American Indian and Alaska Native Mental Health Research

The Journal of the National Center

Volume 17, Issue 2, 2011

Colorado School of Public Health

Centers for American Indian and Alaska Native Health

RESEARCH ASSOCIATES
(Continued)

SOCIOECONOMIC STATUS, PSYCHOLOGICAL DISTRESS, AND OTHER MATERNAL RISK FACTORS FOR FETAL ALCOHOL SPECTRUM DISORDERS AMONG AMERICAN INDIANS OF THE NORTHERN PLAINS

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Abstract: The relationship of selected demographic, socioeconomic status (SES), and psychological characteristics was examined in interviews with 176 Northern Plains American Indian mothers whose children were referred to diagnostic clinics for evaluation of developmental disabilities, including fetal alcohol spectrum disorders (FASD). Thirty-nine mothers had children diagnosed with an FASD (Group 1), 107 had children who were not diagnosed with an FASD or other major disability (Group 2), and 30 additional mothers with normally performing children, matched by age, sex, and reservation with those diagnosed with an FASD, were recruited as a comparison group (Group 3). Analysis revealed statistically significant differences ($p \leq .001$) in alcohol consumption among all three groups, and a statistically significant difference in the mean Total Distress score among the three groups of mothers, $F(2, 176) = 9.60$, $p < .001$, with Group 3 having a lower mean score than Groups 1 and 2. Sequential regression analysis revealed that the quantity of alcohol consumed prior to knowledge of pregnancy, when combined with SES and Total Distress, was more highly associated with having a child diagnosed with an FASD ($R^2 = .206$) than was quantity of alcohol consumed alone.

INTRODUCTION

Numerous studies on alcohol-related birth defects have concluded that maternal drinking, compounded by other risk factors, leads to fetal alcohol syndrome (FAS). FAS is a serious birth defect and the most common non-genetic cause of mental retardation (Hankin, 2002; Abel & Sokol, 1986; O'Connor, Kogan, & Findlay, 2002; May & Gossage, in press). It is unknown how much maternal alcohol consumption results in FAS or other related disorders, or why some women who drink are at substantially higher risk of giving birth to a child with alcohol-related disabilities than others (Stratton, Howe, & Battaglia, 1996). However, researchers have identified several maternal

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risk factors differentially associated with FAS. These include advanced maternal age, number of pregnancies, previous births of a child with FAS, cohabitation with a male partner who drinks heavily, and low socioeconomic status (SES; May et al. 2004; 2008a; Viljoen et al., 2002).

FAS research has identified mild to severe adverse effects of prenatal alcohol exposure, many of which form a spectrum of structural anomalies, behavioral problems, and neurocognitive disabilities. This continuum of effects is referred to as *fetal alcohol spectrum disorders* (FASD; Hoyme et al., 2005). The four diagnostic categories included in the Institute of Medicine definition of the continuum are FAS, partial FAS (PFAS), alcohol-related neurodevelopmental deficits (ARND), and alcohol-related birth defects (ARBD; Stratton et al. 1996). Children with a complete phenotype at the severe end of the continuum of FASD have FAS (Hoyme et al., 2005). Estimates of the number of live births in the U.S. that meet the diagnostic criteria for FAS range from 0.3 to 3 per 1,000 (O'Connor et al., 2002; Stratton et al., 1996; Abel, 1995; May & Gossage 2001b); one more recent estimate is as high as 2 to 7 per 1,000 for FAS, and 20 to 50 per 1,000 for FASD in the general U.S. population (May et al., 2009). Children with less severe phenotypes on the FASD continuum present a diagnostic challenge, because their physical features are more subtle. All children with an FASD display a characteristic pattern of behavioral or cognitive abnormalities typical of prenatal alcohol exposure (Hoyme et al., 2005), e.g., poor executive functioning, increased activity levels, problems in inhibition, and motor and memory problems (O'Connor et al., 2002; Kodituwakku, Kalberg, & May, 2001). Therefore, maternal alcohol consumption poses a serious risk to pre- and postnatal human development.

Some of the first studies on FAS anywhere involved American Indians (AIs; May et al., 1983; May, McCloskey, & Gossage, 2002). Generally, rates of FAS and other FASD were found to be high in some tribal communities, but low to non-existent in others. In all, high-rate communities averaged 8 to 9 cases of FAS per 1,000 live births; the rate of FASD did not exceed 30 per 1,000 in any one community studied at one period of time (May et al., 2002).

This study was conducted to identify the relationship of selected demographic and behavioral characteristics to current psychological distress levels among AI mothers who have given birth to children with an FASD. Special diagnostic clinics were held in seven different sites in the Northern Plains to screen and diagnose referred children who might meet criteria for an FASD or other disabilities. Data from structured maternal interviews identified and examined mothers' marital status, age, socioeconomic status, gravidity, parity, current and past drinking patterns, and symptoms of current psychological distress. We hypothesized that these factors would be associated with higher self-reported prenatal drinking levels in mothers whose children were referred for problems and diagnosed with an FASD than among (a) mothers whose children were referred but

not diagnosed with an FASD and (b) comparison mothers whose children were not referred and did not have problems. The assumption was that psychological distress might be associated with the birth of children with an FASD.

The FAS-specific literature and the general literature on women and alcohol provide insight into maternal drinking during pregnancy. Mothers who drink alcohol during pregnancy are less responsive and less stimulating in their parent/child interactions, and are often under stress. These factors may result in their children's insecure attachment (Kelly, Day, & Streissguth, 2000). The importance of screening pregnant women and new mothers for stress is underscored by the fact that many mothers (40%), especially those from low SES groups, meet clinical criteria for depression (Anhalt, Telzrow, & Brown, 2007). Depressed mothers who are less sensitive and engaged with their children than nondepressed mothers reportedly interact with their infants in a more negative manner (McCarty & McMahon, 2003).

Research on alcohol use and abuse trends among AIs is valuable for a general understanding of the study population. Although there is a lower overall prevalence of drinking among some AI tribes than among the general U.S. population, some AI women who drink are heavy drinkers (May, 1996). A study of a random sample of 1,436 enrolled members from four tribes in the northern U.S. described the quantity, frequency, and variability of their alcohol and other substance use. On a typical day, abstinence from alcohol was the pattern for both men and women (May & Gossage, 2001b). However, those who did drink drank large amounts over a short period of time, resulting in high blood alcohol levels. The mean quantity of drinks consumed, reported by males, was 9 drinks per drinking day; for females, it was more than 5 drinks per drinking day. Frequency of drinking was reported as 4.7 drinking days in the past month for males, and an average of 2.1 days for females. Therefore, on most days, respondents consumed no alcohol at all, but drinking days were characterized by heavy drinking. Regarding variability in drinking behavior, males reported having 5 or more drinks (binge drinking) on 3 days in the prior month, whereas females reported 1.3 days of heavy drinking in the past month (May & Gossage, 2001b). Therefore, one major risk factor for FASD among Northern Plains women is the quantity of alcohol consumed per occasion, rather than the frequency of drinking.

METHODOLOGY

Recruitment Strategies

Participants in the current study were, by design, mothers from several AI tribal backgrounds whose children were referred to special diagnostic/developmental clinics in six rural AI community sites and one urban site in the Northern Plains. The participating mothers were the biological mothers

of the children participating in the clinics. The mothers were recruited from a database maintained for a larger study, which was an ongoing Fetal Alcohol Syndrome Epidemiology research project to determine (via the diagnostic/developmental clinics) the prevalence of FASD in AI communities in the Northern Plains.

A total of 985 children were referred to the clinics. Their ages ranged from 2 months to 17 years. Children were referred either by school or health officials, child protection agencies, or parents because of (1) concerns with inadequate growth, (2) behavior or learning problems, (3) a previous diagnosis of an FASD, (4) a previous diagnosis of a sibling with an FASD, or (5) concerns about the mother's possible drinking during pregnancy.

The diagnostic process utilized all four of the fetal alcohol spectrum diagnoses: FAS, PFAS, ARND, and ARBD (Hoyme et al., 2005). All domains of the diagnostic criteria were considered in the diagnosis: physical growth and dysmorphology, psychological traits, behavior, and maternal risk factors. Final diagnoses were made via a formal, structured case conference with data from clinicians who performed the diagnostic tests for each domain, a pediatric dysmorphologist, an educational diagnostician, and a maternal interviewer.

A total of 293 mothers were included in the larger study database and accounted for the 985 referred children; all but 9.2% were AI. For the current study, mothers were contacted by a project staff member who resided in the same community, and consent for the interviews was requested. Virtually no mothers refused the interview; most of those who did not participate had either moved from the area, had lost custody of their children, or were deceased.

A total of 176 mothers participated in the current study. From this sample, for the purpose of analysis, if her child had been diagnosed with an FASD, the mother was placed in Group 1. If the child had been referred for one of the above problems but not diagnosed with an FASD, the mother went into Group 2. A variety of methods, described below, was used to recruit control mothers for Group 3.

It is important to note that this study and the findings reported here utilized a case control perspective. The comparison mothers are considered controls because their children did not have the study condition, an FASD. The terms "control" and "comparison" are used interchangeably in this article.

To recruit control mothers, notices were placed in newspapers and posted at health facilities and on public bulletin boards seeking typically developing children and their mothers to participate in a developmental clinic. While recruiting controls, project staff asked families if their children had any known developmental disabilities, or were receiving special education services; if so, the children and their mothers were excluded from the study. Control children were matched by tribal community, school, age, and gender with the children who had been diagnosed with an FASD. The

mothers of the control children, who became the subjects of this study, had no drinking history during pregnancy and expressed no concerns regarding their children's growth and development; their children were confirmed normal in the diagnostic clinics described above.

Selected information for this paper was obtained from a 230-item maternal questionnaire that covered basic demographic information; general health and medical history; amount and frequency of alcohol consumption at different times in the mother's life; and family and close friends' drinking history.

Alcohol Intake and Demographic Measures

Responses to the following interview questions on the quantity, frequency, and timing of alcohol use prior to knowledge of pregnancy were used to assess alcohol intake: (1) On the days you drank alcohol, how many drinks did you usually drink? (2) How often did you drink this amount? and (3) How far along were you (in your pregnancy) when you found out that you were pregnant? Demographic measures, such as age, education, occupation, and marital status, were included in this same questionnaire.

Psychological Distress

Psychological distress was assessed in the questionnaire with the use of the Self-Report Symptoms Checklist (SSCL-51), developed by Uhlenhuth et al. (1983) to measure common psychological symptoms. It is a slightly modified version of the 58-item Hopkins Symptom Checklist by Derogatis et al. (1974). To our knowledge, this checklist had not been used previously with an AI/AN population; however, it was chosen because it consists of general (i.e., not culturally specific) statements about individual traits. The total score represents a self-report of how much distress a person has experienced in the past month. Symptom subscale scores indicate the ways and the extent to which the person is distressed (e.g., not at all, a little, or a lot). The symptoms are categorized into nine dimensions: somatic anxiety, decreased energy and interest, depressed mood, hostility, anxious mood, panic/phobia, impaired cognitive functions, sleep disturbance, and appetite disturbance. Derogatis et al. (1974) reported that the internal consistency reliability coefficients of the dimensions ranged from .84 to .87. Item-total score correlations were calculated for each dimension, and all were above .50, with most at about .70, indicating substantial shared common variance among the items in the original 58-item checklist.

Data Analysis

All data were entered, and statistical analyses performed, using SPSS for Windows, version 14.0. Initial internal analyses for each measure were conducted, providing descriptive statistics for each defined item, score, and category for the sample subgroups. Intercorrelations of scores within and across variables were conducted for meaning as well as to determine specific measures for subsequent analyses. Correlations, analysis of variance (ANOVA), and regression were used. Descriptive statistics provided a check on whether specific scores met the analytic assumptions.

RESULTS

Selected Maternal Background Characteristics

Selected background characteristics are found in Table 1. The sample consisted of 176 mothers who lived in one of the seven sites, and were categorized into three groups. Of the referred mothers (n = 146), 39 had children diagnosed with an FASD (Group 1), and 107 mothers had children without an FASD diagnosis (Group 2); 30 mothers were selected as comparisons/controls (Group 3).

Table 1
Maternal Background Information: Referred Mothers and Comparison Mothers (N = 176)

	Group 1: Mothers of children with FASD (*n* = 39)	Group 2: Mothers of children without FASD (*n* = 107)	Group 3: Control/ comparison mothers (*n* = 30)	*F*-test	*p*
Age					
Age on day of interview, mean (SD)	33.1 (6.24)	30.4 (7.75)	31.3 (5.83)		ns
Age at birth of target child, mean (SD)	25.8 (6.72)	23.7 (5.78)	24.2 (4.60)		
Marital Status					
Married (%)	25.6	22.4	30.0		
Divorced (%)	7.7	0.0	3.3		ns
Separated (%)	2.6	2.8	3.3		
Single (%)	25.6	33.6	20.0		
Living w/partner (%)	38.5	41.1	43.3		

Table 1, Continued
Maternal Background Information: Referred Mothers and Comparison Mothers (N = 176)

	Group 1: Mothers of children with FASD (n = 39)	Group 2: Mothers of children without FASD (n = 107)	Group 3: Control/ comparison mothers (n = 30)	F-test	p
SES					
Business managers (%)	0.0	1.9	3.3		
Administrative (%)	2.6	3.7	26.7		
Clerical/Sales (%)	7.7	6.5	26.7		
Skilled labor (%)	0.0	0.0	3.3	$F(2, 174) = 14.17$	$p < .001$
Semi-skilled (%)	30.8	15.9	10.0		
Unskilled/unemployed (%)	43.6	43.9	16.7		
Homemaker (%)	2.6	6.5	3.3		
Student/disabled (%)	10.3	20.6	10.0		
Educational Level					
Less than 7th grade (%)	0.0	0.9	0.0		
7th to 9th grade (%)	25.6	8.4	0.0		
10th to 11th grade (%)	20.5	31.8	0.0	$F(2, 173) = 12.67$	$p < .001$
HS diploma or GED (%)	25.6	38.3	40.0		
Some college (%)	25.6	16.8	53.3		
College graduate (%)	2.6	2.8	3.3		
Graduate school (%)	0.0	0.9	3.3		
Parity, mean (SD)	4.1 (1.7)	3.5 (1.8)	2.8 (1.3)	$F(2, 176) = 4.88$	$p < .006$
Gravidity, mean (SD)	5.1 (1.9)	4.4 (2.2)	3.7 (1.5)		ns

Referred and comparison mothers were similar in age at interview and at the birth of the target children. The data show that 38.5% of mothers in Group 1, 41.1% in Group 2, and 43.3% in Group 3 were unmarried and living with a partner, indicating no significant difference in marital status.

Mothers' SES was defined by using the one-step method for the Hollingshead scores (Hollingshead, 1957), based on occupational status (e.g., unemployed, homemaker, student, disabled) and type of occupation, if any. The majority of Group 1 and 2 mothers (43.6% and 43.9%, respectively) reported that they were in the occupational category of unemployed/unskilled, compared to 16.7% of Group 3 mothers. Overall ANOVA was not significant; however, post hoc analysis

revealed significantly higher SES in the control group than in the two referred groups. Among the three groups, 46.1% of Group 1 mothers, 41.1% of Group 2 mothers, and 0% of Group 3 mothers reported that they had not completed high school. Similarly, overall ANOVA was not significant and post hoc analysis revealed significance between the control group and the two referred groups.

Parity (number of live births) was highest among mothers of children with an FASD (Group 1) and differed significantly compared to controls (Group 3; $p < .006$). Post-hoc analysis revealed no significant difference in mean parity between the two groups of referred mothers. Mean gravidity (total number of pregnancies) also was highest among Group 1 mothers. Group 2 mothers had fewer pregnancies, but post-hoc analysis revealed no significant differences in gravidity among the three groups.

Children

From the total maternal sample (N = 176), 306 children were screened: 143 females (46.7%) and 163 males (53.3%), with an age range from 2 months to 17 years. Of these children, 94 (30.7%) were from referred mothers who had at least one child diagnosed with an FASD (Group 1); 50% were female, with a mean age of 78.34 months ($SD = 49.58$). One hundred seventy-seven (57.8%) were from referred mothers whose children did not have an FASD diagnosis (Group 2); 44.6% were female, and the mean age was 79 months ($SD = 49.1$). Thirty-five (11.4%) children were born to control mothers (Group 3); 48.6% were female, and the mean age was 82.86 months ($SD = 44.23$).

Alcohol Consumption Prior to Known Pregnancy

In Table 2, alcohol consumption is reported as the number of drinks consumed per month prior to knowledge of pregnancy. Of the Group 1 mothers, 30 out of 39 (76.9%) reported drinking before they knew they were pregnant, and provided the amount of alcohol consumed. Nine mothers (23.1%) reported drinking "unknown" amounts of alcohol. Of the Group 2 mothers, 99 out of 107 (93%) reported drinking and provided the amount of alcohol consumed; 8 others (7%) reported "unknown" amounts of alcohol.

Table 2
Mean and Standard Deviation of Reported Number of Drinks per Month
Prior to Knowledge of Pregnancy for the 3 Groups of Mothers (N = 159)

	Group 1 (n = 30)		Group 2 (n = 99)		Group 3 (n = 30)		ANOVA	p
	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD		
Drinking amount per month	173.58*	256.68	59.65**	130.37	16.19	52.43	F(2, 159) = 8.917	p < .001

Asterisks indicate significant post-hoc pairwise comparison between groups adjusted using Bonferroni techniques
*Group 1 (children diagnosed with FASD) was found to differ significantly from both Group 2 (no diagnosis of FASD) and Group 3 (comparison group)
**Group 2 was significantly different from Group 3 (comparison group)

ANOVA results revealed significant differences in reported alcohol consumption among the three groups, especially between Group 1 mothers and mothers in the other two groups. Group 1 mothers reported the highest alcohol consumption and gave birth to 47 affected children (an average of 1.2 affected children per mother). There were 21 children diagnosed with FAS, 20 with PFAS, 5 with ARND, and 1 with ARBD.

Psychological Distress

Using the SSCL-51 to assess mothers' overall levels of distress and the incidence of common psychological symptoms of distress, a Total Distress score (range, 0-102) was obtained. Nine symptom subscale scores indicate type and extent of distress. Symptoms were scored from 0 (*not at all*) to 2 (*a lot*). Table 3 presents the mean scores, standard deviations, and multivariate ANOVA (MANOVA) for the average Total Distress score and symptom subscale scores among the three groups of mothers. Experimentwise alpha = .05 was achieved by setting alpha for each test at .005, adjusted for the number of scales.

Table 3
Mean Scores, Standard Deviations, and MANOVAs
for the SSCL-51 Total Distress Score and Symptom Subscale Scores

	Group 1 (n = 39)		Group 2 (n = 107)		Group 3 (n = 30)		F-test (2, 176)	p
	$\overline{X}$	SD	$\overline{X}$	SD	$\overline{X}$	SD		
Total Distress	31.74	(20.42)	27.24	(22.83)	11.00	(8.90)	9.60	<.001*
Symptoms								
Somatic Anxiety	.46[1]	(.38)	.36[1]	(.45)	.16[2,3]	(.21)	4.42	.013
Decreased Energy	.71[1]	(.58)	.57	(.54)	.33[3]	(.30)	4.47	.013
Decreased Mood	.72[1]	(.46)	.68[1]	(.58)	.25[2,3]	(.29)	9.05	<.001*
Hostility	.70[1]	(.49)	.62[1]	(.49)	.25[2,3]	(.27)	9.43	<.001*
Anxious Mood	.65[1]	(.45)	.56[1]	(.53)	.26[2,3]	(.27)	6.29	.002*
Panic/Phobia	.43[1]	(.47)	.40[1]	(.49)	.04[2,3]	(.08)	8.54	<.001*
Impaired Cognition	.62[1]	(.53)	.47[1]	(.48)	.10[2,3]	(.14)	11.3	<.001*
Sleep Disturbance	.70	(.68)	.67	(.66)	.40	(.51)	2.57	.079
Decreased Appetite	.64[1]	(.51)	.43	(.51)	.33[3]	(.37)	3.34	.038

*$p < .005$ (for the SSCL-51 symptom subscales, the adjusted alpha = .005, 2-tailed test)
[1,2,3] Indicate significant post-hoc pairwise comparison between groups using Bonferroni adjustment
    of significance ([1] = Comparison group, [2] = No FASD group, [3] = FASD group)

Total Distress Score

As shown in Table 3, the referred mothers (Groups 1 and 2) had higher distress than the comparison mothers (Group 3). Group 1 mothers had the highest level of distress (31.74). MANOVA and post-hoc analysis revealed a significant difference in Total Distress between the comparison mothers (Group 3) and the referred mothers (Groups 1 and 2), but not between Group 1 and 2 mothers.

Distress Symptom Subscale Scores

Table 3 also provides the mean score (0, 1, or 2) for each symptom subscale for the three groups, indicating the frequency of each stress symptom. Sleep disturbance was most commonly reported. Group 1 mothers reported that distress occurred with decreased mood, decreased energy,

hostility, and sleep disturbance. Group 2 mothers reported that distress occurred with decreased mood, sleep disturbance, and hostility.   Group 3 mothers cited distress with sleep disturbance, decreased energy, and decreased appetite.

The correlation of each symptom subscale score with other symptom subscale scores and with the Total Distress score was moderately high to high. Table 4 provides data on the correlations between the symptom subscale scores and with the Total Distress score. Decreased mood and anxious mood correlated most highly with Total Distress, and sleep disturbance the lowest.

Table 4
Correlation of the SSCL-51 Symptom Subscale Scores and the Total Distress Score (*N* = 176)

	Somatic anxiety	Decreased energy	Decreased mood	Hostility	Anxious Mood	Panic/ Phobia	Impaired Cognition	Sleep Disturbance	Decreased Appetite	Total Distress
Somatic Anxiety	1.00	.714*	.678*	.625*	.741*	.727*	.679*	.554*	.645*	.854*
Decreased Energy	--	1.00	.787*	.646*	.740*	.691*	.713*	.516*	.592*	.872*
Decreased Mood	--	--	1.00	.709*	.802*	.690*	.710*	.590*	.607*	.899*
Hostility	--	--	--	1.00	.656*	.606*	.685*	.464*	.497*	.802*
Anxious Mood	--	--	--	--	1.00	.780*	.716*	.613*	.618*	.899*
Panic/ Phobia	--	--	--	--	--	1.00	.748*	.492*	.535*	.856*
Impaired Cognition	--	--	--	--	--	--	1.00	.530*	.595*	.859*
Sleep Disturbance	--	--	--	--	--	--	--	1.00	5.04*	.662*
Decreased Appetite	--	--	--	--	--	--	--	--	1.00	.704*
Total Distress	--	--	--	--	--	--	--	--	--	1.00

*Correlations significant at the .001 level (2-tailed)

With the high intercorrelations in mind, we examined whether mothers of children diagnosed with an FASD (Group 1) obtained significantly higher scores than did mothers in Groups 2 and 3 on the nine separate subscales assessed on the SSCL-51. Symptom subscale scores showed a consistent pattern of an average increase in the extent of distress reported by the Group 1 mothers, compared to Group 2 and Group 3 mothers. An omnibus ANOVA and post-hoc analysis (using *p* < .05) indicated significantly higher scores for Group 1 mothers on eight of the nine symptom

subscales when compared to Group 3 mothers, and for six of the nine symptom subscales when compared to Group 2 mothers. Sleep disturbance was the major exception, as it was distributed almost equally across all groups. Group 2 mothers did not receive significantly higher scores than Group 3 mothers in decreased energy and decreased appetite. Group 1 and 2 mothers did not differ significantly in the extent of their symptoms on any of the scales; therefore, all referred mothers (Groups 1 and 2) were essentially equally distressed.

In addition, to prevent alpha slippage and to utilize a more discriminating level of significance, we conducted a MANOVA analysis using a probability level of .005; this analysis indicated statistical significance for five of the nine symptom subscales among the three groups of mothers: decreased mood, hostility, anxious mood, panic/phobia, and impaired cognition.

Combined Alcohol Consumption, SES, and Total Distress

The ultimate goal of this study was to examine potential risk factors (i.e., selected personal and demographic characteristics of mothers) that, in addition to quantity of alcohol consumed prior to knowledge of pregnancy, could increase the likelihood of an FASD diagnosis in offspring. Reported level of distress and SES were selected as the potential risk factors to consider. As shown in Table 5, the quantity of alcohol consumed prior to knowledge of pregnancy, Total Distress score, and SES, taken together, were more highly associated with diagnosis of an FASD than was the single variable of quantity of alcohol consumed. Knowing the quantity of alcohol consumed prior to knowledge of pregnancy produced a 9.6% reduction of error in predicting the birth of a child with an FASD. Knowing both alcohol consumption amount and SES reduced error in predicting an FASD by 16.9%, and adding Total Distress Score reduced error by 20.6%. The combined variables provided a significant increase in predicting which mothers were likely to have children with an FASD.

Table 5
Drinking Prior to Pregnancy, SES, and Total Distress Score as Predictors of Mothers Having a Child with FASD: Sequential Regression (*N* = 176)

Variables	*R*	*R* Square	Adjusted *R* Square	*F*	Sig.
Alcohol	.309	.096	.090	16.365	< .001
SES	.411	.169	.158	15.627	< .001
Total Distress	.453	.206	.190	13.194	< .001

DISCUSSION

This study examined, individually and in combination, the relationship of the quantity of alcohol consumed prior to knowledge of pregnancy and selected personal and background characteristics to the birth of children with an FASD in a sample of 176 mothers. Analyses utilized three groups of mothers: those whose children were diagnosed with an FASD (Group 1), those whose children were not diagnosed with an FASD (Group 2), and controls (Group 3).

Limitations

First, because this study involved questions that were retrospective in nature, that is, requiring the mother to recall alcohol consumption approximately five years after the fact, recall accuracy may at first pose a concern. But the reliability of long-term (5-year) self-report of drinking has been documented through correlations of original and retrospective data, in that heavy drinking may be more accurately reported retrospectively than during pregnancy (May et al., 2008a; Viljoen et al., 2002; Alvik et al., 2006; May et al., 2005; Czarnecki et al., 1990). In fact, a recent study has found that retrospective data collected as long as 14 years after pregnancy are more accurate than similar data collected in the prenatal period (Hannigan et al., 2009).

Second, the present study would have benefited in assessing the validity of the information obtained by using a test-retest method to determine reliability. The maternal interviewer independently conducted an internal audit of the responses after each interview (see Appendix 1). Concerning the veracity of the responses, 5% were believed to be grossly misrepresented due to contradictory information found in the child's chart or obtained from reliable sources. The sampling technique used in this study was nonprobability sampling (specifically, purposive sampling) and the data are cross-sectional and time bound. External validity addresses the question of whether this sample represents the larger population of mothers whose children have an FASD. Because the referred mothers in this study were suspected of drinking during pregnancy or already had at least one child diagnosed with an FASD, they appear likely to be representative of the larger population of mothers whose children have been exposed to alcohol in utero in these Northern Plains communities.

Third, the comparison group is a small, matched, convenience sample and, thus, may not be considered representative of all AI mothers who meet the same group criteria. However, their children were matched by age, sex, and residence to children with an FASD to ensure appropriate comparisons. Furthermore, most of the variables addressed (e.g., SES of most individuals in the participating communities) tended to be robust over time. This finding does not ensure that the need to care for children with an FASD did not cause reduced employment and a subsequent reduction in

SES level. Similarly, low SES and psychological distress may also negatively influence drinking style and alcohol use. But given the cross-sectional nature of the study, we cannot completely speak to these possibilities.

A fourth limitation was the overall small sample size. Because of this, a targeted case control design was used to compare the results for the three groups first via analysis of variance, appropriate for these data. As the results for the comparisons of SES, education level, and drinking behavior were significant and powerful for the three groups, and also for SSCL-51 scores between categories, moving on to more sophisticated analysis was warranted.

Despite these possible limitations, the authors believe that the study findings are consistent with axiomatic expectations and provide an accurate examination of the relationship of maternal characteristics to the birth of children with an FASD.

Selected Maternal Demographics

In general, the findings from this study are similar to previous findings on associations with FASD: high parity, single/cohabitation status, and low SES (May et al., 2005). As reported in previous studies of maternal risk for FASD, mothers of children with an FASD in this study had higher parity rates than the other two groups (Kvigne, et al., 2003; May, et al., 2005, 2008a) and were more likely to be single or living with a partner than were controls (May et al., 2008a; Kivgne et al., 1998); low education level was also present as a risk factor for FASD (O'Connor et al., 2002; May et al., 2005, May et al., 2008a).

Abel & Hannigan (1995) have identified low SES, which can lead to poor nutrition and stress, as a primary risk factor for FASD. They also noted examples of FASD occurring in predominantly low-SES populations, regardless of race. The first cases of children diagnosed with FAS by Jones and Smith (1973) involved mothers receiving welfare. Other studies of children with an FASD, where the participants were equally divided by race, also were characterized by poverty, with family income averaging less than $400/month (Abel & Hannigan, 1995). It is possible that low-SES populations are more often targeted for FASD research; however, other studies comparing low- and high-SES groups show similar results. One study by Bingol et al. (1987) compared two groups of women with alcoholism from different social strata. Each group of women drank an average of 6 ounces of absolute alcohol a day (12 drinks), yet the women of low SES were 16 times more likely to give birth to children with an FASD than were the upper middle-class women. Findings from South Africa also illustrate that mothers of children with an FASD had lower incomes than controls, and suffered poorer nutrition and lower body mass index (May et al., 2005, 2008a; Viljoen et al., 2002). All of the above findings are consistent with this study and suggest that low SES, along with co-factors such as stress and poor nutrition, is significantly associated with FASD.

When combined with heavy drinking, advanced maternal age has been reported as a risk factor for FASD (Hankin, 2002; May et al., 1983). In this study, the mean age of referred mothers whose children had an FASD, although slightly older at the time of delivery than that of comparison mothers, did not differ significantly from that of referred mothers whose children did not have an FASD. The comparison mothers, however, reported consuming less alcohol.

Alcohol Consumption

Drinking prior to knowledge of pregnancy proved to be a useful measure of alcohol consumption. Mothers whose children had an FASD reported drinking significantly more alcohol prior to knowing they were pregnant than mothers in the other two groups, which suggests a high likelihood of continuing an increased level of drinking during pregnancy. Group 1 mothers reported a mean of 9.1 weeks before they knew that they were pregnant, compared to 7.6 and 5.8 weeks, respectively, for the Group 2 and Group 3 mothers. Thus, even if mothers quit drinking once they learned they were pregnant, the children with an FASD were exposed to alcohol longer in utero. We also know from other questionnaire items that most of the Group 1mothers did not quit, but drank throughout pregnancy.

Psychological Distress

Mothers of children with an FASD had higher Total Distress and symptom subscale scores. Maternal psychological distress may increase drinking and/or otherwise negatively influence the mother-child relationship, placing children at risk for later developmental and emotional problems. Previous findings indicate that children whose mothers reported moderate to heavy alcohol consumption during pregnancy had significantly higher levels of depressive symptoms than children of light drinkers or abstainers (O'Connor & Paley, 2006). Also, mothers with depression lasting for years after giving birth may place their children at risk for lower cognitive and language functioning and behavioral problems during formative years (Anhalt, Telzrow, & Brown, 2007). In one study of 100 randomly selected AI adults, Parker et al. (1997) found that 18% seeking primary care at an urban Indian Health Service clinic met full criteria for a mental health disorder, and 17% met the subthreshold for a mental disorder. The most frequently diagnosed disorders were alcohol abuse/dependence, major depressive disorders, and generalized anxiety disorders. With the findings regarding comorbidity in this study, lack of diagnosis and treatment for depression may place future children at risk for an FASD.

The Combined Effect of Alcohol Consumption, SES, and Level of Distress

The sequential regression analysis revealed that the combination of mothers' higher prenatal alcohol consumption, low SES, and higher Total Distress scores was more likely to be associated with children's FASD diagnoses than was mothers' prenatal alcohol consumption alone—11% more. All three of these variables were found to significantly influence the birth of children with an FASD and to explain 20.6% of the variance in FASD diagnosis. The findings suggest that low SES and high distress are influential in combination with prenatal drinking. Thus, it appears important for future research and clinical care to include screening for psychological distress during pregnancy, especially in individuals with low SES and other known maternal risk factors. Information about pregnancy, depression, and drinking might be provided to youths on a routine basis, perhaps in schools, community centers, and health clinics, so that early awareness might lead to prevention.

SUGGESTIONS FOR FUTURE RESEARCH

Despite ongoing prevention efforts, recent studies have indicated that 13% of women continue to drink during pregnancy. This information suggests that at least 1 in 8 fetuses is exposed to alcohol (Hankin, 2002; "Alcohol Use," 2009; O'Conner, & Whaley, 2007). The findings from this study suggest that it is vital for future research to focus on identifying characteristics of prenatal drinking, such as psychological distress, other behavioral components, and SES, to provide a means for appropriate prevention. Once these factors are identified, the directives for prevention and intervention are to change attitudes, lifestyles, stress levels, and behavior during pregnancy. It has been demonstrated that prevention efforts delivered via case management have benefited AI women who have a history of alcohol abuse in pregnancy, and such efforts can be highly effective (May et al., 2008b). The focus of case management is to promote a healthy pregnancy outcome via multiple strategies: establish trust and confidence between mothers and case managers, provide a support network for transportation and health care appointments, ensure proper prenatal care, reduce stress, and motivate women to change (May et al., 2008b). Research that identifies specific personal, behavioral, and social influences on maternal drinking is valuable. Once these factors are identified, the directions for prevention and intervention are clear. FASD is theoretically 100% preventable. This study shows that successful alcohol abuse prevention among AI women must consider their mental health status.

Why some women continue to drink during pregnancy is not fully understood. A vast majority of Northern Plains AI women (88-94%) know about FAS, but many still do not, or cannot, abstain from alcohol when pregnant (May & Gossage, 2001a). Therefore, ongoing studies, especially those that identify children with an FASD, are vital for assessing the characteristics of mothers for

appropriate prevention measures. Future research also should focus on comparing mothers at both extremes of SES and depression—those with low SES and high SES and those with and without depressive symptomotology—to examine further the potential protective factors that influence personal well-being. This current study provides additional evidence that mothers who drink during pregnancy are placing their unborn children at risk of developing FASD.

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APPENDIX 1 – INTERNAL AUDIT QUESTIONS

Sensitive questions regarding quantity, frequency, and timing of alcohol consumption during the pregnancy of the target child, as well as other personal, behavioral, and social factors, were included to help assess the validity of the responses.

1.   Was the information given distorted by the woman's misrepresentation?

Factors considered to measure the accuracy of the responses were the following: Was the information contradictory to the child's chart, such as documentation of intoxication at birth; was the information contradictory with information given from a reliable source; and were there contradictions within the interview?

2.   Was the information given distorted by the risk category of the woman?

Factors that were considered to answer this question were: Is the woman currently drinking and pregnant; is the woman currently drinking and not using birth control; has the woman been abstinent less than one year, but her partner is still drinking and she has not made any positive changes in her social situation; and has the woman had surgical sterilization?

CONCEPTUALIZING NATIVE IDENTITY WITH A MULTIDIMENSIONAL MODEL

John Gonzalez, PhD and Russell Bennett, PhD

Abstract: This study reports on a Native Identity Scale (NIS) adapted from an African American identity scale (Sellers et al., 1997). American Indian (AIs) and First Nations Canadian participants (N = 199) completed the NIS at powwows in the Upper Midwest. The majority of respondents were Ojibwe, but other tribal groups were represented. A principal components factor analysis with varimax rotation revealed four factors important in self-identity: Centrality, Humanist, Public Regard, and Oppressed Minority. The correlation of respondents' scores on items defining the four factors with some aspects of respondents' behavior supports the validity of the factors. It is suggested that the NIS is a promising new tool for the study of identity dimensions in AI populations.

NATIVE IDENTITY: APPLICATION OF A MULTIDIMENSIONAL MODEL

According to Phinney (1990), a clear understanding of the components of ethnic identity is crucial. Phinney states "attitudes toward one's ethnicity are central to the psychological functioning of those who live in societies where their group and its culture are at best poorly represented … and are at worst discriminated against or even attacked verbally and physically" (p. 499). One group that has historically been impacted psychologically by discrimination is American Indians (AIs). The topic of AI identity has not been extensively studied, but it has been approached from several different perspectives. For example, scholars trained in historical methodology have attempted to describe the issue of who is AI from legal, economic, and political perspectives (Hagan, 1985 and Nagel, 1996). (In addition, see Trimble, 2000 and Trimble & Thurman, 2002 for succinct reviews of historical and contemporary problems in defining and identifying North American Indigenous people, and Peroff, 1997 for a discussion about the idea of Indianness and what it has meant for Native and non-Native people). Anthropological research has investigated the acculturation aspect of AI identity (see Choney, Berryhill-Paapke, & Robbins, 1995 and LaFromboise, Coleman, &

Gerton, 1993 for reviews). Most recently, psychological research has investigated the ethnic and cultural identity[1] of AI persons, particularly adolescents (Moran, Fleming, Somervell, & Manson, 1999; Oetting & Beauvais, 1990-91; Oetting, Swaim, & Chiarella, 1998; Trimble, 2000).

Trimble, Helms, and Root (2003) and Trimble and Dickson (2005) provided an extensive review of the ethnic and racial[2] identity literature from a social psychological perspective. It is evident from these reviews that there is limited empirical research on AI identity compared to that of other groups. Furthermore, most empirical research on AI identity focuses on cultural identity. For example, Oetting and Beauvais (1990-1991) proposed the Orthogonal Cultural Identification Theory (OCIT) which posits that identification with any one culture is independent of identification with any other culture.   The OCIT assumes that an individual's position along a continuum of identification with one culture implies nothing about the individual's position along a continuum of identification with another culture. An individual may have any combination of degree of identification with two or more cultures. Subsequent research by Oetting, Swaim, et al. (1998) and Moran et al. (1999) further validated the factor structure and validity of this type of bicultural or multicultural identity construct. (See LaFromboise et al., 1993 and Oetting & Beauvais, 1990-1991 for reviews on acculturation and bicultural identity models.) The application of these models was demonstrated by Whitbeck and colleagues (2001, 2002); they reported that AI youth may be protected through enculturation processes and by having a bicultural sense of identity. The authors also discussed how AI youth can benefit academically by identifying with and participating in their traditional cultures, which suggests a sense of biculturalism.

Trimble (2000) has proposed a four-part ethnic identity measurement model, which has been followed, in part, by cultural identity researchers (e.g. Oetting & Beauvais, 1990-91; Moran et al., 1999). This measurement model proposes that the assessment of ethnic identity needs to include at least four domains: natal, subjective, behavioral, and situational. Natal measures include birthplace and ethnic origins of self and family members. Subjective measures can include self-identification, acculturation status, ego-involvement in group, and attitudes towards out-groups. Behavioral measures can include language use, music and food preferences, and participation in cultural and religious activities. Finally, situational-context measures can include home-family, work, or school settings. Research on cultural identity has primarily assessed the behavioral domain of Trimble's model. Therefore, cultural identity can and should be considered a behaviorally focused identity. In essence, it is a behavioral manifestation of one's ethnic identity. While the assessment of cultural identity in AI persons has proven useful (Moran et al., 2000; Oetting and Beauvais, 1990-91; Oetting, Swaim, et al., 1998), there is limited research investigating the *development* of cultural identity and ethnic identity within AI populations.

Trimble et al. (2003) make the salient point that ethnic identity is multidimensional and that research using only single constructs to measure ethnic identity will have shortcomings. Furthermore, Oetting, Donnermeyer, Trimble, and Beauvais (1998), discussed the multiple socializing agents, such as culture, communities, families, schools, and peers, that affect ethnic and cultural identity. These socializing agents most likely interact with and influence several components of AI self-identity. However, we believe the cultural identification models described above mostly tap the behavioral measures domain of ethnic identity. Furthermore, we believe that cultural identity, though related to ethnic identity, is a separate construct and should be considered as a behavioral component of ethnic identity. While research investigating the cultural identity of Native people and the correlates of that construct has demonstrated different outcomes, more fundamental work needs to be done to investigate the unique components leading to the different developmental pathways of ethnic and cultural identity.

Another area of research on racial identity may provide further insights into the complexity of cultural identity development. Sellers, Rowley, Chavous, Shelton, and Smith (1997) proposed the Multidimensional Model of Racial[2] Identity (MMRI) as a composite theoretical approach for understanding identity. Initially proposed for African American identity, the MMRI provides an empirical strategy for studying other racial and ethnic group identities, such as AI identity. Rather than being concerned with the development of racial or ethnic identity, the MMRI is principally interested in the status of an individual's ethnic identity and what the qualitative meaning of a group membership is within the person's self-concept. In a later article, Sellers, Smith, Shelton, Rowley, and Chavous (1998) put forth two questions that the MMRI attempts to address: "How important is race in the individual's perception of self?" and "What does it mean to be a member of this racial group?" (p. 23). The MMRI assumes that an individual possesses a number of hierarchically ordered, race-related identities and that these identities are both stable properties and subject to situational influence. The most valid indicator of ethnic identity is assumed to be the individual's own perception. Individual differences are expected to exist in the meaning of ethnic identity. Furthermore, the MMRI does not place a value judgment about what is healthy or unhealthy as a racial or ethnic identity.

Sellers et al. (1997) proposed four dimensions along which racial or ethnic identity is expected to vary. The first dimension, Centrality, is a measure of the extent to which "race is a core part of an individual's self-concept" (p. 806). A second dimension, Ideology, represents the minority person's beliefs regarding how they should interact with their own and other groups in society. Ideology is divided into four components, each of which is a set of political attitudes about one's own group and other groups. The Nationalist component emphasizes the importance of one's own racial descent. The Oppressed Minority component emphasizes solidarity and communalities

across many oppressed groups. The Assimilationist component emphasizes the view that integrating one's own ethnic group into the rest of society is important. The Humanist component emphasizes communalities among humans regardless of ethnicity.

The third dimension of the MMRI, Regard, represents affective and evaluative judgments of one's own ethnicity. Regard has two components: Private, the extent to which one feels positively or negatively about his/her own ethnic group, and Public, the extent to which a minority person believes that others evaluate his/her ethnic group positively or negatively.

The final dimension of the MMRI is Salience, the extent to which ethnicity is a relevant part of identity at a particular point in time. Salience is unlike the other three dimensions in that it is situational in nature. Salience can be strengthened or weakened by events in the person's social environment, and its strength will affect the importance of the other three dimensions.

To evaluate the MMRI, Sellers et al. (1997) created an instrument, the Multidimensional Inventory of Black Identity (MIBI), which consisted of items designed to tap each of the dimensions and dimensional components. They reported the results of factor analyses and instrument revision which essentially support the assumptions made by the MMRI (Sellers et al., 1997).

Evidence for the construct validity of the factors identified in Sellers et al.'s (1997) analyses was provided by the relationships observed between the scales and ethnic-related behaviors. For example, more contact with African Americans was positively correlated with the Centrality, Private Regard, and Nationalist scores, while more contact with Anglo Americans was negatively related to the Centrality and Nationalist scores. Moreover, having an African American best friend resulted in higher scores on Centrality and Nationalism and lower scores on Assimilation, Humanist, and Minority Ideology scales.

While Sellers et al. (1998) originally intended for the MMRI to describe African American identity, they suggested that the dimensions of Centrality and Salience, in particular, may be relevant to identity in other racial and ethnic groups. These authors cautioned that the four components making up the Ideology dimension were based specifically on African American historical and cultural experiences and may not be relevant to other ethnic groups. While each racial, ethnic, and cultural group does have its own experiences, the experiences of African Americans and AIs may be similar in terms of forced relocations and cultural suppression. We hypothesize that the MMRI (and the MIBI items derived from it) may serve as a valuable starting point for describing ethnic identity in AI groups. To this end, we modified the MIBI to develop the Native Identity Scale (NIS), an instrument that may be useful in assessing dimensions of AI identity. We also suggest that there may be a dynamic relationship between the potential dimensions of AI identity revealed from this

work and the socialization agents of culture, community, family, and peers described by Oetting, Donnermeyer et al. (1998), that may allow us to further understand the links between identity and behavioral outcomes.

METHODS

Setting for data collection

Data were collected over a two-and-a-half-month period at seven powwows in Minnesota, Wisconsin, and Michigan. Powwows are social gatherings where Native people come together through song and dance. Powwows are not necessarily religious events; rather, they are occasions for Native people to socialize, and these events have become a social institution among Native peoples. Nearly all Native tribes in the United States and Canada hold powwows, which are inter-tribal and thus are attended by members of a variety of tribal groups. Powwows were selected as sites for recruiting participants for several reasons. First, they provided a convenient location where a large number of Native people were present. Second, we believed that the atmosphere of the powwow would enhance the saliency of Native identity. Third, we believed that the powwow situation likely would permit Native people to feel more comfortable responding to a questionnaire than they would in a more formal data collection environment. The respective powwow committees granted approval prior to data collection.

Participants

One hundred ninety-nine people completed the questionnaire. Table 1 summarizes the participant characteristics on a number of variables. The largest tribal group represented was Anishinaabe (79.9%). (Anishinaabe people include the Ojibwe, Potowatomi, Odaawa, Menominee, and Cree.) Lakota/Dakota people made up 6.5% of the respondents, and 9.5% were members of other tribes. Eight participants (4.1%) did not list a tribal affiliation, and thus were not included in the analyses. A second tribal affiliation was listed by 16% of the participants. U.S. citizens made up the majority of the participants (96%); the rest were First Nations[3] (Canadian) citizens (4%). Many of the respondents were involved in specific powwow activities, with 27% identifying themselves as singers and 43% identifying themselves as dancers. These activities are not mutually exclusive, so a given participant might be represented in both percentages. A table was supplied by the respective powwow committees, and powwow participants were asked by the researcher to voluntarily complete the questionnaire as they walked through the vendor areas. Because the researcher was also AI and participated in the powwows, the survey table was not staffed continuously. Data were collected

for approximately one hour before and two hours after Grand Entry ceremonies (Grand Entries typically occur once on Friday evening and twice on Saturday and Sunday). Nearly all powwow attendees who passed by the table were asked to complete the questionnaire. As is the case in this type of sampling approach, refusal rates were moderate at about 30% to 40%.

Table 1
Descriptive Statistics of Participant Characteristics

Variable	N	%	*M*	*SD*
Tribal Affiliation				
Anishinaabe	159	79.8		
Lakota/Dakota	13	6.5		
Other	19	9.5		
Gender				
Male	113	56.8		
Female	77	38.7		
Age	-	-	35.90	12.79
Education				
College grad	47	23.6		
Some post HS	81	40.7		
HS or less	62	31.2		
Dancers	85	42.7		
Singers	53	26.6		
Powwows attended	-	-	9.28	6.85

Note: Anishinaabe people include the Nations of Ojibwe, Cree, Menominee, Pottawatomi, and Odaawa (Ottawa).
"Powwows attended" refers to the number attended by participants during the summer of data collection.

Instrument

To investigate the applicability of the MMRI to Native identity, the 56 items from the revised MIBI (Sellers et al., 1998) were modified by substituting the word "Black" with "American Indian." (Canadian participants received a version of the questionnaire that substituted "Native" for "Black"). Also included were six items written by the authors that were specific to Native culture,

related to issues of language retention, sovereignty, land and treaty rights, and religion or spiritual practices. The response format was a 7-point Likert scale anchored by *strongly agree* (7) and *strongly disagree* (1). Despite the fact that some of the items from the MIBI appeared to be specific to African American culture, the full item pool from the MIBI was included in order to evaluate the overlap in the dimensions of African American and AI identity. In addition, participants were asked their age, gender, and education level; how many powwows they planned to attend during the summer and whether they danced or sang at powwows; how many of their five best friends were non-Native, and how many of the people where they worked were Native. These variables were included because their relationship with the factors that emerged from the analysis could help assess the validity of the instrument.

RESULTS

Factor analysis

A principal components factor analysis with varimax rotation was used to extract the factors. Preliminary analyses were conducted extracting four, five, or six factors. After each of these preliminary analyses, the percentage of variance explained, communalities, eigenvalues, and factor loadings were examined. On this basis, a four-factor solution was determined to be most satisfactory. Four iterations were required to reach the selected solution. Of the original 62 items on the questionnaire, 25 had satisfactory communalities and factor loadings and were retained for the Native Identity Scale (NIS). Communalities of the selected items ranged from .348 to .739. The Kaiser-Meyer-Olkin (KMO) value was good (.815) and Bartlett's Test of Sphericity was highly significant ($p < .0005$). The four factors explained 48.2% (Factor 1, 19.4%; Factor 2, 10.8%; Factor 3, 9.1%; and Factor 4, 8.9%) of the total variance in the NIS. The factors identified were quite distinct in that only 7% of loadings of a factor with items not defining that factor exceeded .200 and none were above .288 (see Table 2).

Nine items made up Factor 1, the Centrality subscale. These items in part reflected the importance of and satisfaction with being Native. Two of the newly written items, which related to the importance of Native language and of treating Native reservations as sovereign nations, loaded on this factor.[3] Higher scores indicate a stronger sense of being Native or that being Native is a central or core part of one's identity. Seven items made up Factor 2, the Humanist subscale. These items involve relationships with non-Natives, with a higher score indicating more acceptance of and commonalities with non-Natives. Four items make up Factor 3, the Public Regard subscale. The items all relate to the way in which AIs believe others perceive them, with a higher score indicating a stronger belief in positive perception by others. Five

Table 2
Factor Loadings of Items from the Native Identity Scale

Item	Centrality	Humanist	Public Regard	Oppressed Minority
I have a strong sense of belonging to AI people	**.857**			
Being AI is an important reflection of who I am	**.825**			
I am proud to be AI	**.759**			
It is important for AIs to surround their children with Native art, music, and literature	**.712**			
Knowledge of AI language is important for AI people	**.701**			
In general, being AI is an important part of my self-image	**.695**			
I have a strong attachment to other AI people	**.645**			
I am happy that I am AI	**.630**			
It is important for AI reservations to be recognized as soverign nations	**.620**		-.266	
AIs should not consider race when buying art or selecting a book to read		**.639**	.217	
AIs should have a choice to marry interracially		**.622**		
AIs should not marry interracially		**-.603**		
AIs should judge Whites as individuals and not as members of the White race		**.572**		
White people can never be trusted where AIs are concerned		**-.568**		.227
AIs and Whites can never live in true harmony because of racial differences		**-.567**	.288	
AIs and Whites have more things in common than they have differences		**.538**		
In general, others respect AI people			**.781**	
In general, other groups view AIs in a positive manner			**.772**	
Overall, AIs are considered good by others			**.608**	
Society views AI people as an asset			**.574**	
The struggle for AI sovereignty in America should be closely related to the struggle of other oppressed groups				**.788**
AIs should learn about the oppression of other groups				**.632**
There are other people who experience racial injustice and indignities similar to AIs				**.596**
AIs will be more successful in achieving their goals if they form coalitions with other oppressed groups				**.581**
The racism AIs have experienced is similar to that of other minority groups		.268	.231	**.558**

Note: Only items loading above .200 are shown.
          Boldface items indicate the factor on which the item loaded.

items made up Factor 4, the Oppressed Minority subscale. These items relate to Native people's sense of solidarity with other oppressed groups, with a higher score indicating greater solidarity. Table 3 shows the means, standard deviations, and alphas for each factor. Finally, the subscale inter-correlations, which suggest distinct dimensions and subscale independence, are presented in Table 4.

Table 3
Descriptive Statistics for the Native Identity Scale Factors

Scale	*M*	*SD*	Cronbach's α
Centrality	59.45	6.26	.88
Humanism	30.24	8.36	.70
Public Regard	14.47	5.15	.65
Oppressed Minority	25.11	6.01	.66

Table 4
NIS Factor Inter-correlations

Scale	1	2	3	4
1. Centrality	-			
2. Humanism	-.43	-		
3. Public Regard	-.16	.28	-	
4. Oppressed Minority	.14	.05	.19	-

Correlates and Relationships of Factors

For each respondent, a score was created for each subscale by summing the Likert values for each item that defined the scale. Items 3 and 5 on the Humanist subscale were reverse scored. The relationships among the subscale scores and the respondents' involvement in powwows; the ethnicity of people in their work and social environments; and age, gender, education, and tribal affiliation were examined to assess the validity and meaning of the scales. Several one-way ANOVAs were conducted on the NIS factor scores and validity assessment variables. Independent *t*-tests and Pearson *r* correlation analyses were conducted when appropriate. Relationships were, for the most part, as expected and are summarized in narrative form in Table 5.

Table 5
Summary of the Significant Relationships of NIS Factors and Validity Assessment Variables

Factor	
Centrality	Higher scores are associated with fewer non-Native best friends, a higher incidence of dancing at powwows, and a greater likelihood of using appropriate Native language terms for self-identification
Humanism	Higher scores are associated with more non-Native best friends, a lower incidence of dancing at powwows, and a lesser likelihood of using appropriate Native language terms for self-identification
Public Regard	Higher scores are associated with more non-Native coworkers, a lower level of education completed, younger age, and being male
Oppressed Minority	None of the measured variables were associated with this factor.

There was a significant difference in Centrality scores depending on the number of non-Natives among a respondent's five best friends, $F(2, 175) = 4.10$, $p < .02$. Tukey's HSD tests showed respondents with no non-Native friends ($M = 60.9$) had significantly higher Centrality scores than those with three or more non-Native friends (M = 57.7); those with one or two non-Native friends had Centrality scores in between ($M = 59.1$) which were not significantly different from those of the other two groups.   Respondents who danced at powwows had significantly higher Centrality scores ($M = 60.9$) than those who did not dance ($M = 58.8$), $t(189) = 2.59$, $p < .02$, Cohen's $d = .40$. Respondents who used appropriate words from their Native languages (e.g. Anishinaabe, Ojibwe, Lakota) to self-identify their tribal affiliation had significantly higher Centrality scores ($M = 60.7$) than those who used words that are derived from other languages and are not culturally traditional (e.g., Chippewa or Sioux; $M = 59.1$), $t(188) = 2.25$, $p < .03$, Cohen's $d = .35$. There was a significant positive correlation between Centrality scores and the number of powwows a respondent attended during the summer, $r(139) = .19$, $p < .04$.

There was a significant difference in Humanism scores depending on the number of non-Natives among a respondent's five best friends, $F(2, 175) = 4.16$, $p < .02$. Tukey's HSD tests showed respondents with three or more non-Native friends ($M = 32.7$) had significantly higher Humanism scores than those with no non-Native friends ($M = 28.1$); those with one or two non-Native friends had Humanism scores in between ($M = 30.9$), which were not significantly different from those of the other two groups. Respondents who did not dance at powwows had significantly higher Humanism scores ($M = 31.9$) than those who did dance ($M = 28.1$), $t(188) = 3.18$, $p < .01$, Cohen's $d = .46$. Respondents who used words that are not culturally derived to describe their tribal affiliation had significantly higher Humanism scores ($M = 31.8$) than those who used words derived from their Indigenous languages ($M = 28.8$), $t(176) = 2.42$, $p < .02$. Cohen's $d = .37$. There

was a significant negative correlation between Humanism scores and the number of powwows a respondent attended during the summer, r (164) = -.15, $p < .05$; respondents who attend fewer powwows had higher scores.

There was a significant difference in Public Regard scores depending on the number of non-Natives among a respondent's coworkers, F (2, 158) = 3.22, $p < .05$. Tukey's HSD tests showed respondents with most or all non-Native coworkers (M = 15.2) had significantly higher Public Regard scores than those with no or few non-Native coworkers (M = 13.0); those with some non-Native coworkers had intermediate Public Regard scores (M = 14.4) which were not significantly different from the other two groups. There was a significant difference on Public Regard scores depending on a respondent's education, F (2, 183) = 3.76, $p < .03$. Tukey's HSD tests showed respondents with a high school degree or less (M = 15.6) had significantly higher Public Regard scores than those with a college degree (M = 12.9); those with some higher education had intermediate Public Regard scores (M = 14.6) which were not significantly different from those of the other two groups. There was a significant negative correlation between Public Regard scores and age, r (178) = -.19, $p < .05$; younger respondents had higher scores.   Men (M =15.0) had significantly higher Public Regard scores than women (M = 13.5), t (184) = 1.99, $p < .05$, Cohen's d = .30. No significant relationships were found between Oppressed Minority scores and any of these variables.

DISCUSSION

Although the MMRI was developed for African American identity, the present results suggest the application of the model to Native identity appears promising. Clearly, we did not expect the "structure" of Native identity to directly match that of African American identity. In addition, the approach to data analyses and interpretation further ensured that the Factor structure would deviate. For Sellers et al. (1998), the driving process was to fit the data to their proposed theory of racial identity for African Americans. Our approach was more data driven and exploratory in nature. As stated previously, it was assumed that AIs and African Americans shared a similar history in terms of forced relocations and forced assimilation. In addition, the saliency of being AI in a society that historically segregated AIs to reservations may be more similar to the African American experience than to that of other ethnic groups. Thus, a theoretical basis for applying the Multidimensional Model was proposed. However, it was also recognized that the unique history of each group would also lead to "unique ideological profiles" (Sellers et al., 1998, p. 35) related to their identities and would reveal itself in differing factor structures.

The analyses of the data resulted in a unique but less complex factor structure of AI identity with both similarities and differences vis-à-vis. African American identity. Centrality appears to be an aspect of identity that applies across ethnic groups. However, the composition of the Centrality

factor for AIs differed from that of African Americans on Sellers et al.'s (1998) MIBI. Only four of the eight items from the MIBI Centrality subscale loaded on the NIS Centrality factor, with the other five items of the NIS Centrality factor coming from other subscales of the MIBI and two newly written items specific to Native history and culture. Specifically, two items from the MIBI Private Regard subscale loaded on the NIS Centrality factor: "proud to be Native" and "happy that I am Native." One item from the MIBI Nationalist Ideology subscale loaded on the NIS Centrality factor: "importance of surrounding children with Native art, music, and literature." The final two items of the NIS Centrality factor were newly written items created for this study and related to specific aspects of Native culture: "importance of knowing Native language" and "importance of being recognized as sovereign nations."

Sellers et al. (1997) defined Centrality as a measure of the extent to which "race is a core part of an individual's self-concept" (p. 806). Native identity seems to also incorporate this conception of being Native, as well as taking pride in being Native, as a core part of the Native self-concept. Having a sense of pride in one's ethnic group and a strong attachment to that group is a key factor. These feelings are described by Phinney (1989, 1992) and others (Roberts et al., 1999; Spencer, Icard, Harachi, Catalano, & Oxford, 2000) as part of the process in developing an ethnic identity. Moreover, retaining traditional language and having a Nationalistic ideology by surrounding one's children with Native symbols and desiring to be sovereign appear to be *central* to Native self-concept. These aspects of Centrality can be seen further in the relationships with behavioral indicators. For example, the significant positive relationship between powwow participation and Centrality suggests that those who actively participate in this important cultural activity see such participation as a core part of their self-concept as a Native person. However, the use of Indigenous language as an indicator of the strength of the Centrality factor might be restricted to the tribes studied and may not be true of all tribes—and would not be a meaningful indicator for tribes whose languages have been lost. Additionally, the significant negative correlation between number of non-Native friends and Centrality scores is indicative of having a Nationalistic ideology. Thus, respondents with high Centrality scores are more likely to be involved in Native culture and less likely to socialize with non-Natives.

The second factor, Humanist, is an ideology or philosophy that historically can be applied to AI worldviews. Traditionally, many Indigenous tribes of North America had an attitude of acceptance towards other racial and ethnic groups. For example, when Europeans first arrived in North America many Indigenous tribes were accepting of the "foreign visitors" despite the evident differences (Berkhofer, 1979; Deloria, 1973 2003; Page, 2003). There was an ideology of respect for other human beings and living beings that appears to be still present in Native identity today. However, the composition of the NIS Humanist factor also differed from the MIBI's. Only four of

the nine items on the MIBI Humanist subscale loaded on the NIS Humanist factor: "should have choice to marry interracially," "Natives and Whites have more in common than differences," "should not consider race when buying art or books to read," and "should judge Whites as individuals and not as members of White race." Three items from the MIBI Nationalist subscale instead loaded on the NIS Humanist factor to finalize this factor, and all three loaded negatively: "should not marry interracially," "Native and Whites can never live in true harmony because of racial differences," and "Whites can never be trusted where Natives are concerned." However, it is not unexpected that the above items from the MIBI Nationalist subscale loaded on the NIS Humanist factor because they relate to humanism by being "non-humanistic" in nature, thus explaining their negative loadings. The addition of the above items loading on this factor probably strengthens the validity of this dimension.

The positive relationship between number of non-Native friends and the Humanist factor provides some construct validity for this factor. It makes intuitive sense that someone who has a Humanistic ideology would "see" past race and ethnicity or consider these constructs less when associating with people. However, the negative relationship between powwow activity and the Humanist factor is not clear. This relationship indicates that someone who is high on Humanist (i.e., views all people as similar regardless of race) is less likely to attend powwows or participate as a dancer. It is possible that the Humanist factor is tapping some aspects of assimilation in Native people. Therefore, a person who scored high on this factor may be more assimilated and *may* be less likely to attend and participate in powwows.

The third factor, Public Regard, should be important to ethnic identity development in general. From a developmental model this makes sense. Members of ethnic groups that are most often in the minority are exposed to a variety of views and attitudes about their group through both personal experience and vicarious elements such as mass media. This experience is particularly true for AI groups (e.g., images from western films; use of AI mascots and logos by school, college, and professional sports teams). Furthermore, Cross (1991) hypothesizes that, during the encounter stage (pre-exploration), exposure to the attitudes and behavior of the majority culture will serve as a catalyst for examination of one's ethnic identity and one's place within society. Thus, a minority member's view of how he or she is perceived by society is an important aspect of ethnic identity. Finally, LaFromboise et al. (1993) postulated that being accepted by members of a second culture was part of the process of bicultural acquisition.

The items composing the NIS Public Regard factor all came from the MIBI Public Regard subscale. However, only four of the original nine items from MIBI formed the NIS factor. Therefore, this component of Native identity is similar to that of African American identity, and may be to all ethnic groups as postulated above. The relationship between Public Regard scores and demographic

and behavioral variables provides an interesting set of questions for future research. For example, the positive correlation between Public Regard scores and number of non-Native coworkers suggests that more association with non-Natives may be associated with a sense of being evaluated more positively by non-Natives. The negative correlations between Public Regard scores and age may reflect that older Native people have been subject to more racism, prejudice, and discrimination. Additionally, many older Native individuals have had the experience of being sent to boarding school, or have been exposed to stories of the boarding school experience by family members. Finally, the negative correlations between Public Regard scores and education may indicate that more educated Native people have experienced negative interactions with non-Natives, possibly as a result of their progression through an educational system that reflects the majority culture and is unfriendly to minority people in general (Huffman, 1991; Zakhar, 1987). The differences between men and women on Public Regard scores suggest that women have had less favorable interactions in mainstream society than men. This suggestion may in fact be congruent with the cultural differences that exist between Native peoples and Western Whites. For example, the family structures in many Native cultures follow a maternal lineage pattern where the forms of ownership and rights are passed down through the mother, which is in contrast to the paternal lineage pattern seen in American society.

The fourth factor, Oppressed Minority, is, we speculate, another aspect of ethnic identity that can apply cross-culturally for ethnic minority groups. This factor taps into an ideological viewpoint that there is and should be a sense of solidarity with other ethnic minority groups. Like Public Regard, this ideology appears important to the development of an ethnic identity. For example, these views and feelings are likely to interact with the self-concept influencing one's orientation toward majority groups and other cultures (Berry, Trimble, & Olmedo, 1986). Phinney (1989, 1992) reports how subjects in her studies indicated a desire to learn more about their own culture as part of their ethnicity, and about how their culture and ethnic group differed from others. In other words, individuals attempt to identify the activities, values, or beliefs that make their culture and ethnic group different than or similar to others. This suggestion would imply that, during the development of an ethnic identity or second-culture acquisition, individuals are contemplating their position and role in relation to other groups in society. Thus, for ethnic minority group members in particular, the opportunity exists to develop a sense of solidarity with other oppressed groups.

The composition of the NIS Oppressed Minority factor was very similar to that of the MIBI Oppressed Minority subscale, consisting of five out of nine items from the MIBI. Although the Oppressed Minority factor accounted for 8.9% of the variance on our scale, we did not find any significant relationships with our behavioral indicator or demographic questions. Theoretically, negative relationships between Oppressed Minority scores and number of non-Native friends or

non-Native coworkers would be predicted. However, it is unclear why this was not seen. It is possible that these environmental variables are not critical in relation to this ideology. Future research needs to identify what environmental variables and behavioral indicators are related to an Oppressed Minority ideology.

As stated above, the current research on Native identity has focused on the ethnic and cultural identity theories. Researchers have attempted to determine if and how these constructs are related to behavioral health issues in Native communities, such as substance abuse. The general belief is that cultural factors (e.g., powwow attendance) protect against substance misuse and other psychosocial issues (Fleming, 1992, Whitbeck et al., 2001, 2002). Whitbeck and colleagues also suggested that cultural factors can have an impact on academic success, using a more behavioral assessment of cultural identity. They found that youth who reported engaging in more traditional activities also reported being more successful in school. However, the research in this area has not produced conclusive evidence of the hypothesized links between culture characteristics and psychosocial functioning (Oetting, Donnermeyer, et al. 1998). For example, it is commonly believed that a person's identification with the majority culture or his/her culture of origin can indicate how likely he/she is to engage in substance use. As Oetting et al. (1998) point out, the disappointment of not finding clear-cut relationships in the research does not lie in the basic belief itself, but may involve the generated hypotheses and the methods used to test these hypotheses. We posit that measuring only a person's self-identity and cultural identity is insufficient to help explain psychosocial functioning. Oetting et al. (1998) have reached a similar conclusion and have presented a theory that further explains why simple relationships between cultural identification and substance use are not found. They posit that Native youth have varying levels of ethnic and cultural identity, and the ways these identities are learned and solidified vary through different socialization processes. In addition, different subcultures within cultures have varying norms about substance use and other behavioral health activities. Therefore, knowing a person's cultural and/or ethnic identity does not automatically provide information about his/her behavioral health lifestyle. Oetting et al. (1998) have found that many other factors play a role in these behaviors, particularly the socialization processes occurring in the family, school, and peer group.

We posit that there is a dynamic relationship between these socialization agents of culture, community, family, school, and peers and the dimensions of identity that are assessed by the NIS, and that, through further development, the NIS can be a useful tool for studying the underlying processes of AI identity. In other words, two Native people can have a strong cultural or ethnic identification based on some self-identification questions, but would probably have different "profiles" on the dimensions of the NIS and, depending on the differing levels of each dimension, one may be more protected from behavioral health issues than the other.

For example, Sellers and colleagues (2003) have reported some relationships among subscales of the MMRI and behavioral health indicators. Caldwell, Sellers, Bernat, and Zimmerman (2004) reported that racial Centrality and Private Regard were associated with alcohol use. Specifically, they found that Private Regard (having a positive view of one's own racial/ethnic group) and parental support were associated with less self-reported alcohol use. In addition, they reported that this dimension of identity interacted with the Centrality dimension such that students whose race was a more central part of their identity and who scored higher on Private Regard reported less alcohol use. In an earlier article, Sellers, Caldwell, Schmeelk-Cone, and Zimmerman (2003) discussed the multiple pathways through which identity dimensions can have an impact on psychological well-being or behavioral health. They reported some evidence of a direct relationship between Centrality and psychological distress, whereby individuals for whom ethnicity was more central to identity experienced less psychological distress, based on items from the Brief Symptom Inventory. Furthermore, they reported indirect relationships between both Centrality and Private Regard and psychological distress as a result of racial discrimination and perceived stress. Finally, results from Caldwell, Zimmerman, Bernat, Sellers, and Notaro (2002) suggest that the meanings ethnic and cultural minority group members attribute to their ethnicity may be a key factor to their mental and behavioral health. They found that the relationships between identity dimensions and mental health were mediated by maternal support and perceived stress. Structural equation models indicated that Centrality and Private Regard were not significantly associated with psychological distress alone, but instead operated indirectly by way of maternal support and perceived stress.

Together, these studies highlight the importance of viewing ethnic identity as multidimensional in understanding mental and behavioral health. In addition, these studies indicate that key variables such as parental support and perceived stress in the form of racial discrimination have an impact on mental health. Although these studies were conducted with African American populations, the identity dimensions and social variables of family support and discrimination can certainly apply to AI and Alaska Native populations as well. The idea that parental support was associated with the ethnic identity dimensions of Centrality and Private Regard highlights the concept of ethnic socialization, a critical component of cultural transmission in many Native cultures and similar to what Oetting, Donnermeyer, et al. (1998) discussed as primary socialization theory. In many Native communities, the importance of having pride in one's culture and feeling good or positive about Native people is stressed and is thought to act as a buffer against mental and behavioral health problems. Sellers and colleagues (2003) found mixed support for this hypothesis with African American populations. Whereas Private Regard (feeling good or positive about own ethnic group) was inversely related to perceived stress and psychological distress, Centrality (pride and core identity marker) was positively related to perceived stress and negative mental health indicators

in some studies, but inversely related to alcohol use in another study. However, it is important to note that two of the Private Regard items from the MIBI loaded on Centrality for the NIS and that the MMRI factors differed for Native identity. Thus, determining how these identity dimensions may be associated with mental and behavioral health factors and other psychosocial functioning in Native populations is an important empirical question.

Limitations

While it can be argued that modifying a measure originally developed with African Americans is a limitation to the current study, we would like to point out that the factor structure of the NIS differed significantly, and the newly created items addressing specific AI issues (i.e., sovereignty, language, land) lend support for using this approach as a starting point. Future research with the NIS needs to investigate the inclusion of other ideologies. For example, it was expected that an Assimilationist ideology would emerge as part of the Native identity. Historically, assimilation has been a major issue for AI people. While the federal policy of forced assimilation was in place, many Indigenous nations struggled to maintain their traditional cultures. Parts of this ideology are included in the Centrality factor, but the question remains whether it should be a separate factor. In our original factor analysis, a five-factor solution was one of the possible options, with the fifth factor being the Assimilationist. However, only two items comprised that factor and we felt that it did not currently account for enough variance. In future studies, this factor will need to be reconsidered through additional item construction and factor analytic designs. It is acknowledged here that the correlations between the factors and current environment variables were relatively weak, and accounted for about 4% to 5% of shared variance. Future research assessing other environmental variables and areas of psychosocial functioning can provide further evidence for the validity of the NIS and the different facets of identity tapped by the NIS subscales.

Finally, the procedure used to recruit participants may have limitations. The fact that all participants were attendees at Upper Midwest powwows may make them more homogeneous in their cultural identity than participants recruited in other ways. Specifically, greater homogeneity might limit the strength of the relationship between factor scores and participant characteristics (e.g., number of non-Native friends, number of powwows attended). Also, it is acknowledged that because the majority of the participants were from a single tribal group, Anishinaabe, the results might not generalize to members of other tribes.

CONCLUSION

Previous research on AI populations has focused primarily on bicultural ethnic identity. While the construct of bicultural identity has been validated (Moran et al., 1999; Oetting & Beauvais, 1990-91), the predicted relationships between bicultural ethnic identity and psychosocial outcome variables has not been strongly supported (Oetting et al., 1998). This study was conducted to investigate the possible underlying dimensions or factors that may compose ethnic identity in AIs and that may be more related to socializing agents and psychosocial outcome variables.

A measure (the NIS) was adapted based on a multidimensional model (Sellers et al., 1997) of identity that assesses various ideological and social determinants of an ethnic minority experience. An exploratory analysis resulted in a four-factor model of AI ethnic identity: Centrality, Humanism, Public Regard, and Oppressed Minority. Construct validity of these factors was partially demonstrated by significant relationships with validity assessment variables. The NIS suggests there are indeed some underlying dimensions of AI ethnic identity that are not tapped by current assessment measures. Future research with the NIS should assess the possible relationships between the factors found in this study and the socializing agents of culture and community that are more directly related to psychosocial outcome variables important to AI communities.

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FOOTNOTES

[1] We agree with Phinney's definition of ethnic identity in that it "is a dynamic, multidimensional construct that refers to one's identity, or sense of self as a member of an ethnic group" (2003, p. 63). Cultural identity is defined by the authors as the "acting out" of one's ethnic identity. The person's sense that he/she can and does participate in cultural activities and beliefs held by their ethnic/cultural group.

[2] Racial identity is most often associated in the literature with African American identity. Researchers such as Janet Helms, William Cross, and Robert Sellers prefer to use this term when describing their work with African Americans. Interestingly, it seems to imply a sense of both ethnic and cultural identity with this group.

[3] "First Nations" is a term Indigenous peoples of Canada use to refer to themselves and to signify their relationship to this land.

DELAY DISCOUNTING OF DIFFERENT OUTCOMES IN A SAMPLE OF AMERICAN INDIAN AND NON-INDIAN COLLEGE STUDENTS

Jeffrey N. Weatherly, PhD and J. Douglas McDonald, PhD

Abstract: Delay discounting occurs when an individual prefers a lesser amount of an outcome that is available immediately, rather than waiting for the full amount. The present study was a preliminary investigation into delay discounting in a yet unstudied population, American Indians (AIs). AI college students completed a delay-discounting task that consisted of five different outcomes (e.g., money, retirement income, obtaining the ideal body image). An equal-sized group of Caucasian respondents was then matched to the AI sample in terms of sex, age, and grade point average. Results demonstrated that AI and Caucasian respondents sometimes differed in how they discounted certain outcomes, suggesting that the value of these outcomes may differ across ethnicities. Further, the AI participants displayed different rates of discounting across the different outcomes, indicating that those outcomes may hold different values for the AI respondents. The potential value of delay discounting in understanding cross-cultural and intra-cultural differences is discussed and, because of the preliminary nature of the present study, a call for additional research is made.

It is not unusual for people to choose a lesser amount of something in exchange for getting that something immediately, rather than having to wait to get the full amount. For instance, when individuals win the lottery, it is common for them to choose to receive a smaller "lump sum" of cash immediately, rather than having their full winnings paid out in installments across many years (e.g., Baker, Johnson, & Bickel, 2003). This decision sometimes makes intuitive sense because the future is uncertain. In the case of the lottery, one must depend on the institution responsible for paying out the money over time having the continued ability to pay. Further, one's own future is never certain; by waiting, one runs the risk of not surviving long enough to collect the full amount.

The study of how and why people make decisions between getting a certain amount of an outcome now versus waiting for a greater amount of that outcome later is known as the study of temporal or delay discounting (e.g., see Critchfield & Kollins, 2001, or Madden & Bickel, 2010, for reviews). Delay discounting research has its roots in early delay-of-gratification work (Rotter,

1954). Although the concepts are related, delay discounting involves making multiple choices across a series of delays (see Madden & Bickel, 2010). Delay of gratification, on the other hand, often involves a single, dichotomous choice. In terms of delay discounting, how much the subjective value of an outcome decreases as the full amount is increasingly delayed determines the "rate" at which the individual discounts (i.e., a single rate of discounting is calculated across the multiple delays).

The rate of discounting varies systematically as a function of certain factors. For instance, the greater the value of the outcome, the less discounting is observed (e.g., Chapman, 1996; Smith & Hantula, 2008), a finding known as the magnitude effect. Take the situation in which someone owed you $10 but could not pay you the full amount for two weeks. In such a situation, you might be willing to accept $9 today rather than waiting two weeks. On the other hand, if someone owed you $10,000, you would be unlikely to accept $9,000 today rather than waiting two weeks for the full amount. Thus, over the same delay, the value of the smaller amount has been discounted by at least 10% whereas the value of the larger amount has not.

The study of delay discounting has received a great deal of research interest over the past decade because the rate at which people discount future outcomes has been shown to vary as a function of group membership, psychological characteristics, and/or experience. Such findings are of interest because they provide insight into the decision-making process that helps define those variables, as well as raising the issue of whether those variables change as a function of delay discounting or whether the ways in which people discount delayed outcomes changes as a function of those variables. For example, individuals who are pathological gamblers tend to discount hypothetical monetary rewards more steeply than do individuals who do not gamble pathologically (e.g., Dixon, Marley, & Jacobs, 2003; see Petry, 2005, for a review), raising the question of whether increased discounting leads to pathological behavior, pathology alters discounting, or there are other factors that lead to both. Ostaszewski (1996) showed that extraverted, highly impulsive respondents displayed greater rates of discounting than did their counterparts. Do changes in discounting lead one to be more extraverted? Logue and Anderson (2001) found that experienced university administrators discounted future budgetary amounts more steeply than did less experienced administrators, a finding the authors suggested indicated that experienced administrators have learned not to trust promises of future budget increases. Alternatively, are administrators inherently conservative?

As noted above, finding that rates of delay discounting vary across groups is interesting, but the results are correlational in nature. What is potentially more interesting is the finding that measures of delay discounting may predict actual behavior in certain situations (e.g., Weatherly, Marino, Ferraro, & Slagle, 2008). If that is the case, then knowing how an individual discounts delayed outcomes could potentially be used in a preventative fashion by allowing therapists or

counselors to address issues before they become problematic for the individual. That is, knowing how a student discounts a certain outcome may inform school counselors as to whether the student may be at risk for engaging in problem behavior (e.g., experimenting with drugs or sex). Furthermore, measures of delay discounting could be used as dependent measures that might indicate whether or not a particular treatment is working. For example, if delay discounting contributes to pathological gambling, then a successful gambling treatment should produce changes in the individual's rate of discounting.

To our knowledge, no investigations have yet attempted to study delay discounting in AIs, although some (e.g., Granzberg, 1973) have attempted to study delay of gratification. Studying delay discounting among AIs would seem inherently warranted, if not socially compelling, for several reasons. One reason is theoretical. That is, does delay discounting vary as function of culture or ethnicity? Although very few studies have attempted to address this question, results from one cross-cultural study (Du, Green, & Myerson, 2002) would suggest it does. Du et al. found differences in the rate that American, Chinese, and Japanese graduate students temporally discounted hypothetical monetary amounts. Finding differences in delay discounting across different cultures and ethnicities would be of interest because the study of those differences could potentially provide a metric of the values held by different cultures.

A second reason for studying delay discounting in AIs is a practical one. AIs differ from the non-AI majority population in regards to a number of (mental-) health-related factors, including substance abuse, pathological gambling, and psychopathology (e.g., McDonald & Chaney, 2003; Wardman, el-Gueblay, & Hodgins, 2001). Given that research has shown that delay discounting differs as a function of disorders such as pathological gambling (e.g., Dixon et al., 2003) and substance abuse (Petry, 2001; Petry & Casarella, 1999), one might expect to find that AIs differ in their delay discounting relative to their majority-population counterparts. On the other hand, if similar rates of delay discounting were to be found between AIs and non Indians, then such results would suggest that the higher rates of disordered behavior among AI populations are likely the outcome of other factors not directly related to decision-making characteristics (e.g., socioeconomic status, educational opportunities, degree of acculturation).

A third reason to pursue the study of delay discounting in AI populations is that it may ultimately shed light on cultural differences between tribes. Although the full pursuit of this reason was beyond the scope of the present preliminary investigation, it may be the case that tribes in more impoverished areas may show differences in discounting of monetary outcomes relative to tribes in less impoverished areas. Similarly, differences may be found in how members of different tribes discount outcomes related to their own health, personal well-being, or government policies. Thus, knowing how members of certain tribes discount delayed outcomes could be informative for

policy makers at both the local and national levels. For example, if one knew how tribal members discounted particular outcomes (e.g., the building of a new fire station), then policy makers would have a better idea about how much the members might be willing to pay now to get those outcomes at some date in the future.

The present study was a preliminary investigation into measuring delay discounting in a sample of AI university students. Two different groups of AI students completed discounting tasks on a different set of five outcomes and the results were then compared to an equal-sized group of Caucasian students matched to the AI sample in terms of sex, age, and grade point average. Two issues were of particular interest in this preliminary investigation. First, would AI and Caucasian students differ in how they discounted the different outcomes? Second, what differences would be observed within the AI samples in how the respondents discounted the different types of outcomes? Because of the exploratory nature of this study, we did not have *a priori* hypotheses about the answers to these questions.

METHOD

Participants

The participants were undergraduate college students enrolled in an abnormal, developmental, educational, introductory, or personality psychology class at the University of North Dakota. In all, a total of 791 participants were surveyed. A total of 26 of these students self-identified as AI. From the pool of respondents who self-identified as Caucasian, 26 were matched to the sample of AI respondents by three factors: sex, age, and self-reported grade point average. This process involved matching each individual AI participant with a Caucasian participant based on the above characteristics. Participants were matched on grade point average so as to help ensure similar academic performance between the individuals. Thus, the data from 52 respondents are reported in the present preliminary investigation.

Materials and Procedure

Participants completed a questionnaire packet in their particular psychology course. Each questionnaire packet contained three items. The first was an informed consent cover sheet outlining the research as approved by the Institution Review Board at the University of North Dakota. The second was a demographic form that asked participants about their sex, age, grade point average, and ethnicity, as well as a number of additional pieces of information (e.g., political affiliation, smoking habits, gambling frequency). The third was a series of delay-discounting questions that pertained to five different outcomes.

The delay-discounting questions were in the form of "fill in the blank" (Chapman, 1996; and see Smith & Hantula, 2008). Each set of questions had five different types of outcomes. Because no research on delay discounting in AIs exists, the outcomes tested in the present investigation were wide ranging (i.e., not limited to one specific outcome such as a hypothetical amount of money). Set A asked participants about $1,000 they had won, $100,000 they had won, 100 free packs of cigarettes[1], finding the perfect partner through a dating service[2], and obtaining the ideal body image through diet and exercise. Set B asked participants about $1,000 they were owed, $100,000 they were owed, medical treatment for a "serious" disease they were suffering from, their annual retirement income relative to $100,000 per year, and a Federal legislation policy reforming the American educational system. The hypothetical monetary outcomes were chosen because money is the typical outcome that is investigated in studies of delay discounting (see Madden & Bickel, 2010). Two different monetary amounts were included as a manipulation check. That is, previous research has demonstrated that people display less delay discounting as the magnitude of the outcome is increased (e.g., Chapman, 1996). Thus, one would expect to see less discounting for the $100,000 than for the $1,000. Cigarettes were chosen because previous research has linked the discounting of cigarettes to that of money (e.g., see Yi, Mitchell, & Bickel, 2010). The outcomes of dating partner, ideal body image, medical treatment, and retirement income were chosen because they potentially addressed aspects of people's well-being, and one might expect them to be treated differently than tangible outcomes (e.g., a sum of money). Federal legislation was chosen because, although it might indirectly affect the respondents, it represented an outcome that might be experienced by others. The exact wording of these questions can be found in Weatherly, Terrell, and Derenne (2010).

Each question was asked eight different times, with the wording of the question only varying as a function of the delay the person would have to wait to receive the full amount of the outcome. The eight delays were one week, two weeks, one month, three months, six months, one year, five years, or ten years. For each question, the respondent was required to provide an amount or percentage of the outcome he or she would accept today rather than waiting the specified period of time. Thus, each packet of delay-discounting questions contained 40 total questions (5 outcomes X 8 delays). The order of the questions was then randomized, and all participants who completed a certain set of questions did so in the same random order. Each section of a particular class completed the same set of questions (e.g., one section of students enrolled in developmental psychology completed Set A, while another section of students in developmental psychology completed Set B). Because we did not have *a priori* knowledge of the ethnicity of the students in the different classes, it was not possible to ensure that an equal number of AI students completed Set A and Set B of questions.

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[1]For this particular outcome, respondents were asked to "suppose" they smoked cigarettes.
[2]For this particular outcome, respondents were asked to "suppose" they were single.

Data Analysis

There are several different ways to analyze data from delay-discounting tasks such as the ones used in the present study (see Madden & Bickel, 2010, for a thorough discussion). Each involves analyzing the data for each outcome across all the delays tested and determining a single discounting "rate." This approach is taken because delay discounting is conceptualized as a process, rather than individual decision points, and the "rate" of discounting theoretically encompasses the decision-making process for that particular respondent for that particular outcome.

One way to analyze delay-discounting data is to calculate the area under the curve (AUC) created by the indifference points across the different delays using the following equation (Myerson, Green, & Warusawitharana, 2001):

$$x_2 - x_1 \left[(y_1 + y_2)/2 \right] \quad \text{(Equation 1)}$$

The measure of temporal discounting in Equation 1 is the result of summing the AUC across the trapezoids calculated across the different delays. The result is a proportion than can vary between 0.0 and 1.0. Small AUC values represent steep discounting of that outcome (i.e., a willingness to take a small amount of the outcome rather than waiting); large AUC values represent little discounting of that outcome (i.e., a willingness to wait for the full amount). Again, it is important to note that AUC measures discounting across all of the tested delays and summarizes discounting as a single value. As noted above, this conversion is typical within the field because delay discounting is considered a process, not a single decision at any given delay.

Another popular technique for analyzing delay-discounting data is fitting the indifference points across the delays with the following hyperbolic equation (e.g., Mazur, 1987):

$$V = A / (1 + k\text{D}) \quad \text{(Equation 2)}$$

In Equation 2, V stands for the subjective value of the delayed outcome, A stands for the amount of that particular outcome, D stands for the delay to the full amount of the outcome, and k is a free parameter. The value of k describes the rate at which discounting occurs and, when this type of analysis is employed, serves as the dependent measure of discounting. In Equation 2, the higher the value of k, the more the respondent is discounting that particular outcome.

Although Equation 2 is perhaps the most popular technique for analyzing discounting data, we employed Equation 1 for the present preliminary investigation. This decision was made for several reasons. First, Equation 2 was developed using a specific type of discounting task (i.e., a binary-choice procedure). The present study used the fill-in-the-blank method, not a binary-choice procedure (see Smith & Hantula, 2008, for a discussion). Second, as outlined by Myerson et al. (2001), Equation 2 assumes that delay discounting follows a particular form (i.e., a hyperbola). Discounting may or may not take this form, but we had no theoretical reason to expect that to be

true. Equation 1, on the other hand, is atheoretical in terms of the form the resulting discounting curve takes. Third, Equation 2 produces a skewed distribution because k has a lower bound (i.e., 0), but no upper bound. Thus, data transformations are required before parametric statistics are employed. Equation 1 does not suffer from this difficulty. Fourth, and perhaps most importantly, the AUC produced by Equation 1 is standardized across outcomes, whereas the value of k in Equation 2 depends on the scale. Because the present preliminary investigation asked respondents about outcomes that differed along a number of different factors (e.g., domain, scale), the use of Equation 1 was deemed most appropriate.

RESULTS

Set A

A total of eight respondents (6 females, 2 males) who completed Set A of delay-discounting questions self-identified as AIs. Eight respondents who self-identified as Caucasian were then individually matched to each of the AI respondents in terms of sex (6 females, 2 males), age, and grade point average. Statistical analyses indicated that the groups did not differ in terms of age (AI = 19.63 years; Cauc = 20.5 years; $F(1, 14) < 1$, $\eta^2 = .014$) or grade point average (AI = 2.20 out of 4.0; Cauc = 2.24 out of 4.0; $F(1, 14) < 1$, $\eta^2 = .002$). An alpha level of .05 was used to judge statistical significance for all analyses.

The goals of the present study were to determine if delay discounting differed between AI and non-AI participants, whether such a difference varied across different outcomes, and whether AI participants differentially discounted the different outcomes. Toward that end, the top graph in Figure 1 presents the amount of discounting observed for both groups of respondents across the five different type of outcomes. Higher AUC proportions in Figure 1 represent less delay discounting. The data suggest that differences in discounting existed both between groups and across outcomes. The data used to construct the top graph of Figure 1 were subjected to a two-way (Ethnic group X Type of outcome) mixed-model analysis of variance (ANOVA). In this ANOVA, ethnic group served as the between-groups variable and type of outcome was a repeated measure. Results showed that the main effect of ethnic group was not significant, $F(1, 14) < 1$, $\eta^2 = .065$, indicating that, across the five different outcomes, levels of discounting did not differ between the AI and Caucasian respondents. The main effect of type of outcome was significant, $F(4, 56) = 8.28$, $p <$ .001, $\eta^2 = .372$, indicating that different rates of discounting were observed across the five different outcomes. The interaction between ethnic group and outcome was also significant, $F(4, 56) = 3.04$, $p = .024$, $\eta^2 = .179$., indicating that the changes in discounting rates across the different outcomes differed as a function of ethnic group.

Figure 1
Discounting Rates

Set A

Set B
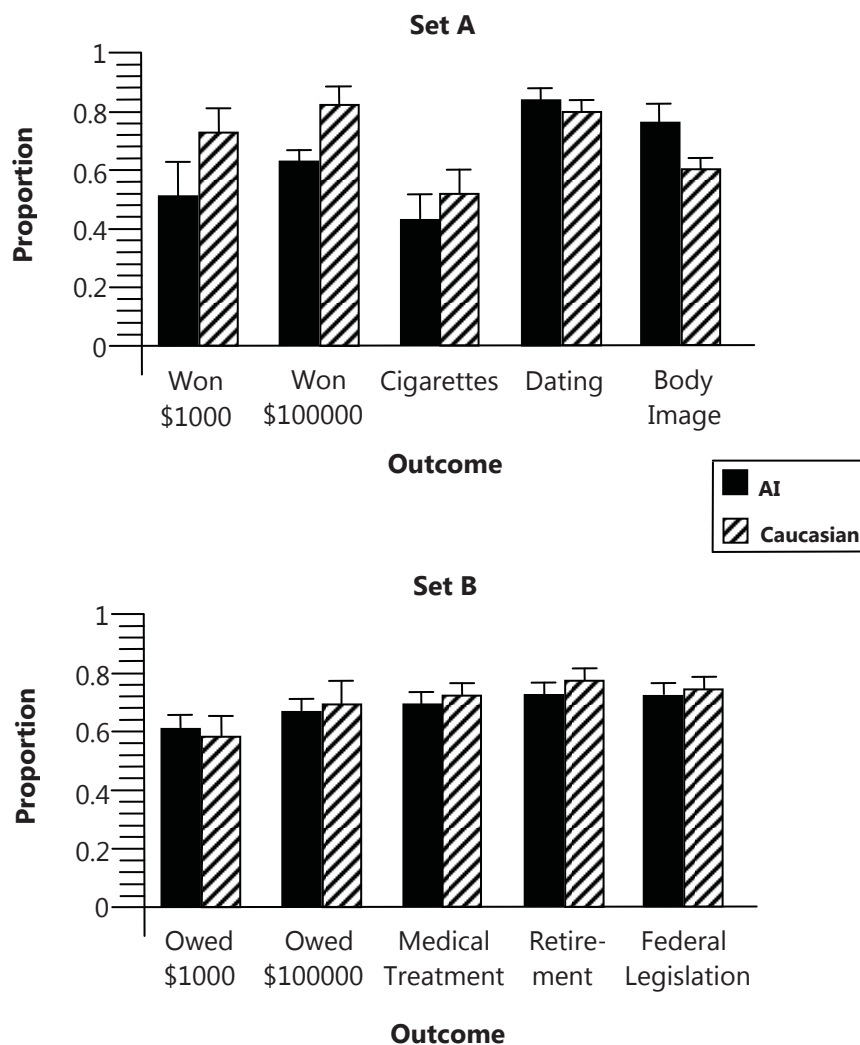
Discounting Rates Observed for Both Sets of Outcomes. Presented is the proportion of the area under the discounting curve for the mean of all AI and Caucasian respondents for each of the outcomes completed by the different groups. The top graph presents results from respondents who completed Set A (n = 8) of delay-discounting questions. The difference in discounting of body image between AI and non-AI participants was significant. The bottom graph presents results from respondents who completed Set B (n = 18). No significant between-group differences in discounting were observed. In both graphs, high proportions represent low rates of delay discounting. The error bars represent one standard error of the mean across participants for that particular outcome.

Follow-up analyses were conducted due to the significant interaction. Comparison of the different groups on each outcome showed that AI and Caucasian respondents did not differ in their discounting of cigarettes, $F(1, 14) < 1$, $\eta^2 = .035$, or dating partner, $F(1, 14) < 1$, $\eta^2 = .029$. The differences approached statistical significance for the monetary amounts of winning \$1,000, $F(1, 14) = 4.11$, $p = .062$, $\eta^2 = .227$, and \$100,000, $F(1, 14) = 4.49$, $p = .052$, $\eta^2 = .243$. The difference between groups was significant for body image, $F(1, 14) = 4.92$, $p = .044$, $\eta^2 = .260$, with Caucasian respondents discounting body image to a greater degree than the AI respondents.

A one-way repeated-measures ANOVA was conducted on the discounting of the five different outcomes by the AI respondents. Results showed that discounting differed significantly across the outcomes, $F(4, 28) = 6.59$, $p = .001$, $\eta^2 = .485$. *Post hoc* Tukey HSD comparisons indicated that the AI respondents discounted cigarettes significantly more than they did a dating partner and their own body image. Further, they discounted winning \$1,000 significantly more than they did a dating partner.

Set B

A total of 18 respondents (15 females, 3 males) who completed Set B of delay-discounting questions self-identified as AIs. Eighteen respondents who self-identified as Caucasian were then individually matched to the AI respondents in terms of sex (15 females, 3 males), age, and grade point average. Statistical analyses indicated that the groups did not differ in terms of age (AI = 22.89 years; Cauc = 22.17 years; $F(1, 34) < 1$, $\eta^2 = .003$) or grade point average (AI = 2.92 out of 4.0; Cauc = 2.92 out of 4.0; $F(1, 34) < 1$, $\eta^2 = .000$).

The bottom graph in Figure 1 presents the amount of discounting observed for both groups of respondents across the five different outcomes. Like Set A, differences in discounting are apparent across the different outcomes. However, the differences between groups were not large. The data used to construct the bottom graph of Figure 1 were subjected to a two-way (Ethnic group X Type of outcome) mixed-model ANOVA identical to that used to analyze the data from Set A. Results showed that the main effect of ethnic group was not significant, $F(1, 34) < 1$, $\eta^2 = .003$, indicating that, across the five different outcomes, levels of discounting did not differ between the AI and Caucasian respondents. The main effect of type of outcome was significant, $F(4, 136) = 7.03$, $p < .001$, $\eta^2 = .171$, indicating that discounting differed across the five outcomes. In this analysis, the interaction between ethnic group and type of outcome was not significant, $F(4, 136) < 1$, $\eta^2 = .008$.

The discounting data of the AIs across the five different outcomes in Set B were analyzed by conducting a one-way repeated-measures ANOVA. Results showed that discounting differed significantly across the different outcomes, $F(4, 68) = 2.64$, $p = .041$, $\eta^2 = .134$. *Post hoc* Tukey

HSD comparisons indicated that the AI respondents discounted being owed $1,000 significantly more than they did their annual retirement income. Differences between all the other outcomes did not reach statistical significance.

DISCUSSION

The present study was intended as a preliminary investigation to better understand the complex process of delay discounting in a cross-cultural context. Several intriguing findings resulted. First, AI respondents discounted an ideal body image significantly *less* than did a matched Caucasian sample, suggesting that this outcome had a *greater* value for the AI respondents than for the Caucasian respondents. Cross-ethnic differences in discounting approached, but did not reach, significance for several other outcomes. Despite the lack of statistical significance, the effect sizes for these differences were large (Cohen, 1988). Thus, it seems likely that future studies that employ larger sample sizes may find additional cross-cultural differences in rates of delay discounting of different outcomes.

Differences in rates of delay discounting also were observed across the different outcomes for the AI participants, indicating that the respondents may have placed different values on the different outcomes. For instance, respondents who completed Set A discounted cigarettes at a significantly greater rate than they did a dating partner or their own ideal body image. They discounted money more than they did a dating partner. Respondents who completed Set B discounted $1,000 at a significantly greater rate than their annual retirement income. These differences suggest that the outcomes of a dating partner, body image, and retirement income held great value for the AI respondents while outcomes such as cigarettes did not. These differences potentially represent a novel way to assess intra-cultural values. Future research may want to focus on expanding the number and type of outcomes studied, as well as diversifying the sample of AI respondents so that generational, tribal, or other factors (e.g., living on or off the reservation) can be assessed.

With that said, we readily recognize that the present study had many shortfalls which limit the generalizability of the results. First, an increased sample size would obviously lend greater power and flexibility to statistical examinations. Second, the representative aspects of the sample could be more sophisticated as well. More specifically, all of the participants in the present study were enrolled in a four-year university. Future research efforts could certainly focus on reservation and urban Indian participants. Additionally, consideration of the degree of biculturalism and the extent to which it may influence delay-discounting behaviors might prove worthy if not fascinating. Finally, examination of potential differences between younger and older participants, and participants with varying levels of education, would also be strongly suggested.

Further manipulations of study methodology could also include more detailed consideration of the outcomes being discounted. For example, what—if any—differences may be observed between objective and tangible outcomes such as clean drinking water or money, as opposed to more subjective outcomes such as adherence to tribal values, customs, and ceremonies? Future researchers might also creatively consider ways to incorporate sociocultural variables that have a significant impact on many Native communities, such as obesity, alcohol abuse, poverty, diabetes, and depressive disorders.

It is our hope that this preliminary investigation serves to generate research on delay discounting in AI populations. A recent book published by the American Psychological Association (Madden & Bickel, 2010) was devoted to the study of delay discounting. Completely absent from that text, however, was the potential influence of cultural variables in the process of discounting. Given that delay discounting has been linked to many mental health issues (e.g., substance abuse, pathological gambling, health decision making; see Madden & Bickel, 2010) that impact AI populations, understanding discounting in AIs would seem a worthwhile pursuit. It would be especially interesting to determine whether the disparities in mental health issues observed between AI and non-AI populations will also be observed in measures of delay discounting. Although one cannot generalize the present results with excessive confidence, the preliminary data in this study suggest that the answer will be "no."

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ACKNOWLEDGEMENTS