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American Indian and Alaska Native Mental Health Research

EDUCATION IS ASSOCIATED WITH PHYSICAL ACTIVITY AMONG AMERICAN INDIAN ELDERS

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Abstract: Although educational attainment and physical activity levels tend to be positively associated in majority populations, this relationship has not been investigated in American Indian and Alaska Native (AI/AN) elders. This study examined the association between education and physical activity among AI/AN elders (N = 107) using self-report and behavioral outcomes. Regression models showed that higher education was significantly associated with total caloric expenditure for moderate-intensity physical activities and distance traveled during a 6-minute walk test of fitness. Additional research is needed to understand modifiable personal, social, and environmental physical activity barriers in these populations.

Introduction

The proportion of physically inactive adults is steadily increasing in the general U.S. population (National Center for Health Statistics, 2003; U.S. Department of Health and Human Services [DHHS], 1996), and especially among American Indians and Alaska Natives (AI/ANs; Coble & Rhodes, 2006). Relative to majority populations, AI/ANs report lower levels of leisure-time physical activity (Welty et al., 1995; Young, 1991), less frequent exercise (Cheadle et al., 1994; Mendlein et al., 1997), and higher rates of inactive lifestyles (Goldberg et al., 1991; Molina & Campos-Outcalt, 1991). Physical inactivity elevates the risk for obesity, hypertension, type 2 diabetes, and cardiovascular disease (Paffenbarger,

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Hyde, Hsieh, & Wing, 1986; DHHS, 2000), all of which are becoming more prevalent in many Native communities (Galloway, 2005).

Several factors, such as age, gender, body weight, health status, and environmental features (e.g., availability of sidewalks, green space, neighborhood safety), influence physical activity levels (Martinez-Gonzalez, Martinez, Hu, Gibney, & Kearney, 1999; Trost, Owen, Bauman, Sallis, & Brown, 2002; Umstattd, Saunders, Wilcox, Valois, & Dowda, 2006). Findings from the Behavioral Risk Factor Surveillance System show a clear association between lower educational levels and inactive lifestyles in both the 1990 and 2004 assessment periods (Harper & Lynch, 2007). Although educational attainment tends to be positively associated with engaging in physical activity and exercise in the majority culture (Trost et al., 2002), some studies among AI/ANs have substantiated this association (Coble & Rhodes, 2006; Thompson, Wolfe, Wilson, Pardilla, & Perez, 2003; Doshi & Jiles, 2006) but others have shown only moderate (King et al., 2000; Whitt, DuBose, Ainsworth, & Tudor-Locke, 2004) or non-significant associations (Fischer et al., 1999; Harnack, Sherwood, & Rock, 1999). Evaluating the education-physical activity relationship may be further complicated by considerable disparities in education, as AI/ANs are less likely to have completed high school (Warne, 2007) or to have obtained a college degree (Castor et al., 2006) than members of the general U.S. population.

A limitation of available studies with AI/ANs is the reliance on cross-sectional, self-report measures of physical activity and exercise. The link between education and physical activity in these populations may be clarified by examining performance on an objective, behaviorally-based measure of physical fitness and exercise capacity such as the 6-minute walk test (6MWT). The 6MWT has been used extensively among medically ill (American Thoracic Society, 2002; Carter, Holiday, Stocks, Grothues, & Tiep, 2003; Solway, Brooks, Lacasse, & Thomas, 2001), healthy (Enright & Sherril, 1998; Sanderson & Bittner, 2006; Simonsick, Montgomery, Newman, Bauer, & Harris, 2001), and older (Enright et al., 2003; Peeters & Mets, 1996) adults. Few studies, however, have used this test with non-Caucasian populations (Lee, Chan, Wong, Lau, & Ng, 2007; Poh, Eastwood, Cecins, Ho, & Jenkins, 2006; Sanderson & Bittner, 2006), and none have empirically applied it to AI/ANs.

Because rates of physical inactivity are disproportionately high among older adults in general and AI/ANs as a whole (Centers for Disease Control and Prevention, 2004; Coble & Rhodes, 2006; National Center for Health Statistics, 2003), additional research is warranted to determine those factors that influence physical activity outcomes specific to older

AIs. The purpose of this study, therefore, was to determine whether educational attainment is associated with physical activity among AI elders between 50 and 74 years of age who participated in a randomized physical activity trial. We predicted that higher education would be positively associated both with self-reported physical activity levels and with distance traveled during the 6MWT.

Methods

Participants and Procedures

The present study represents an analysis of data collected as part of the larger randomized physical activity trial (Sawchuk et al., in press). Participants were 125 AI/AN elders who enrolled in a 6-week randomized trial that compared physical activity monitoring only to physical activity monitoring with the use of a pedometer. Study recruitment efforts and procedures were conducted at the Seattle Indian Health Board, a large, urban primary care medical facility for AIs and Alaska Natives. Inclusion criteria included sedentary lifestyle (responding "no" to the question "Have you been physically active for the past 6 months?"), ability to walk without assistance, no medical contraindications to walking, living within a 2-hour radius of the study site, and age between 50 and 74 years. (In contrast to the majority culture, the term elder in AI/AN communities is not entirely defined by chronological age. Rather, elder represents a level of status and respect within the family and community.) Approval for this study was obtained from the Human Subjects Division at the University of Washington and the Privacy Board at the Seattle Indian Health Board. The study was conducted between April and November, 2005.

During the first study visit, participants completed a structured interview that gathered self-report data and measured body mass index (BMI). Participants were then randomly assigned to a group that either monitored their daily physical activities or monitored their daily physical activities and total step counts with the use of a pedometer. Participants were given a series of weekly activity-monitoring sheets, and the research assistant demonstrated how to complete each daily activity entry. The research assistant reviewed different types of physical activities and exercises the participant might try over the six-week study period. An educational handout on the health benefits of increased physical activity was also reviewed with each participant. At the second visit 6 weeks later, participants completed the self-report measures again, and the BMI was

reassessed, followed by the 6MWT. Following completion of the walk, participants were compensated for their time and debriefed about the goals of the activity trial.

Demographic and Health Information

Demographic information collected included age and sex. BMI was calculated using the following formula: weight in kg/height in meters[2]. We created 3 education variables: less than a high school education; completed high school, GED, or some vocational/technical training; and completed some college education. Participants were classified as either current smokers or nonsmokers based on endorsing the question: "Do you smoke cigarettes now?" Lastly, the Mental Component and Physical Component Summary scores derived from Medical Outcomes Survey Short Form-36 (SF-36; Ware & Sherbourne, 1992) were used as an index of health status over the last 4 weeks. The SF-36 has well-established reliability and validity (Ware & Sherbourne, 1992) and has been used with diverse patient populations (Schlenk et al., 1998; Yost, Haan, Levine, & Gold, 2005), including older adults (Chapman, Duberstein, & Lyness, 2007; Hu, 2007; Wolinsky et al., 1998), and AIs (Beals et al., 2006; Johnson, Nowatzki, & Coons, 1996).

Self-report Physical Activity Measure

The Community Healthy Activities Model Program for Seniors (CHAMPS) Questionnaire is a 41-item self-report measure assessing a range of light, moderate, and vigorous physical activities in leisure, work, exercise, and chore-related domains (Stewart et al., 1997). Respondents report their weekly frequency and duration of participation in activities over the previous 4 weeks. For this study, we examined responses on the following subscales: (1) total weekly caloric expenditure for all exercise activities, and (2) total weekly caloric expenditure for moderate or greater intensity exercise-related activities. The CHAMPS has excellent psychometric characteristics and has been used extensively with older adults (Harada, Chiu, King, & Stewart, 2001; Stewart et al., 2001) and non-Caucasian populations (Resnicow et al., 2003; Stewart et al., 2006) as an outcome measure for physical activity interventions.

Performance-based Physical Activity Measure

The 6MWT has been widely used as a reliable and valid measure of fitness in healthy (Harada, Chiu, & Stewart, 1999; Harada et al., 2001; Simonsick et al., 2001) and medically ill (Bittner et al., 1994; Peeters & Mets, 1996; Montgomery & Gardner, 1998) older adults. Participants are instructed to walk unassisted around 2 traffic cones on opposite ends of a 50-foot corridor and cover as much distance as possible within a 6-minute time frame. Following a standardized administration protocol (Peeters & Mets, 1996), a research assistant provided verbal encouragement at fixed intervals during the walk, and recorded the total number of laps completed. At the end of 6 minutes, a marker was placed on the ground next to the participant and the total distance in feet was calculated with a rolling tape measure. Previous studies have found that performance on the 6MWT is influenced by age, gender, body mass, and health status (Sanderson & Bittner, 2006).

Statistical Analyses

We calculated means and 95% confidence intervals for age, sex, BMI, and the Mental Component and Physical Component Summary scores at enrollment for the 3 educational categories. For sex and current smoking status, we calculated proportions and their associated 95% binomial confidence intervals by education category.

We used data from weeks 1 and 6 to determine each participant's weekly caloric expenditures due to any exercise-related activity, and those due to moderate or greater intensity exercise. As the continuous CHAMPS measure of weekly caloric expenditure was heavily right-skewed, we calculated the unadjusted median weekly expenditure for each education category and constructed 95% confidence intervals using established techniques (Conover, 1980). We assessed trends on CHAMPS subscales across education category by regressing each log-transformed CHAMPS measure on a linear education category term.

For adjusted analysis of the CHAMPS measures, we conducted regressions of the log-transformed caloric expenditure measures on education category. Our regression models controlled for age, male sex, BMI, current smoking status, and the Mental Component and Physical Component Summary scores. This procedure capitalized on longitudinal measures of CHAMPS and Short Form-36 data taken at weeks 1 and 6 of the study. Our procedures assumed an independent working correlation

matrix and an identity link function to accommodate the correlation between repeated observations of the same individual (Diggle, Heagerty, Liang, & Zeger, 2002).

To generate an adjusted summary measure for caloric expenditure, we transformed the adjusted predicted values from the generalized estimating equation models back to the CHAMPS data's original scale (kcal/week), and calculated adjusted medians and their 95% confidence intervals for each education category. We evaluated trends in the predicted values using a generalized estimating equation regression that modeled education category with a single linear term.

We calculated the unadjusted mean 6MWT distance for each education category separately and constructed a 95% confidence interval for each estimate. We investigated the significance of trends across education groups using the same procedure we used with the CHAMPS data. Adjusted analysis of the 6MWT was calculated by conducting multiple linear regressions of 6MWT on education category, controlling for the same covariates mentioned above. We then calculated adjusted means and their 95% confidence intervals for each education category based on the linear regression parameter estimates. We then assessed a trend in adjusted mean 6MWT across education categories, as described above.

Results

Participant Characteristics

Of the 125 participants in the original randomized trial, 107 provided complete information on age, sex, BMI, smoking status, physical and mental health, and self-reported exercise-related activity. Table 1 summarizes participant characteristics for the whole group and by education category. Members of the three education categories were similar with respect to age, sex, BMI, and baseline Mental and Physical Component scores.

Education and Self-reported Physical Activity

The unadjusted median weekly caloric expenditure from exercise-related activities is shown in Table 1. Groups did not differ significantly in unadjusted expenditure from overall exercise, nor was there evidence of any trend across education groups. The groups did

differ, however, in unadjusted expenditure from moderate to vigorous exercise ($p < 0.01$), and a significant increasing trend in expenditure was evident as education increased ($p < 0.01$).

Table 2 presents adjusted estimates of median CHAMPS caloric expenditure measures and adjusted mean 6MWT distances by education category. The groups did not differ significantly in the adjusted caloric expenditure due to all exercise activity, and we did not detect a trend across the educational groups ($p = 0.13$). As with the unadjusted results, groups differed significantly in caloric expenditure due to moderate to vigorous exercise ($p < 0.01$), and an increasing trend was significant as educational attainment increased ($p < 0.01$).

Table 1
Characteristics and Unadjusted Outcome Measures
by Education Category among American Indian Elder Study Participants

	Less than High School Diploma	High School Graduate, GED, or Vocational	At Least Some College	Total
	(95% CI)	*(95% CI)*	*(95% CI)*	*(95% CI)*
Characteristic	*n = 17*	*n = 35*	*n = 55*	*n = 107*
Demographic Measures				
Age at interview, *mean*	59 (57, 60)	59 (57, 60)	58 (56, 59)	58 (57, 59)
Male sex, *%*	18 (4, 43)	31 (17, 49)	22 (12, 35)	24 (17, 34)
Body mass index, *mean*	30 (28, 33)	31 (29, 33)	30 (29, 32)	31 (29, 32)
Current smoker, *%*	41 (18, 67)	37 (21, 55)	29 (17, 43)	34 (25, 43)
Short Form-36				
Physical component summary, *mean*	46 (41, 51)	42 (39, 45)	42 (39, 45)	43 (41, 45)
Mental component summary, *mean*	49 (42, 55)	45 (41, 48)	48 (45, 51)	47 (45, 49)
Unadjusted Outcome Measures				
CHAMPS Exercise-Related Activity Level				
All activity, *median*	3,133 (1,743, 3,708)	2,967 (1,532, 4,905)	3,493 (2,723, 4,325)	3,422 (2,723, 4,101)
Moderate or higher intensity[†], *median*	838 (629, 1,376)	1,432 (507, 2,548)	1,449 (926, 2,255)	1,369 (926, 1,652)
6-minute walk distance[†], *mean*	1,198 (1,101, 1,294)	1,251 (1,145, 1,356)	1,416 (1,358, 1,482)	1,329 (1,279, 1,379)

CI = confidence interval
CHAMPS = Community Healthy Activities Model Program for Seniors Questionnaire
† p < 0.01

Table 2
Adjusted Outcome Measures by Education Category
among American Indian Elder Study Participants

	Less than High School Diploma	High School Graduate, GED, or Vocational	At Least Some Col- lege	$P_{(trend)}$
	Estimate (95% CI)	*Estimate (95% CI)*	*Estimate (95% CI)*	
Outcome Measure	*n = 17*	*n = 35*	*n = 55*	
CHAMPS Exercise- Related Activity Level				
All activity, *median*	2,658 (2,067, 2,793)	2,333 (2,103, 3,034)	2,990 (2,748, 3,430)	0.13
Moderate or higher intensity, *median*	888 (740, 941)	1,299 (1,008, 1,579)	1,638 (1,332, 1,988)	≤ 0.01
6-minute walk distance, *mean*	1,192 (1,093, 1,290)	1,250 (1,183, 1,318)	1,412 (1659, 1466)	≤ 0.01

CI = confidence interval
CHAMPS = Community Healthy Activities Model Program for Seniors Questionnaire

Education and Objective Physical Activity Performance

The bottom of Table 1 presents the objective physical activity outcome for each education category. The unadjusted mean 6MWT, measured only at week 6, differed significantly by education category ($p < 0.01$), and demonstrated an increasing trend over increasing educational attainment ($p < 0.01$).

As shown in Table 2, after adjustment for demographic and health-related covariates, education categories still differed significantly in adjusted mean 6MWT measures at week 6 ($p < 0.01$). The upward trend observable in this measure as education category increased was also significant ($p < 0.01$).

Discussion

Our study confirmed the previously reported positive relationship between educational attainment and physical activity levels in a sample of AI/AN elders. As in other studies with both majority (Harper & Lynch, 2007; Trost et al., 2002) and AI (Doshi & Jiles, 2006; Thompson et al., 2003) participants, higher levels of education were positively related to self-reported measures of physical activity. This association was specific to median caloric expenditure for moderately intense physical activities in both unadjusted models and after controlling for relevant demographic and health variables. A similar pattern of findings emerged on our behavioral outcome of physical activity performance. A significant

positive trend was found between higher levels of education and increased distance covered during the 6MWT, for both unadjusted and fully adjusted models. Our results are strengthened by the congruence between self-reported and performance-based outcomes. Furthermore, the utility of the 6MWT as a behavioral outcome is underscored, given its sensitivity in assessing physical fitness, and its brevity and ease of administration in the primary care setting (Enright et al., 2003; Solway et al., 2001).

Failure to engage in leisure-time physical activity is a commonly used self-reported index to classify individuals as physically inactive. Findings from the Behavioral Risk Factor Surveillance System found clear, stepwise trends in educational inequities and rates of physical inactivity (Harper & Lynch, 2007). Specifically, the 1990 survey noted that 51% of respondents with less than a high school education were classified as physically inactive compared to 34% of those who had completed high school, 25% with some college education, and 17% with at least a bachelor's degree. In the 2004 survey period, rates of physical inactivity slightly declined across all educational groups, but striking disparities in physical inactivity by educational attainment remained (Harper & Lynch, 2007). One explanation for the high levels of inactivity among AI/ANs is their generally low levels of education due to their lack of educational opportunities. In this regard, educational disparities are the greatest among AI/ANs compared to the general U.S. population, with lower educational attainment typically embedded within a broader system of other socioeconomic inequities, including poverty, unemployment, and poor health care (Castor et al., 2006; Warne, 2007).

Likewise, AI/AN women with some college education were 3 times more likely to be physically active than their counterparts who did not complete high school (Thompson et al., 2003). AI/AN women with less than a high school degree were also twice as likely to be classified as having no leisure-time physical activity in comparison to those with a college education (Doshi & Jiles, 2006). Other investigations from diverse tribal regions have shown either moderate (King et al., 2000; Whitt et al., 2004) or non-significant associations (Fisher et al., 1999; Harnack et al., 1999) between education and physical activity. Of note, half the AI/AN elders in our study had some level of college education, a rate similar to other samples examining physical activity levels in AI/ANs (Thompson et al., 2003). Even so, others have demonstrated that educational attainment does not reliably differentiate AIs who meet physical activity benchmarks established by the Centers for Disease Control and Prevention and the American College of Sports Medicine

(King et al., 2000; Thompson et al., 2003). Among AI women, other factors, such as exercise self-efficacy, perception of being in good health, and knowing other people who exercise have been found to predict meeting physical activity benchmarks (Thompson et al., 2003).

Promotion of physical activity among at-risk populations must take into consideration both the content of the material and the methods by which this information is delivered. Previous studies have found that educational resources distributed in the medical setting are written well above the average reading level of the U.S. population (Johnson & Stern, 2004; Wallace & Lennon, 2004). Materials for health and exercise promotion should therefore be adapted to an appropriate reading level for those populations with lower education levels. Acceptance of and adherence to physical activity guidelines can be enhanced by marketing campaigns that contain motivational, informative, thought-provoking, and persuasive messages (Brawley & Latimer, 2007). Linking physical activity messages to core cultural values (e.g., physical and spiritual healing) and practices (e.g., potlatches) may be particularly important in these populations (Kirby, Levesque, Wabano, & Robertson-Wilson, 2007). Delivery of physical activity interventions and health-related information may also vary between urban and rural environments. Studies suggest that urban-dwelling adults are twice as likely to meet physical activity benchmarks than rural residents (Parks, Houseman, & Brownson, 2003) Although differential facilitators and barriers to exercise exist between urban and rural environments, rural areas may need to emphasize the use of telephone-based motivational interventions to reach target populations (Kolt et al., 2006; Pinto et al., 2002).

Our study has several limitations and notable strengths. First, we did not assess other factors that influence physical activity levels, such as social support, neighborhood walkability, and the availability of places to exercise. These factors may mediate the education-physical activity relationship. Second, our findings may not be generalizable to younger AI/ANs or those residing in rural areas. Third, though not a goal of the study, we did not assess whether our participants met physical activity benchmarks established by the Centers for Disease Control and the American College of Sports Medicine, as did other studies of AIs (King et al., 2000; Thompson et al., 2003).

Despite these limitations, our study is unique in assessing the relationship between education and physical activity in a rarely studied group, AI/AN elders. Furthermore, unlike previous studies that have relied exclusively on self-reported physical activity (Doshi & Jiles, 2006; Fisher et al., 1999; Harnack et al., 1999; King et al., 2000; Thompson et al., 2003;

Whitt et al., 2004), we incorporated a behavioral outcome measure, the 6MWT. In addition, we did not rely on a single assessment of self-reported physical activity. Rather, we used changes in our physical activity measure across a 6-week trial as the outcome. Finally, our sample included both men and women, which extends previous research on the education-physical activity relationship that was limited to AI/AN women (Doshi & Jiles, 2006; Thompson et al., 2003).

Although disparities in physical activity and exercise engagement are evident among older, ethnically diverse populations, few attempts have been made to better understand demographic, personal, and environmental factors that affect this important health-related behavior. Routine physical activity can reduce the risk for many health problems disproportionately experienced by AI/ANs (Galloway, 2005). Future research should investigate novel, low-cost methods for promoting exercise in older AI/ANs, especially at the frequency and intensity levels recommended by public health agencies. Furthermore, several variables likely mediate and moderate the education-physical activity relationship; thus, future research with a larger sample will be necessary to explore these complex associations.

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Authors' Note

AMERICAN INDIANS AND NON-INDIANS PLAYING A SLOT-MACHINE SIMULATION: EFFECT OF SENSATION SEEKING AND PAYBACK PERCENTAGE

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Abstract: The research literature on gambling behavior indicates that American Indians (AIs) suffer from pathological gambling at a greater rate than the majority population. The literature also suggests that dispositional factors, such as sensation seeking, can influence gambling. However, situational factors, such as the payback percentage of a slot machine, may not. The present study recruited 12 AI and 12 non-AI participants to play a simulated slot machine in three different sessions. Half of the participants in each group were high sensation seekers. The other half were low sensation seekiers. Across the three gambling sessions, the simulation was programmed to pay back at a rate of 85, 95, or 105%. Results showed non-significant differences in gambling behavior between AIs and non-AIs and between high and low sensation seekers. Participants were, however, sensitive to percentage payback, playing more trials and betting more credits when the percentage was 105% than when it was 85 or 95%. The present results question whether ethnicity or certain personality characteristics, in and of themselves, are predictive of differences in individuals' gambling behavior. Results also suggest that people's gambling behavior is sensitive to winning and losing, but not to losing and losing even more. Implications for the study of gambling are discussed.

Pathological gambling is a maladaptive pattern of gambling behavior that persists despite significant negative consequences. In the *DSM-IV-TR* (American Psychiatric Association, 2000), pathological gambling is found under impulse-control disorders not otherwise specified and requires the individual to display at least five cognitive and/or behavioral symptoms to be diagnosed. Research suggests that the overall prevalence rate of pathological gambling ranges from 1% to 2% (see Petry, 2005 for a recent review), with some speculation that the growing availability of gambling opportunities may lead to an increase in the prevalence of pathological gambling.

Not all populations suffer from pathological gambling equally. For instance, it is estimated that American Indians (AIs) suffer from pathological gambling at up to 15 times the frequency of the majority population (Wardman, el-Guebaly, & Hodgins, 2001). Such differences are not isolated to pathological gambling; AIs also display increased frequencies of other disorders, such as alcohol and drug abuse, relative to the general population (e.g., Young, 1994). Comorbidity issues aside, Petry (2005) suggested minority-group membership (e.g., AI) as one of the six known risk factors for pathological gambling. Others risk factors include age, gender, substance use and abuse, marital status, and socio-economic status.[1]

Although the data indicate ethnic minority groups suffer from pathological gambling at a greater frequency than the majority population, the underlying reasons for this difference are neither simple nor straightforward. Increased prevalence rates may exist because there are inherent differences across ethnicities in terms of underlying causes of behavior (e.g., genetics). However, populations such as AIs differ from the majority population in other important aspects (e.g., socio-economic status, rates of substance abuse and psychopathology, etc. McDonald & Chaney, 2003; Zitzow, 1996; and see Petry, 2005). It is therefore possible that these other factors, and not ethnicity *per se*, contribute to heightened rates of pathological gambling in AIs. Yet another possibility is that the differences in gambling are cultural (e.g., how the different populations view gambling and/or what constitutes a gambling problem; see Raylu & Oei, 2004).

Some researchers have postulated that certain personality characteristics or dispositional factors contribute to gambling behavior and gambling problems. One such characteristic is the sensation-seeking personality (Zuckerman, 1979). Zuckerman suggested that one's arousal level plays an important role in maintaining gambling activity, in that high sensation seekers require higher levels of stimulation to maintain

an optimal level of arousal than do low sensation seekers. Zuckerman suggested that gambling is a form of sensation seeking "in which individuals risk loss of money for the positive reinforcement produced by states of high arousal during the period of uncertainty, as well as the positive arousal by winning" (p. 69). High sensation seekers would therefore be prone to develop into pathological gamblers due to their need for high levels of arousal and the reinforcing properties associated with large risks.

Sensation seeking among AIs appears to be associated with problem behavior. For instance, research has suggested that high sensation seeking among AI youths is related to their drug use (Howard, Walker, Walker, Cottler, & Compton, 1999). Zuckerman (2003) argued that existing evidence does not support the view that the trait of sensation seeking varies as a function of ethnic group. Regardless, if ethnic minority status is associated with heightened rates of gambling, then one could predict that high sensation-seeking ethnic minorities would display even higher rates of gambling than low sensation-seeking minorities (or perhaps even higher rates than high sensation-seeking individuals from the majority population).

Research on gambling has also investigated how environmental or situational factors can influence gambling behavior. For example, Weatherly and Brandt (2004) recruited non-pathological participants to play a simulated slot machine. Across groups (Experiment 1) or conditions (Experiment 2), the payback percentage (i.e., how well the simulation paid off) was varied across three different values (i.e., 75, 83, and 95%). The researchers also manipulated the value of the credits that participants bet (i.e., $0.00, 0.01, or 0.10 each). Results showed that participants' gambling varied systematically at the different credit values. Specifically, participants bet less as the value of the credits increased. However, their gambling behavior did not vary as a function of percentage payback, suggesting that behavior was insensitive to how well the simulation was paying off. Subsequent research (e.g., Weatherly, McDougall, & Gillis, 2006) has replicated the finding that increasing the salience of the money for which participants are gambling inhibits gambling behavior. However, additional research on participants' sensitivity to percentage payback rates has yet to be conducted.

The present experiment was designed to address the above issues. High and low sensation-seeking AI and non-AI participants were recruited to play a slot-machine simulation three separate times. Across these sessions, the percentage payback rate of the simulation was varied from 85 to 105%. The AI participants were also administered the

Northern Plains Bicultural Inventory (NPBI; Allen & French, 1993), which is designed to assess AIs' degrees of cultural identity with both their Native culture and the majority culture.

Given past research, several hypotheses were proposed. First, we predicted that the gambling behavior of the AI participants would exceed that of the non-AI participants. We also hypothesized that rates of gambling by the AI participants would be associated with their cultural identification. Specifically, we did not expect differences in gambling behavior for AI participants who identified more highly with the majority culture. We further hypothesized that participants who were high sensation seekers would gamble more than their low sensation-seeking counterparts. Finally, to be consistent with previous research, we predicted that participants' gambling behavior would not vary as a function of payback percentage when the percentages were less than 100% (i.e., losing percentages). However, we predicted that participants' behavior would be sensitive to payback percentage when the percentage was greater than 100% (i.e., a winning percentage).

Method

Participants and Materials

All phases of the present study, as well as the materials that were used, were approved by the University of North Dakota's institutional review board. Participants were recruited through the psychology department subject pool at the University of North Dakota and by circulating advertisements across campus specifically targeting AI students. Participants were required to be at least 21 years of age. A total of 63 individuals were originally screened for potential participation in the gambling sessions, using inclusion criteria that included age, score on the South Oaks Gambling Screen (SOGS; Lesieur & Blume, 1987), and score on the Zuckerman (1994) Sensation-Seeking Scale, form V (SSS).

During the initial screening, all participants were given a packet of materials including informed consent documents, a demographic questionnaire, the SOGS (Lesieur & Blume, 1987), and the SSS (Zuckerman, 1994). Participants identified as AIs and who were invited to participate in the gambling sessions were administered the NPBI (Allen & French, 1993) prior to the first gambling session.

The demographic questionnaire was designed to ascertain basic information about the sample. Participants were asked to provide their age, gender, year in school, and tribal affiliation, if applicable.

The SOGS (Lesieur & Blume, 1987) is a 20-item scale derived from the psychiatric criteria for pathological gambling that asks participants about their gambling history. It is the most widely used screening tool for gambling behavior and gambling problems (see Petry, 2005), with a score of 5 or more indicating the potential presence of pathological gambling. Individuals scoring 5 or more on the SOGS were not asked to participate in gambling sessions.

The SSS (Zuckerman, 1994) is a 40-item, forced-choice questionnaire that assesses thrill and adventure seeking. Items address the tendency to engage in sports or physically dangerous pursuits, experience seeking that involves changes in lifestyle and stimulation of the mind, disinhibition marked by outgoing social behaviors, and boredom susceptibility characterized by an inability to tolerate repeated experiences and monotony.

The NPBI (Allen & French, 1993) is a 30-item scale that was developed based on the Orthogonal Theory of Biculturalism (Oetting & Beauvais, 1990). The NPBI assesses cultural competence on two distinct cultural dimensions: American Indian Cultural Identification (AICI) and European American Cultural Identification (EACI). Those scoring high (above the median) on both subscales are considered Bicultural. Participants scoring high on AICI but low (below the median) on EACI are Traditional. Low scores on both subscales are considered Marginal, and high EACI and low AICI individuals are labeled Assimilated.

Of the 63 individuals who were initially screened, 35 were AI. Eight of these individuals did not qualify for participation due to their SOGS score (i.e., ≥ 5). Twenty-eight of the 63 individuals initially screened were non-AI. Of these individuals, 4 did not qualify for participation due to their SOGS score.

Excluding individuals who scored above 5 on the SOGS help ensure that pathological individuals were not allowed to engage in their pathology. To identify high and low sensation seekers, basic statistics were calculated on the SSS using the entire sample. An individual was deemed a high sensation seeker if that individual obtained a *z* score of +0.5 or higher. An individual was deemed a low sensation seeker if that individual obtained a *z* score of –0.5 or lower. These inclusion criteria guaranteed that high and low sensation seekers differed from each other by at least one standard deviation on the SSS. In terms of absolute

scores, these criteria resulted in individuals scoring 24 or higher on the SSS being considered high sensation seekers and those scoring 16 or lower being considered low sensation seekers.

A total of 24 individuals (13 female, 11 male), all non-pathological gamblers, were identified for participation. Twelve of the participants were identified AIs (as evidenced by membership in a Federally recognized tribe) whereas 12 participants were self-identified non-AIs. Participants earned extra credit in their psychology course for completing the screening information. They received money and extra credit in their psychology course for completing the gambling sessions.

Participants were divided into four groups: 6 AI high sensation seekers, 6 non-AI high sensation seekers, 6 AI low sensation seekers, and 6 non-AI low sensation seekers.

Procedure

Participants who qualified to participate in the gambling sessions played a customized version of the slot-machine simulation published by MacLin, Dixon, and Hayes (1999). Like the original version, this version had three reels with three symbols visible on each reel. This version differed from the original in that each individual outcome was preprogrammed rather than being randomly determined. The symbols appearing on the middle row determined a win or loss. The simulation was programmed to pay out 16 credits for every credit bet for three bars landing on the win line, 8 credits for three cherries, 4 credits for two cherries and a blank (in that order), 2 credits for one cherry and two blanks (in that order), and 1 credit for three blanks. Overall payback percentages were varied by arranging these different outcomes (with losses) across 150 potential trials.

The slot-machine simulation was loaded on a desktop computer. The computer was situated on a table located in a windowless room measuring approximately 3 m by 3 m. The researcher sat adjacent to the participant during the gambling session.

These 24 individuals each participated in three separate gambling sessions. Sessions differed in terms of the programmed rate of payback on the slot-machine simulation. The different payback percentages were 85, 95, and 105%. The order participants experienced these sessions was pseudo-randomly determined across participants. A preprogrammed series of outcomes was created for each of the three payback percentages. Thus, each participant experienced the same series of outcomes when playing the simulation as did other participants.

The first condition for each participant began with completion of the informed consent process. Participants who had self identified as AIs were also asked to complete the NPBI. The researcher then read the participant the following instructions:

You are about to play a computer-simulated slot machine that is programmed similar to those you would find at an actual casino. You have been staked with 100 credits to bet. Each credit is worth $0.05 for a total of $5.00. At the end of the three sessions you will be paid in cash for the total number of credits you have accumulated across all of the sessions. It should be your goal to end the session with as many credits as you can. How you accomplish that is up to you. You may bet one, two, or three credits per play by clicking on the appropriate button. You may quit playing at any time. The session will end when a) you decide to quit, b) you reach 0 credits, or c) 20 minutes have gone by. Do you have any questions?

If the participant had questions, the researcher repeated the appropriate passage of the instructions. Participants then played the simulation until one of the three criteria was met. The different gambling sessions were separated by at least 24 hours, with the above instructions read prior to each session. At the conclusion of the third gambling session, participants were debriefed, paid for their participation, provided with documentation of their participation for extra credit purposes, and dismissed.

Results

Table 1 presents the SSS scores for the four different groups. These data indicate that inclusion criteria created distinctly different groups in terms of sensation seeking. However, Table 1 also indicates that SSS scores were similar between the AI and non-AI groups.

Table 1
Mean SSS Scores (and Standard Deviations)
for Participants in Each Group

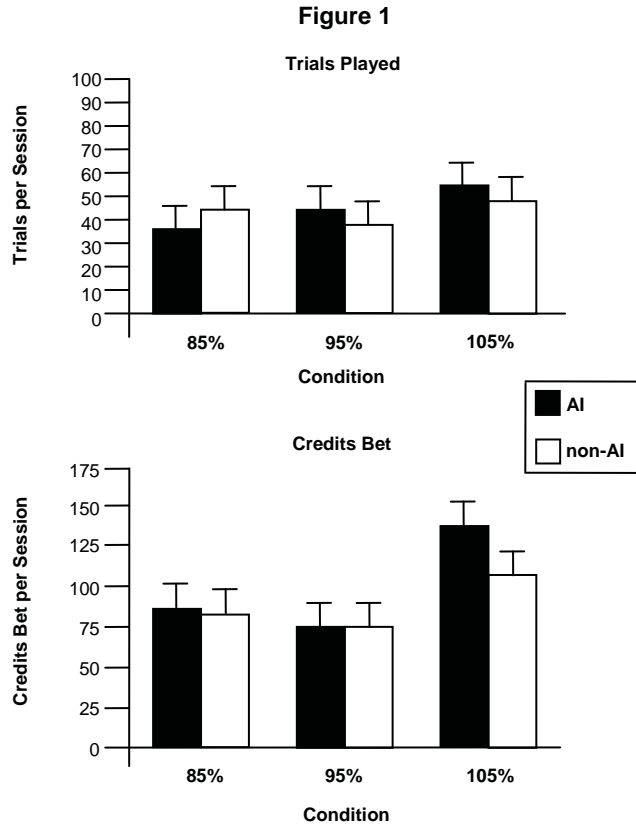|	American Indians	Non-Indians
High Sensation Seeking	Mean = 26.6, SD=2.87	Mean = 25.1, SD=1.39
Low Sensation Seeking	Mean = 14.5, SD=2.25	Mean = 11.6, SD=4.58

Gambling behavior on the slot-machine simulation was measured in two different ways. The first was the number of trials (i.e., bets made) participants played in each of the three gambling sessions. This measure was analyzed by conducting a three-way (Sensation Seeking X Ethnicity X Payback Percentage) mixed-model analysis of variance (ANOVA) on the number of trials played by individual participants in each of the three gambling sessions. Sensation seeking and ethnicity were each grouping factors. Payback percentage was a repeated measure. In this analysis, the main effect of sensation seeking was not significant $F(1, 20) = 1.11$, $p=.305$, $w^2 = .053$, indicating that high and low sensation seekers did not differ significantly in how many times they played the slot-machine simulation. The main effect of ethnicity was also not significant $F(1, 20) = .00$, $p=.960$, $w^2 = .000$, indicating that AI and non-AI participants did not differ in how frequently they played the simulation. The main effect of payback percentage was significant $F(2, 40) = 3.28$, $p<.048$, $w^2 = .01$, indicating that participants played a different number of trials across the three different payback percentages. However, a follow-up Tukey HSD test failed to find significant differences between any pair of sessions. The interaction between sensation seeking and ethnicity $F(1, 20) = 1.26$, $p=.275$, $w^2 = .059$, between sensation seeking and percentage payback $F(2, 40) = .21$, $p=.812$, $w^2 = .010$, between ethnicity and percentage payback $F(2, 40) = .34$, $p=.715$, $w^2 = .017$, and across all three variables $F(2, 40) = .70$, $p=.500$, $w^2 = .034$ each failed to reach statistical significance. Results from this analysis, and all that follow, were considered significant at $p<.05$.

The second measure of gambling was the total number of credits (i.e., total amount bet) participants wagered across the three different sessions. These data were also analyzed by conducting a three-way (Sensation Seeking X Ethnicity X Payback Percentage) mixed-model ANOVA. Results from this analysis again showed that the main effects of sensation seeking $F(1, 20) = .39$, $p=.539$, $w^2= .019$ and ethnicity $F(1, 20) = .44$, $p=.516$, $w^2= .021$ failed to reach significance, indicating that participants' betting behavior did not differ as a function of their SSS score or their ethnicity, respectively. However, the main effect of percentage payback was again found to be significant $F(2, 40) = 9.21$, $p<.001$, $w^2= .117$. A follow-up Tukey HSD test showed that participants bet more in at 105% payback percentage than at either the 85% or 95% payback percentages. Betting did not differ between the 85% and 95% payback percentages. The interaction between sensation seeking and ethnicity $F(1, 20) = 1.22$, $p=.282$, $w^2 = .058$, between sensation seeking and percentage payback $F(2, 40) = .23$, $p=.793$, $w^2 = .012$, between ethnicity

and percentage payback $F(2, 40) = 1.01$, $p=.372$, $w^2 = .048$, and across all three variables $F(2, 40) = 1.51$, $p=.233$, $w^2 = .070$ each failed to reach statistical significance.

Figure 1 presents the two significant main effects from the above analyses. The top graph presents the total number of trials played as a function of payback percentage for both groups of participants. The bottom graph presents the number of credits wagered as a function of payback percentage for both groups. As apparent in Figure 1, participants' behavior was similar when the percentage payback was 85 or 95%. However, both behavioral measures increased (betting significantly so) when the payback percentage was 105%.

Figure 1

Presented are the number of trials played and total number of credits bet by the mean of all American Indian (AI) and non-Indian (n-AI) participants at each different payback percentage. Error bars represent one standard error of the mean across participants responding at that particular payback percentage.

Finally, scores on the NPBI were analyzed by correlating the scores of the AI participants on each subscale (i.e., the AICI and EACI scores) with each measure of gambling, including the SOGS score. No significant correlations were found, indicating that the gambling behaviors of the AI participants did not vary systematically as a function of their cultural identification.

Discussion

The present study was designed to assess three different factors – ethnicity (and ethnic identity), sensation seeking, and sensitivity to payback percentages – when participants played a slot-machine simulation. Ethnicity was investigated because the literature suggests that ethnic minorities, especially AIs (see Wardman et al., 2001) are more prone to suffer from gambling problems than the majority population. The present study, however, found no differences in the gambling behavior of AI and non-AI participants. Sensation seeking was investigated because researchers (e.g., Zuckerman, 1979) have speculated that this dispositional factor can promote gambling and gambling problems. Again, however, the present results provided no evidence that participants who scored high on the SSS gambled differently on the simulation than did participants who scored low on the SSS. Finally, payback percentage was manipulated because prior results (Weatherly & Brandt, 2004) had suggested that gamblers' behavior was not sensitive to differences in how well slot machines pay off. The present results showed that participants' gambling was in fact sensitive to percentage payback, but only under certain conditions.

The failure to find differences in the gambling behavior of AI and non-AI participants is a somewhat surprising, but perhaps welcome, result. It is surprising because the literature (e.g., Wardman et al., 2001) indicates that AIs suffer from gambling problems at up to 15 times the rate of the majority population. That difference led us to predict that AI participants would gamble differently than non-AI participants. That prediction, however, was not supported.

One could, of course, argue that our failure to find a difference between AIs and non-AIs was the result of a lack of statistical power and thus represents a Type II error. This argument cannot be refuted. If we had employed a much larger sample size, it is possible that significant differences would have emerged.

It might also be suggested that since the AI sample consisted entirely of college students, they were not sufficiently "culturally dissimilar" in terms of self-identity from their majority-culture peers, thus

negating or at least suppressing a potential ethnicity effect. This question is an empirical one that future research can test. The fact that the current study recruited AIs who were enrolled at a university suggests that our sample was a select one, as it did not include AIs in other settings.

The present procedure used to identify high and low sensation seekers might also have served to mask differences that may have existed between AI and non-AI participants. That is, targeting low and high sensation seekers (and excluding "medium" sensation seekers) may have equalized the two ethnic groups. However, Zuckerman's (2003) claim that sensation seeking does not vary as a function of ethnicity would seem to argue against this possibility because it would suggest that ethnicity and sensation seeking are independent.

Null results are difficult to interpret and one should always be cautious when doing so. With that said, one could consider the failure to find differences in gambling between AIs and non-AIs in the present study welcome. Should this result be a valid one, it would suggest that differences in the prevalence rates of pathological gambling between these groups is not intrinsic or genetic, but rather is the outcome of other factors such as socioeconomic status.

The present experiment also failed to demonstrate an effect of the sensation-seeking personality. One could argue that this failure was due to sample size or to the researchers creating groups that did not truly differ in terms of sensation seeking. However, it is also possible that the SSS is not a good predictor of gambling behavior. For instance, although the SSS may provide a general measure of sensation seeking, it may be unrealistic to expect the instrument to predict behavior in any one particular situation. Prior research from our laboratory has demonstrated that other dispositions (e.g., depression) are not accurate predictors of gambling in a laboratory setting despite the fact that the literature suggests that those dispositions are associated with gambling (Dannewitz & Weatherly, 2007).

With both ethnicity and sensation seeking, one could also argue that differences in behavior were not found because the current study utilized only non-pathological participants. It is certainly possible that statistically significant differences may have emerged had we employed pathological gamblers. We would argue, however, that failing to find differences in gambling behavior in a non-pathological sample supports the conclusion that neither of these factors, in and of itself, necessarily produces differences in gambling behavior.

One might also question whether the present procedure was a legitimate test of gambling behavior because participants were not risking their own money. Rather, they were gambling money that had been staked to them. This concern can, however, be countered by findings in the research literature. Specifically, research on what is known as the "endowment effect" has demonstrated that people tend to take ownership of something that is given to them and are thus negatively impacted by its loss (e.g., Kahneman, Knetsch, & Thaler, 1990).

Finally, the present results partially replicate previous research on gamblers' sensitivity to percentage payback. That is, Weatherly and Brandt (2004) found, across two experiments, that participants gambled similarly at three different losing payback percentages. The present experiment programmed only two different losing payback percentages, but also found that participants' gambling behavior was similar across those two percentages. Unlike previous research, however, the present experiment also programmed one winning payback percentage and results showed that participants' gambling did change when faced with this contingency. Specifically, participants bet more credits than when facing losing contingencies. Technically, one cannot term this particular condition gambling. Because the payback percentage was above 100%, it would be more accurate to term it "investing."

The present results therefore suggest that gamblers' behavior may be sensitive to winning vs. losing. However, like previous research, they also suggest that gamblers are not sensitive to differences in percentage payback when those percentages are not in the players' favor. This outcome can certainly be detrimental to the player because it would potentially lead to large losses that could be avoided if one switched to a slot machine with a higher percentage payback rate. Future researchers might be well served by looking into procedures that may increase participants' sensitivity to such differences. If such a procedure could be perfected, then it may represent a significant step forward in our understanding (and treatment) of gambling behavior. The value of such research would further increase if conducted in a multicultural context.

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Footnote

[1] Risk factors are not necessarily causal factors. Rather, they are factors that are known to be associated with the disorder, in this case pathological gambling. Research suggests that ethnic minorities, young people, men, drug users, people who are single or divorced, and individuals at low socioeconomic status are more likely than their counterparts to become pathological gamblers.

Authors' Note

THE STRUCTURE OF DRINKING MOTIVES IN FIRST NATIONS ADOLESCENTS IN NOVA SCOTIA

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OBJECTIVE: The factor structure of the Drinking Motives Questionnaire - Revised (DMQ-R; Cooper, 1994) was examined in a sample of First Nations (i.e., Mi'kmaq) adolescents. RESULTS: Exploratory principal components analysis indicated a three-factor structure (conformity, coping, and positive reinforcement motives), with the positive reinforcement motives of enhancement and social motives not separating into the expected two distinct factors. Moreover, community informants (e.g., school personnel) anecdotally indicated possible wording problems with some of the social motive items for the cultural group. A qualitative methodology - focus group interviews with Mi'kmaq adolescents - was used to explore potential reasons for these observed differences in the structure of drinking motives from previous findings in the majority culture (i.e., a measurement problem vs. a real difference in the structure of drinking motives in the Mi'kmaq culture). CONCLUSIONS: Qualitative findings support the interpretation that a true social motive for alcohol use does not exist in this cultural/age group and that drinking in social contexts for this group seems less motivated by social affiliation than by enhancement motives (e.g., drinking to party).

In Canada, 4.4% of the population is composed of individuals who identify themselves as Aboriginal (Aboriginal people can include Indian, Métis, and Inuit peoples, as recognized in the Constitution of

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Canada; Statistics Canada, 2001). Unfortunately, the abuse of alcohol and other substances is consistently reported as a major problem in Aboriginal communities (Health Canada, 2003); these communities are well aware of the negative role that alcohol plays in the health of their people. In the Aboriginal Peoples Survey (Statistics Canada, 1991), 73% of First Nations respondents reported that alcohol was a problem in their communities. This situation is not unique to Aboriginal youth in Canada; similar problems are faced by American Indian and Alaska Native (AI/AN) communities in the U.S. For example, Spicer et al. (2003) found that that alcohol dependence for AI men was twice the national average. Data from the Indian Health Service and the Centers for Disease Control and Prevention indicate that alcohol-related hospitalizations among AIs are disproportionately high (Indian Health Service, 1995; Centers for Disease Control and Prevention, 1992). Clearly, there is a need for culturally relevant intervention programming designed to address the issue of alcohol abuse within Aboriginal groups, and for early intervention programming to prevent alcohol problems in Aboriginal young people.

When developing interventions for use with Aboriginal groups, the appropriateness of assessment measures derived from majority cultures must be considered. The validity of such measures when used with Aboriginal groups cannot be assumed. Intervention design is dependent upon appropriate assessment; inappropriate assessment may lead to less-than-optimal interventions. For example, when assessing adolescents' motives for drinking, it is important to appreciate cultural diversity and the effects this diversity might have on the validity of psychological measures (Kuntsche, Stewart, & Cooper, 2008). Drinking motives that might be common within a majority culture simply may not apply within other communities or groups. This difference may lead to confusion when culturally inappropriate items (designed to tap a specific but culturally exclusive construct) on a measure are encountered. If measures are broadly applied across varying cultures, one can reasonably expect that not all items would be relevant for all groups (for more, see Mushquash & Bova, 2007).

Adolescents within a group may drink for different reasons, which must be taken into consideration when developing prevention and treatment programs. For example, a treatment approach for an individual who consumes alcohol to cope with negative feelings would be different than that for an individual who consumes alcohol to enhance experiences. Sub-typing drinkers on the basis of their reasons for drinking facilitates the ability to design appropriate and individually

specific prevention and treatment programs with more accuracy and effectiveness (Conrod, Pihl, Stewart, & Dongier, 2000). Such grouping can only be done when considering both the nature of the questions on a measure, and the overall factor structure of the measurement model within the cultural group with which the measure is intended to be used.

Cox and Klinger (1988, 1990) proposed a framework for categorizing motives for drinking in which they recognized that people drink to obtain various valued outcomes. This model was adapted by Cooper (1994), who characterized drinking motives along two underlying dimensions. These dimensions reflect the valence (which can involve positive or negative reinforcement) and the source (internal or external) of outcomes that an individual might hope to achieve by drinking. What emerges is a four-factor model that crosses valence by source, whereby individuals may drink to obtain a positive outcome (positive reinforcement) or to avoid a negative outcome (negative reinforcement), and whereby they may drink to achieve an internal reward (e.g., change in affective state) or an external reward (e.g., change in social environment). Each of the four resultant factors represents a distinct motive for drinking (enhancement, social, coping, and conformity).

Enhancement motives are internally generated and positively reinforcing. They reflect the crossing of the positive reinforcement valence, and internal source dimensions (i.e., drinking to enhance pleasurable emotional states). Social motives are externally generated and positively reinforcing. Individuals who are motivated to drink for social reasons are externally controlled, seeking to obtain positive social drinking outcomes (i.e., affiliation with others). Coping motives are internally generated and negatively reinforcing (i.e., drinking to cope with negative emotions), and the remaining motive, conformity, is externally generated and negatively reinforcing (i.e., drinking to reduce social censure; see Cooper, 1994).

The ability to identify and classify individuals along these four drinking motives has important implications for intervention and treatment. If the goal of programming is to lessen the harm of drinking, then determining why a person drinks becomes vital. By targeting individuals' reasons for drinking, the appropriate tools can be provided to enable them to change. Further, some motives have been related to more normative and less risky drinking behavior, while others have been associated with heavier and more problematic drinking, at least in the majority culture. For example, social motives are endorsed more often than any others and are associated with light, infrequent, and

nonproblematic alcohol use among adolescents and young adults from the majority culture (Cooper, 1994; Stewart et al., in press). Conversely, coping motives have been related to heavier, problematic drinking in these groups (Cooper, 1994). In addition, social motives are related to drinking in social settings while coping motives have been related to drinking alone (Cooper, 1994). Again in contrast to social motives, enhancement motives have been shown to positively predict a pattern of heavy alcohol use and drinking in situations conducive to heavy drinking, and to be related to alcohol problems by virtue of their association with heavier consumption (Cooper; Stewart et al.). Determining why an individual drinks is important to ensure that the right issues are being addressed, whether in educational or therapeutic settings.

Study 1

An intervention program (described in detail elsewhere) developed in collaboration with First Nations school-based partners and students, was implemented in two Aboriginal communities in Atlantic Canada (Comeau et al., 2005; Mushquash, Comeau, & Stewart, 2007). This program sought to prevent alcohol misuse by Aboriginal adolescents at risk for alcohol abuse, using a risk-reduction approach. At-risk adolescents were those who scored above one standard deviation on specific personality traits (Anxiety Sensitive, Hopelessness/Negative Thinking, and Sensation Seeking) associated with problematic alcohol use as measured by the Substance Use Risk Profile Scale (SURPS; Woicik, Conrod, Stewart, & Pihl, 2008; Krank, Stewart, Wall, Woicik, & Conrod, 2008). As part of the assessment process to screen for eligible intervention participants, the Drinking Motives Questionnaire - Revised (DMQ-R) was administered to students in four high schools (grades 8-12) in two First Nations communities within Nova Scotia. For this study, data collected from Mi'kmaq students were analyzed. Data were collected across 2 school years and pooled to enable an adequate sample size for factor analysis.

Method

Participants

The screening sample consisted of 164 adolescents (84 female, 80 male) from grades 8 to 12. The mean age of the sample was 16.3 years (*SD* = 1.3) and the average education obtained was grade 10. Of

the total pooled sample, 153 students reported using alcohol in the previous 4 months and were included in the analysis (nondrinkers were excluded because the DMQ-R response format requires respondents to be drinkers). Students reported drinking 5-6 or 7-9 drinks per drinking occasion, (M = 3.35, SD = 1.451; on a Likert-type scale of 1 to 5, with each number representing a range of drinks: 1 = *1 to 2 drinks*; 2 = *3 to 4 drinks*; 3 = *5 to 6 drinks*; 4 = *7 to 9 drinks*; 5 = *10 or more drinks*), and drinking at least 2 to 3 times per month, (M = 2.41, SD = 1.447; on a Likert-type scale of 1 to 5).

Measures

The DMQ-R is a 20-item self-report measure designed to quantify adolescents' reasons for drinking alcohol. It is based on an earlier version (DMQ; Cooper, Russell, Skinner, & Windle, 1992) which was designed to measure three distinct drinking motives (coping, enhancement, and social) in adult samples. The revised version was specifically designed to measure the four drinking motives described in Cooper's (1994) model in adolescent samples, and also included the conformity motives subscale. Respondents rate their relative frequency of drinking alcohol for the four reasons (social, enhancement, coping, and conformity), each tapped by five items, on a 5-point scale, with 1 = *almost never/never* and 5 = *almost always/always*. For the purposes of this study, if values were missing from participants' DMQ-R data, the mean of the subscale was used. Each subscale has five values; if two or fewer values were missing from the subscale, the mean of the remaining values was used. If more than two values in a subscale were missing, the participant was excluded from the analysis.

Data Analysis

In order to explore the factor structure of the DMQ-R, an exploratory principal components factor analytic methodology was employed, because no work had previously been done with the DMQ-R in this population. As well, oblique rotation was used because of the previously observed intercorrelation of the factors on this measure in adolescents (Cooper, 1994) and young adults (Simons, Correia, Carey, & Borsari, 1998; Stewart, Zeitlin, & Samoluk, 1996; Stewart, Watt, Zvolensky, Mushquash, Eifert, & Samoluk, in press) from the majority culture. In the present study, there were mild to moderate correlations (three-factor solution: .260 - .408; four-factor solution: .159 - .415) between the factors.

Results

      Kaiser's eigenvalue > 1 criterion for factor extraction supported a four-factor solution (four eigenvalues greater than 1.00; Table 1). When a four-factor solution was examined, 64.77% of the variance was accounted for, but the structure matrix was not interpretable within the DMQ-R framework. Social and enhancement motives loaded on the same factor (1; 41.25% variance explained) and a factor made mostly of coping items emerged (3; 6.98% variance explained). The remaining two factors were composed of items from other motives, with one factor (2; 11.04% variance explained) made mostly of conformity items (and some coping items) and one factor (4; 5.50% variance explained) representing only one item from the measure (see Table 2). Because the fourth factor had only one item with a salient loading, the four-factor solution clearly represented factor over-extraction. Thus, the four-factor solution showed poor simple structure (Thurstone, 1947). Because of the relatively small subject-to-variable ratio, loadings > .60 were considered salient; this criterion is quite strict, but helps ensure the reliability of the solution.

Table 1
Eigenvalues for Obliquely-rotated Factor Analysis

| Component | Eigenvalues | | |
	Total	% of Variance	Cumulative %
1	8.250	41.251	41.251
2	2.209	11.043	52.294
3	1.396	6.980	59.274
4	1.101	5.503	64.777

      When a three-factor solution was examined, slightly less variance was accounted for (59.27%), but the factor solution better reflected the DMQ-R. As with the four-factor solution, Factor 1 accounted for the most variance and was composed of social and enhancement motive items. Factor 2 was composed of items from the coping motive. Factor 3 was made up of items from the conformity motive (see Table 3). Thus, the three-factor solution was theoretically interpretable and showed excellent simple structure.

      When a two-factor solution was forced, factors reflecting positive reinforcement (Factor 1) and negative reinforcement motives (Factor 2) emerged. Although this two-factor solution was more parsimonious, the three-factor solution provided more detail as it separated the negative reinforcement factor into coping and conformity motives. While we did not conduct a confirmatory factor analysis (which would have allowed us to test if the incremental information provided by splitting coping and

conformity motives over a generic negative reinforcement motive was a significant improvement in model fit), the three-factor solution more closely reflected the theorized model (Cooper, 1994). A single-factor solution was not examined as it would simply be a reflection of a general motivation to drink or a proxy measure of drinking frequency.

Table 2
Structure Matrix for Obliquely-rotated, Four-factor Solution
(N = 153 drinkers)

DMQ-R Item	Factor 1 - Enhancement Motives	Factor 2 - Social Motives	Factor 3 - Coping Motives	Factor 4 - Conformity Motives
Enhancement Motives Subscale				
13. Because it gives you a pleasant feeling	.834*	.347	.438	.172
18. Because it's fun	.876*	.252	.323	-.002
7. Because you like the feeling	.749*	.344	.310	.201
9. Because it's exciting	.779*	.399	.239	.187
10. To get high	.635*	.512	.463	.285
Coping Motives Subscale				
17. To forget about your problems	.458	.489	.739*	.032
1. To forget your worries	.181	.285	.694*	.012
4. Because it helps you when you feel depressed or nervous	.425	.344	.852*	.130
6. To cheer up when you are in a bad mood	.391	.351	.813*	.122
15. Because you feel more self-confident and sure of yourself	.479	.693*	.524	.029
Conformity Motives Subscale				
20. So you won't feel left out	.405	.812*	.476	.170
12. To fit in with a group that you like	.405	.775*	.420	.235
19. To be liked	.277	.881*	.384	-.030
8. So that others won't kid you about not drinking	.207	.654*	.108	.533
2. Because your friends pressure you to drink	.103	.156	.101	.844*
Social Motives Subscale				
5. To be sociable	.496	.499	.464	.393
3. Because it helps you enjoy a party	.715*	.231	.298	.479
14. Because it improves parties and celebrations	.780*	.275	.382	.064
11. Because it makes social gatherings more fun	.841*	.391	.423	.112
16. To celebrate a special occasion with friends	.766*	.245	.329	-.032

Extraction method: Principal Component Analysis
Rotation method: Oblimin with Kaiser Normalization
*loading >.60
Loadings for Factor 3 have been multiplied by -1.00 to aid in interpretability

Table 3
Structure Matrix for Obliquely-rotated, Three-factor Solution
(*N* = 153 drinkers)

DMQ-R Item	Factor 1 - Enhancement/ Social Motives	Factor 2 - Coping Motives	Factor 3 - Conformity Motives
Enhancement Motives Subscale			
13. Because it gives you a pleasant feeling	.837*	.419	.278
18. Because it's fun	.866*	.327	.139
7. Because you like the feeling	.782*	.303	.316
9. Because it's exciting	.778*	.261	.372
10. To get high	.645*	.471	.470
Coping Motives Subscale			
17. To forget about your problems	.463	.758*	.279
1. To forget your worries	.190	.673*	.104
4. Because it helps you when you feel depressed or nervous	.440	.795*	.173
6. To cheer up when you are in a bad mood	.405	.766*	.184
15. Because you feel more self-confident and sure of yourself	.476	.631*	.500
Conformity Motives Subscale			
20. So you won't feel left out	.409	.597	.679*
12. To fit in with a group that you like	.412	.525	.689*
19. To be liked	.268	.581	.669*
8. So that others won't kid you about not drinking	.229	.165	.788*
2. Because your friends pressure you to drink	.150	-.042	.499
Social Motives Subscale			
5. To be sociable	.514	.450	.510
3. Because it helps you enjoy a party	.736*	.207	.348
14. Because it improves parties and celebrations	.777*	.374	.178
11. Because it makes social gatherings more fun	.839*	.431	.291
16. To celebrate a special occasion with friends	.757*	.340	.119

Extraction Method: Principal Component Analysis
Rotation Method: Oblimin with Kaiser Normalization
*loading >.60

Discussion

The hypothesized four-factor model did not emerge in this analysis. One reason why the solution was different from the expected theoretical model might be sample size. Gorusch (1983) recommended a minimum of five subjects per variable. Higher subject-to-variable ratios are generally better (Tabachnick & Fidell, 2001); small sample sizes yield

unstable factors in factor analysis, as correlation coefficients estimated from small samples tend to be less reliable (Tabachnick & Fidell). The DMQ-R has 20 items, and only 153 respondents were included in the analysis; this translates to a subject-to-variable ratio of 7.7:1. Given the stringent guidelines with respect to the classification of loadings (salient loadings > .60), this ratio is acceptable.

It may be that a three-factor solution better represents the drinking motives of Mi'kmaq youth. In particular, it may be that, within this group, there is an association of drinking in social contexts with enhancement motives leading to a confounding of social and enhancement motives. This would indicate that Cooper's (1994) model and the DMQ-R need to be modified to ensure that the measure is valid for use with this cultural group. This finding speaks to the issue of cultural appropriateness; anecdotal evidence from school personnel indicated potential problems with some of the social motive items. For example, community informants indicated that the word "sociable" (DMQ-R item 5) is not typically used within the Mi'kmaq culture and thus the respondents may not have been able to adequately answer the social motive item that used this term. However, it is unclear whether the findings were related strictly to problems with inappropriate wording and language, or if the three-factor solution was related to a structural difference in drinking motives in this sample.

Study 2

Because of the emergence of a three-factor model, a qualitative study was conducted to help elucidate the reasons why the social and enhancement motives were not separating into two distinct factors in this cultural/age group.

Method

Participants

This study purposively sampled participants from the screening sample who were identified as being at high risk for alcohol-related problems (i.e., who scored higher than one standard deviation on the SURPS) and participated in the intervention, as well as students who were identified as being at high risk who did not participate in the intervention. In addition, a group of students who participated in the intervention by contributing artwork to the intervention manuals, but who were not in

the high-risk category, participated in the focus groups. This additional group was included to avoid potential confounds associated with sampling only high-risk individuals. For example, it may be that there is no social motive for drinking among high-risk drinkers, and sampling only this group would bias the results in that direction. As well, many of the high-risk students had participated in the intervention and may have been affected by the material in such a way as to change their previous motivations for drinking (Mushquash et al., 2007).

Apparatus

The seven open-ended questions from the Motivational Information – Reasons for Drinking section of the Comprehensive Drinker Profile (CDP; Marlatt & Miller, 1984) formed the guide for the qualitative interviews. This section of the CDP was previously used in developing the intervention. Specifically, it was used to identify scenarios and stories in which community adolescents felt motivated to drink. It was chosen for use in the present study because it captures the source and valence of reasons for drinking, similar to the structure of Cooper's (1994) model, but in an open-ended manner suitable for use in a group-based interview. In addition to directly querying about reasons for drinking, the CDP asks about the most positive effects or consequences associated with drinking, as this is an indirect way to get at why young people drink. In other words, finding out what they think are positive effects of drinking can help clarify their desired consequences of, or motives for, drinking.

Procedure

Students were interviewed in small groups of 5 to 10 at their respective schools. A culturally relevant Sharing Circle format, in which students sat quietly and respectfully, taking turns sharing openly without judgement from others, was used to ensure that participants could feel free to communicate their feelings and opinions in a way that was safe; the interviewer was a First Nations young adult from a different group in Canada. All relevant procedures used to protect participants' confidentiality were described to the students and, following their assent, the focus group interviews were audiotaped. Upon the recommendation of our community partners, parental consent was not sought so as not to create potential child-protection issues. Audiotapes were later transcribed and data were analyzed for predominant themes. The focus groups could have consisted of students from three pools of potential participants: those who participated in the interventions, those who were eligible but did not participate in the interventions, and those who

were at low risk). Generally speaking, the focus groups consisted of more high-risk youth than low-risk. There was roughly a similar distribution between students who participated in the interventions and those who did not.

Results

"No one has ever asked those kinds of questions before, so it's kind of hard to think about."

The above quotation – perhaps the most powerful comment made during the interview process – was obtained from one student in response to the query about why young people drink alcohol. It came from a young woman in one of the groups and served to demonstrate two points: that there is a need for this type of exploration with Aboriginal youth, and that the students took this opportunity to share very seriously and gave an appropriate effort. The students appeared very honest when giving their responses, despite the subject matter, and some gave personal anecdotes and related stories about situations they had experienced.

Why Do You Drink?

"I drink a lot, any time I get the chance."

As illustrated by the quotation, the students drank for a lot of reasons and in a lot of different contexts. However, additional probing of those various reasons for drinking did not reveal motivations that could be considered social. The other three motives were represented well by reasons such as: stress, escape from reality, numbing, frustration, anger, and depression (Coping); friends use it, to fit in (Conformity); and boredom, "to do things you wouldn't normally do," and "to get high" (Enhancement). Unlike enhancement, conformity, and coping motives, a social motive for drinking did not spontaneously emerge when the students were queried about why they drink alcohol. Although responses such as "friends use it" and "to party" seem on the surface to be an acknowledgement of social motives, they clearly emerged instead as conformity and enhancement motives when the initial responses were further probed.

Social motives have been linked to lighter and less problematic drinking than enhancement, coping, and conformity motives (Cooper, 1994) but should not necessarily be equated with light drinking. Participants identified that they were aware of light social drinking in mainstream culture. They recognized that a social motive for drinking existed outside of their community, but it had negative connotations for them; they implied that individuals who drank for that reason were 'snobs'. This attitude was demonstrated by the following quotation:

"In France…there are people who drink occasionally, but they are antisocial."

When asked what they felt were the most positive effects or consequences associated with drinking alcohol, the groups had difficulty identifying any. Some described the numbness and 'buzz' as positive effects, but none spontaneously mentioned social affiliation as a possible positive consequence of alcohol, again suggesting the absence of a social motive in this cultural/age group. In contrast, there was much agreement with the following statements, made by a number of students:

"There's nothing positive about drinking."

"[I] can't think of a positive reason at all."

"Nothing, there's nothing positive. Nothing's good."

What is Negative?

In contrast to the overall group consensus that there is nothing positive about drinking (save some acknowledgement of enhancement and coping effects, as numbness is typically considered a coping or escape motive), the groups did describe a number of negative effects and consequences associated with drinking alcohol. These included acute negative effects (blacking out, passing out, and alcohol poisoning), high-risk behavioral effects (fighting, making trouble, driving while intoxicated, physical/sexual abuse, and suicide), residual negative effects (hangovers, guilt, relationship break-ups, family dissolution, and financial problems), and long-term health effects (stomach ulcers and "killing yourself slowly"). It was clear that most of the group members had been exposed to many of these negative effects and consequences, and many gave personally relevant examples of the negative consequences of alcohol among their friends and families.

General Discussion

The studies described sought to examine the motives for drinking among a group of Mi'kmaq adolescents in Nova Scotia. A factor-analytic study demonstrated that the theorized four-factor model of drinking motives (Cooper, 1994) did not emerge in this group of adolescents. Instead, it was demonstrated that a three-factor model better fit the data, with social and enhancement motives failing to separate into two distinct factors. In order to examine why this was the case, a qualitative study followed up with open-ended, semi-structured interview questions designed to tap motives for drinking (internal and external as well as positively and negatively reinforcing) and perceived positive and negative effects of alcohol in this cultural group from adolescents' own perspectives. This method allowed them to identify the reasons for drinking in their cultural group in their own words, unconstrained by the content of items on a questionnaire developed by researchers for use with another cultural group (i.e., the majority culture).

The participants most often described motives for drinking that would fall into a coping category. These students described drinking because they were depressed, frustrated, angry, lonely, sad, and stressed. They used alcohol to cope with interpersonal conflict and to numb their feelings with respect to the emotions listed previously. Numbing was one of the few positive effects of alcohol that was spontaneously acknowledged in the group interviews). The coping motive for drinking is a high-risk motive and is particularly concerning given the young ages of the participants. This internally generated negative reinforcement motive (coping) to reduce or regulate negative emotions occurred quite frequently in the descriptions of these adolescents about the reasons for drinking in their culture and age group.

The next most commonly discussed motive in the interviews was the internally generated positive reinforcement motive (enhancement), which involves alcohol use to improve mood or increase emotional well-being. This group used alcohol in response to boredom and to enable them to engage in "fun" (high-risk) behaviors that they would not normally engage in while sober. In addition, alcohol was commonly used to get high and to bring about the pleasurable feelings they experienced while under the influence. This finding would be consistent with an enhancement motive rather than a coping (with boredom) motive for alcohol use. Achieving a buzz (i.e., an enhancement-motivated drinking effect) was the only other positive effect besides numbing that was noted by the group when they were directly asked what is good about drinking.

The conformity motive also emerged quite clearly in this group. Participants described that they drank alcohol because their peers did, and to fit in:

"That's the way it is when you are younger. It's all peer pressure. You say no, you don't want to get drunk and they [friends] say you should. You see how much fun they have and then you are curious. They [friends] accuse you of being afraid, or not living."

Some participants described pressuring their friends to use alcohol as well. Further, the focus groups revealed that students who did not engage in alcohol consumption were considered to be "out group" members and were sometimes mocked or scoffed at. The drinkers teased the nondrinkers about being "nerds."

Although the participants in the qualitative interviews did not spontaneously cite a social motive for drinking, when directly queried, they did offer that drinking occurred in some social contexts like parties (e.g. birthdays) and other celebrations. However, upon further probing, it became quite clear that this apparent social drinking motive was not related to peer affiliation or being social *per se*, but was much more demonstrative of enhancement-motivated drinking. That is, the social-context drinking described was heavy and high risk rather than light and nonproblematic, and the desired outcome for these social drinking occasions was typically heavy intoxication. This finding helps clarify and explain the previous factor analytic findings that social and enhancement motives load together in this group. Specifically, this group's conceptualization of socially motivated drinking is captured more accurately by the definition of enhancement-motivated drinking.

There is evidence that both abstainers and heavy drinkers exist in AI/AN cultures, with fewer people who drink in moderation (Heath, 1989). The question of whether there is a social drinking motive in these cultural groups is important. If the cultural view is that the spectrum of drinking behavior is polarized, i.e., drinkers (problematic) versus nondrinkers (nonproblematic), then this view would represent a structural difference in drinking motives. Majority culture views on alcohol use are more continuous, with the continuum of alcohol use including nondrinkers, non-problem drinkers, problem drinkers, and those with severe alcohol use disorder (Sobell, Wagner, & Sobell, 2003).

In a risk-reduction model of intervention, the goal is a movement toward less harmful forms of drinking behavior (e.g., socially motivated drinking; Cooper, 1994). If a social motive is not present in this group, then

abstinence may be the only healthy outcome for Mi'kmaq adolescents and interventions should be adapted accordingly. Alternatively, perhaps this group could be taught to drink for less risky social affiliative reasons. The goal here would be to create a healthier fourth motive (social) for drinking. However, if this motive for drinking does not fit within the cultural understanding of alcohol use and there are few models within the community who display this reason for drinking, then such harm reduction attempts may not be successful.

Summary

Cooper's (1994) four-factor model of drinking motives was examined within the Mi'kmaq culture by administering the DMQ-R to Mi'kmaq adolescent students in four high schools in two First Nations communities in Nova Scotia. The theorized four-factor model was not supported; instead, a three-factor solution emerged with social and enhancement motives failing to separate into two distinct factors. This three-factor solution likely did not represent factor over-extraction (given that Kaiser's criterion supported four factors) and was theoretically interpretable within Cooper's (1994) model as it was the only solution that separated the negative reinforcement factor into separate coping and conformity motives.

Subsequent qualitative methods (interviews administered in focus groups) were used to examine potential reasons why three factors emerged instead of four. The most important finding was that the social motive for drinking seemed not to exist in this cultural group. That is, there was an absence of clear content on social motives for drinking in adolescents' spontaneously generated answers to a question probing reasons for drinking. In addition, the motive that this group labeled as social (drinking that occurs during social celebrations, birthday parties, etc.) appeared to be more representative of enhancement-motivated drinking and included heavy alcohol use. Most importantly, intoxication – rather than social affiliation – appeared to be the desired outcome of drinking in such social contexts.

This paper examined the structural validity of the DMQ-R. In order to explore other types of validity, the relationships between the subscales of the DMQ-R and other measures will need to be examined. This further research will clarify both the convergent validity (i.e., relationships that would be expected, based on theory) and discriminant validity (i.e., relationships that would be theorized not to exist) of this measure. While

reliability and structural validity are critical first steps, future research will need to examine whether the new proposed structure has better concurrent and predictive validity in this group.

A potential limitation of the research is the fact that young people might have difficulty discussing such sensitive information in the presence of peers, as they were asked to do in the focus groups; discussing social motives within what could be seen as a social context (i.e., focus group) could prevent students from speaking about their experiences with alcohol in a social context. However, it became clear that the students were speaking very openly and honestly, as evidenced by the content of the focus group data and verification from adults (i.e., guidance counselors) who are very familiar with the students and the contexts in which they drink. As well, this paper did not include an investigation of the community's goals and values with respect to alcohol use, and how these goals and values might fit with youths' reasons for drinking (e.g. differences in perceptions around alcohol and the possible lack of social drinking role models to emulate safer, socially motivated drinking). Future investigation of this topic would be helpful.

Clinically, the most important implications are the need for an adjustment to interventions based on risk-reduction models and a consideration of a different scoring procedure for the DMQ-R in this cultural group. A risk-reduction approach would suggest that a movement toward less harmful (i.e., social; Cooper, 1994) motivations for drinking is the most effective goal within the intervention framework. Because of the association of the social motive with light, infrequent, and nonproblematic drinking behavior (in the majority culture; Cooper, 1994), a movement toward this motive for drinking could reduce harm. However, because social drinking motives did not emerge within this group, abstinence may be the only healthy outcome supported in the community for Mi'kmaq adolescents. With this population, scoring the social motive items on the DMQ-R as enhancement motives may identify individuals' motives for alcohol use more clearly than the traditional scoring method, which may identify potentially problematic use patterns (enhancement) as nonproblematic (i.e. social). These implications for treatment and prevention require further investigation.

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