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THE RELATIONSHIP BETWEEN DIABETES SELF-EFFICACY AND DIABETES SELF-CARE IN AMERICAN INDIANS AND ALASKA NATIVES

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Abstract: *The objective of the present study was to investigate how American Indian/Alaska Natives' (AI/ANs') attitudes and beliefs might influence how they experience and manage diabetes, with particular attention paid to their attitudes about disease causality. An AI/AN sample of 119 participants completed an anonymous survey that examined the impact of judgments of personal responsibility for disease onset, anger, self-blame, social support, and diabetes self-efficacy on diabetes self-care. Our primary model was tested using structural equation modeling. Results indicated that, while many participants considered themselves almost entirely responsible for their disease onset, this judgment did not predict anger. Anger was strongly related to self-blame and social support, while diabetes self-efficacy was strongly related to diabetes self-care. These psychosocial variables accounted for 70% of the variability in self-reported disease management.*

In 2010, there were an estimated 285 million adults with diabetes worldwide; some researchers expect that by the year 2030, that number will rise to 439 million (Shaw, Sicree, & Zimmet, 2010). The alarming growth rate and the existence of life-threatening complications (e.g., heart disease, kidney disease) underscore the need for a more complete understanding of the intricacies of appropriate diabetes self-care. Moreover, diabetes disproportionately affects particular minority groups (e.g., Latino/as, African Americans, American Indians and Alaska Natives [AI/ANs]), and imposes a heavy burden in terms of the risk of complications and mortality (Burrows, Geiss, Engelgau, & Acton, 2000). In AI/AN communities, diabetes is considered a particularly significant public health issue. Burrows et al. (2000) found that between 1990 and 1997, the prevalence of diagnosed diabetes among AI/ANs increased by 29%. Within a similar timeframe, the prevalence of diabetes in AI/AN adolescents rose by a startling 68% (Acton et al., 2002). These trends highlight the importance of understanding and promoting lifelong diabetes self-care strategies in AI/AN communities. The objective of the present study was to examine how AI/ANs' attitudes and beliefs might influence how they experience and manage diabetes, with particular attention paid to their attitudes about disease causality and personal responsibility for disease onset.

Judgments of Personal Responsibility for Diabetes Onset

Diabetes is a potentially preventable and controllable disease, and research indicates that lifestyle change can be effective in preventing and/or delaying the onset of type 2 diabetes (Diabetes Prevention Program Research Group, 2002; Knowler et al., 2009). Based on this evidence, one governmental initiative, *Healthy People 2020*, encourages personal responsibility for reducing the risks and complications associated with diabetes (U.S. Department of Health and Human Services, 2011). Positive individual lifestyle choices, such as healthy eating and engaging in regular physical activity, are emphasized. But this type of initiative necessitates a more complete understanding of the cognitive, emotional, and sociocultural challenges and consequences of being held accountable for one's own health status.

There are at least two ways that information about personal responsibility for disease onset might influence individuals who have diabetes. First, information about disease causality might influence diabetes patients from an *interpersonal* perspective, or how others perceive them. Weiner's (1995) theory of social motivation provides a theoretical framework to examine beliefs about personal responsibility from this perspective. Weiner (1995) argued that, if there is a judgment that a particular person was the cause of a negative event, an inference that the cause was controllable, and an absence of mitigating circumstances, the individual will be judged by others to be responsible for the event onset. Weiner contends that being judged personally responsible for the onset of a negative event (e.g., diabetes) could lead others to be angry and assign blame, and could influence the person's subsequent behavior. Weiner, Perry, and Magnusson (1988) found that perceptions of personal responsibility for the onset of a variety of medical conditions (e.g., obesity, drug addiction, AIDS) were associated with more anger and blame, decreased liking, and a reduced magnitude of charitable assistance and helping behavior offered to the target.

Second, information about disease causality might influence how diabetes patients perceive themselves. A study that examined Weiner's (1995) model from an *intrapersonal* perspective found that individuals' perceptions of their personal responsibility for disease onset were significantly related to anger and self-blame (DePalma, Rollison, & Camporese, 2011). This study, however, was conducted with a small sample of largely non-Hispanic White participants; thus, the generalizability of this model to other populations remains untested.

Judgments of Personal Responsibility for Diabetes Onset in AI/AN Groups

Many AI/ANs believe that diabetes within their community is a result of the Westernization that occurred during the 19th and 20th centuries, which led to a loss of their traditional healthy diet (Devlin, Roberts, Okaya, & Xiong, 2006; Dillinger, Jett, Macri, & Grivetti, 1999). However, some AI/ANs do assign judgments of a more personal responsibility for diabetes onset, and these explanations may play an important part in disease management. In a study of AIs living in New Mexico Pueblo communities, mentors/educators suggested that the belief that one was personally at fault for his or her diabetes onset was associated with a fear of social stigma and feelings of personal shame (Griffin, Gilliland, Perez, Upson, & Carter, 2000). These factors, in turn, were thought to have discouraged participation in healthy lifestyle education sessions (Griffin et al., 2000). Thus, self-blame and fear of social stigma may negatively impact health promotion efforts associated with diet, exercise, and preventive health screening.

Interpersonal Relationships

Weiner contends that there are important social implications for individuals held accountable for a negative event; these individuals tend to elicit greater anger and blame from the people in their environment, and they tend to get less help and are liked less (Corrigan, Markowitz, Watson, Rowan & Kubiak, 2003; Weiner, 1995; Weiner et al., 1988). For these reasons it is important to examine the social implications of being held responsible for one's own diabetes onset. One dynamic feature of interpersonal relationships is the provision of social support, which has been found to be significantly related to diabetes self-care (Schafer, McCaul, & Glasgow, 1986). Supportive behaviors from friends, family, or significant others may include praise for following a healthy diet or an expressed willingness to exercise together (Lewin et al., 2005). Nonsupportive behaviors, or negative social support, may include criticism for not exercising regularly or nagging about blood glucose testing (Lewin et al., 2005). AI/AN family and community members have been shown to impact diabetes management by providing a supportive environment that encourages increased physical activity (Thompson, Wolfe, Wilson, Pardilla, & Perez, 2003). Conversely, familial constraints also have been shown to be incompatible with many AI/AN women's personal decisions to adopt a healthier diet or seek preventive screening services (Taylor, Keim, Sparrer, Van Delinder & Parker, 2004; Thompson et al., 2003). Individuals with diabetes who reported more nonsupportive social behavior from significant others also reported less effective diabetes self-care behavior (DePalma et al., 2011).

Predicting Diabetes Self-Care Behavior: The Role of Self-Efficacy

From an intrapersonal perspective, increased self-blame, in conjunction with the perceptions of nagging and criticism may serve to erode self-efficacy. Self-efficacy is confidence in one's ability to perform a particular behavior, and is expected to influence the likelihood of behavioral occurrence (Bandura, 1977). For example, if a significant other repeatedly argues with a diabetes patient about disease management, disparages the patient for not testing his/her blood sugar appropriately, or criticizes the patient for not exercising regularly, it may erode the patient's confidence in his/her ability to manage the disease appropriately.

Individuals with lower levels of self-efficacy have been shown to be more likely to perceive diabetes self-care activities as a burden (Weijman et al., 2004), and evidence indicates that enhancing self-efficacy can result in more effective diabetes management (van de Laar & van der Bijl, 2001). According to several researchers, self-efficacy may be a critical indicator of diabetes self-care (King et al., 2010; Nouwen et al., 2011; van de Laar & van der Bijl, 2001). Two qualitative studies with small AI/AN samples have examined the role of self-efficacy in diabetes management. In a sample of 22 AI/AN women with gestational diabetes, Jones et al. (2012) expressed concern that AI/AN women may not have confidence that they can prevent or delay the onset of diabetes. In a sample of 18 AI/AN adults, Shaw, Brown, Khan, Mau, and Dillard (2013) identified social support and self-efficacy as two central resources to increase the likelihood of positive health outcomes.

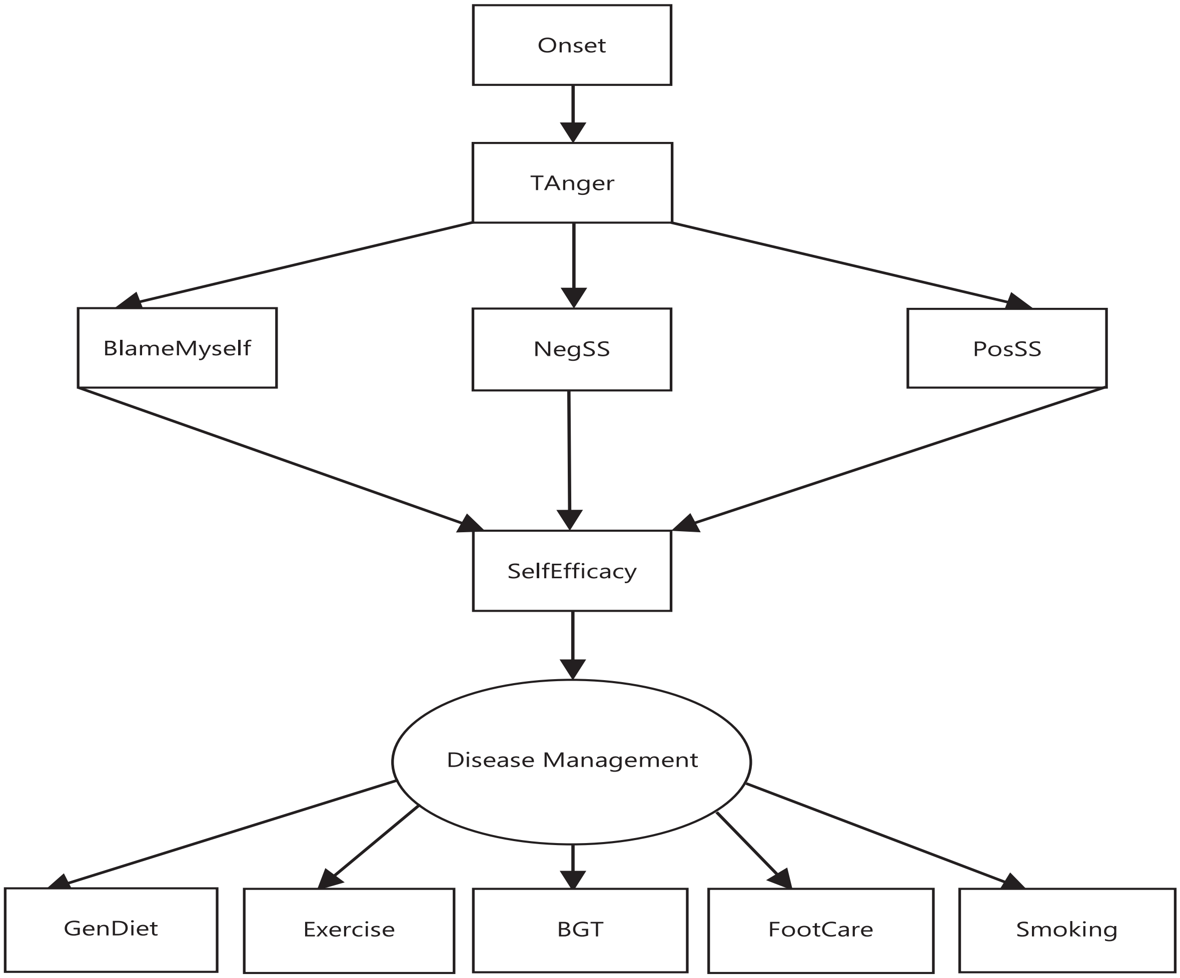
Depression

Depressive symptoms often are comorbid with diabetes (Li, Ford, Strine, & Mokdad, 2008), and depression is almost twice as common in adults with diabetes than in those without diabetes (Gonzalez et al., 2007). Gonzalez and colleagues (2007) found that major depression was significantly related to poor adherence to a number of self-care behaviors, including dietary recommendations and exercise, and to less frequent self-monitoring of blood glucose. Those individuals who reported some depressive symptoms, but did not meet the criteria for major depression, still showed lower adherence to self-care behaviors, suggesting that even mild depressive symptoms may diminish disease management. Li et al. (2008) examined data from the 2006 Behavioral Risk Factor Surveillance System and reported that the rate of major depression was 27.8% for AI/ANs—the highest rate among all ethnic groups identified. Depression may impede successful diabetes self-care behaviors in AI/AN communities, and is important to assess.

Hypotheses

The objective of the present study was to examine, from an intrapersonal perspective, how AI/ANs' perceptions of disease causality might influence how they affectively experience and behaviorally manage their diabetes. As can be seen in the proposed model in Figure 1, we hypothesized that an individual's initial judgment of personal responsibility for diabetes onset would lead to increased self-blame and anger. The increased anger also would be associated with greater perceived nonsupportive social behavior. These increases in nonsupportive social behavior would, in turn, be associated with decreases in diabetes self-efficacy. Diabetes self-efficacy was hypothesized to be the mechanism through which these psychosocial variables would ultimately influence diabetes self-care. We also explored whether increases in self-blame and decreased diabetes self-efficacy might be associated with depression.

Figure 1
Model Representing the Proposed Relationship Between Judgments of Responsibility for Disease Onset, Trait Anger, Self-blame, Perceived Social Support and Self-efficacy and Disease Management



METHODS

Procedure

Approval for this study was obtained from the College Review Board for Human Subjects Research at Ithaca College. Participants were recruited from those in attendance at a conference in North Dakota on issues related to AI/ANs and aging. A member of the Native American Council on Native American Aging provided tabled information to conference attendees, including information about personal care, home health care, respite care, and referral services. Posters were attached to the information table that advertised the survey in order to recruit participants. Participation was restricted to individuals with diabetes who were 18 years of age or older. The participants filled out a voluntary, anonymous paper-and-pencil survey, which took approximately 20 minutes. Participants placed their completed surveys in a drop box and were given a $5 gift card in appreciation of their participation.

Participants

Of the 119 individuals who participated, 117 self-identified as AI or AN. Two individuals did not self-report this information, but their inclusion did not change any result.

Materials

The survey consisted of scales measuring judgments of personal responsibility for disease onset, anger, self-blame, perceived supportive and nonsupportive social behaviors, diabetes self-efficacy, and disease management. Participants also were asked to self-report race, and chose the option: American Indian or Alaska Native. Disease type was measured by asking participants “With which type of diabetes have you been diagnosed?” (type 1, type 2, I don’t know, or I don’t have diabetes). Participants also reported other basic demographic information (e.g., age, education, marital status, height, and weight). Finally, participants responded to questions measuring depression. The reliability of the multi-item scales used in the survey also was assessed; the mean, standard deviation, and reliability for each scale can be found in Table 1. Reliability analyses indicated satisfactory internal reliability across all measures.

Table 1
Descriptive Statistics for Factors Related to Disease Management

Variable	Number of Items	Sample Score Range	Means	*SD*	Cronbach's Alpha
Personal Responsibility - Onset	1	0-10	7.49	3.23	-
State-Trait Anger Expression Inventory-2 - Trait Anger	10	10-39	14.29	4.60	.89
Self-blame	1	1-4	1.96	1.00	-
Diabetes Family Behavior Checklist - Positive	9	9-36	17.90	6.87	.78
- Negative	7	7-24	12.14	4.77	.74
Self-efficacy	7	0-10	6.15	2.73	.90
Center for Epidemiologic Studies Depression Scale	20	0-32	14.22	7.62	.77
Summary of Diabetes Self-care Activities (SDSCA) - General Diet	2	0-7	4.50	1.96	.82
SDSCA - Blood Glucose Testing	2	0-7	4.24	2.55	.91
SDSCA - Foot Care	2	0-7	4.72	2.39	.75
SDSCA - Exercise	2	0-7	3.08	2.41	.83
SDSCA - Smoking Status	1				
Yes 20.2%					
No 79.8%					

Primary Measures

Personal Responsibility and Self-Blame

Judgments of personal responsibility for disease onset was assessed by asking: "How responsible do you perceive yourself to be for the onset of your diabetes?" Responses ranged from 0 (*not at all responsible*) to 10 (*entirely responsible*). DePalma et al. (2011) adapted this item from Weiner's (1995) measures to represent a very specific personal responsibility for diabetes onset.

Consistent with the work of Karlsen and Bru (2002), self-blame was measured by asking: "How do you generally react when you experience diabetes-related stressful events: I blame myself" with response options ranging from 1 (*I usually don't do this at all*) to 4 (*I usually do this a lot*). To our knowledge, neither of these measures has been used in AI/AN samples.

Anger

The 10-item Trait-Anger subscale of the State-Trait Anger Expression Inventory-2 (Spielberger, 1999) was used to measure trait anger. Ten items assessed the degree to which an individual expressed both an angry temperament (e.g., “I am quick tempered”) and an angry reactionary style (e.g., “It makes me furious when I am criticized in front of others”). Scores range from 10-40, with internal reliability ratings surpassing .80 (Spielberger, 1999). This measure has been used successfully before in an AI/AN population (Schultz, 2006).

It was important to measure dispositional anger; that is, we wanted to know how these people believe they are *generally* (trait anger), not at a particular moment in time (state anger). Dispositional anger could create an important (and continuous) interaction with the social environment—particularly with those people who are providing social support.

Social Support

The Diabetes Family Behavior Checklist (DFBC) was selected as a diabetes-specific measure of family support of, or interference with, the diabetes self-care regimen (Schafer et al., 1986). In this 16-item scale, each item is rated on a scale of 1 (*never*) to 5 (*at least once a day*). Two separate subscales reflect perceived supportive or positive social support behaviors (e.g., encouragement and praise; 9 items) and nonsupportive or negative social support behaviors (e.g., nagging and criticism; 7 items). The nonsupportive subscale has been shown to correlate concurrently and prospectively with adherence to glucose testing, diet, and insulin injections; supportive DFBC scores were not related to these adherence measures (Schafer et al., 1986). Schafer et al. (1986) report that test-retest reliabilities ranged from .69 (nonsupportive) to .84 (supportive). Lewin et al. (2005) replicated the two-factor structure of the DFBC, and reported high internal consistency (Cronbach’s $\alpha = .71$ to .79). This measure of social support is rarely used with AI/AN adult samples, but Jiang et al. (2012) administered a 4-item subset to a very large sample of AI/AN participants, and reported reasonable internal consistency (Cronbach’s $\alpha = .64$).

Self-Efficacy

While there are global measures of general self-efficacy, measures also exist for more specific diabetes self-efficacy. Diabetes self-efficacy was measured using “Section III - Self-Efficacy” of the Multidimensional Diabetes Questionnaire (MDQ; Talbot, Nouwen, Gingras, Gosselin, & Audet, 1997). This scale consists of 7 items assessing how confident the participant is in his or her ability to perform specific diabetes self-care tasks (e.g., “How confident are you in your ability to follow your diet?” and “How confident are you in your ability to test your blood sugar at the recommended frequency?”). Talbot et al. (1997) ratings ranged from 0 (*not at all confident*) to 100 (*very confident*). In the present study, to be more consistent with the presentation of other similar included items, each item is rated on a scale of 0 (*not at all confident*) to 10 (*very confident*). That is, we changed the numerical response options, retained numbers on a comparable scale, and retained the identical text anchors. Although the psychometric properties of the MDQ have not been reported in AI/AN populations, Sacco and Bykowski (2010) report Cronbach's alpha of .90 in their study of 124 diabetes patients.

Disease Management

The Summary of Diabetes Self-Care Activities Measure (SDSCA) is an 11-item self-report scale with 6 subscales designed to assess important components of diabetes self-care: general diet (2 items), specific diet (2 items), exercise (2 items), blood glucose testing (2 items), foot care (2 items), and smoking status (1 item; Toobert, Hampson, & Glasgow, 2000). For example, participants are asked, "On how many of the last seven days did you participate in at least 30 minutes of physical activity?" In an analysis of 7 studies using the SDSCA, Toobert et al. (2000) report acceptable inter-item correlations (M=0.47) and moderate test-retest correlations (M=0.40). These authors, however, indicate that the specific diet subscale consistently exhibits poor psychometric properties, as did findings from the present study (Cronbach's $\alpha = .19$). As a result, the specific diet subscale was excluded from the present study, leaving 5 remaining subscales: general diet, exercise, blood glucose testing, smoking, and foot care (Toobert et al., 2000). To our knowledge, this measure has not been reported in an AI/AN sample.

Secondary Measures

Body Mass Index (BMI)

Participants were asked to self-report height and weight. Using this information we were able to estimate BMI using Quetelet's index, which is body weight (in pounds) divided by stature (in inches squared; Gallagher et al., 1996).

Depression

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was used to measure depression. This scale has been shown to have high internal consistency and presents 20 items to assess the way the participant has felt during the past week (Radloff, 1977). Each item is rated from 0 to 3, where 0 = *Rarely or none of the time (less than 1 day)* and 3 = *All of the time (5-7 days)*; total scores can range from 0 to 60, with higher numbers indicating higher levels of depression. A meta-analysis conducted by Kim, DeCoster, Huang, and Chiriboga (2011) provides evidence that the factor structure of the CES-D replicates across racial/ethnic groups—a comparison which included AI samples.

Design and Analysis

We begin with a presentation of descriptive statistics of our demographic data, and include reliability analyses. We then turn to our inferential analyses. Our primary model was tested using structural equation modeling with AMOS 21.0. Given an existing theoretical model that is represented by a series of structural equations, this analytic method enables a simultaneous assessment of the overall model. Because the psychometric properties of our disease management measure (SDSCA) have not been reported in AI/AN samples, a two-stage testing sequence included first conducting a confirmatory factor analysis that tested the adequacy of the measurement model for this measure. We then tested the full latent variable model. Because there is no single accepted measure of model fit, several criteria were used to assess model fit and parsimony, including a non-significant chi-square, a high goodness of fit index, and low root mean square error approximation, which generally indicate an acceptable model (Hooper, Coughlan, & Mullen, 2008).

RESULTS

Descriptive Information

Sociodemographic and descriptive information about the sample can be found in Table 2. The sample largely consisted of older females with type 2 diabetes who were married/partnered. Participants were between the ages of 41 and 85 years ($M = 65.78$, $SD = 8.24$). The sample included 18 men and 98 women (three did not report their sex). The average level of education attained was some college credit, but less than one year; education ranged from completion of the 7th grade to the attainment of a doctoral degree.

After applying a Bonferroni correction factor for multiple comparisons (Darlington, 1990), the measures of BMI, education, gender, and marital status were not related to any of the variables in the structural model, nor were they related to the latent construct of diabetes management. As age increased, however, diabetes self-efficacy increased ($r = .36$, $p < .001$, $\eta^2 = .13$).

Table 2
Sociodemographic Information

Characteristic	Number	Percentage
Gender		
Male	18	15.5%
Female	98	84.5%
Relationship		
Married/partnered	48	41.4%
Widowed	39	33.6%
Divorced	17	14.7%
Separated	5	4.3%
Never married/partnered	7	6.0%
Education		
7th-12th grade (no diploma)	24	20.5%
High school graduate	32	27.4%
Some college	28	23.9%
Associates degree	10	8.5%
Bachelors degree	14	12.0%
Masters degree	6	5.1%
Professional degree	2	1.7%
Doctoral degree	1	0.9%
Disease Type		
Type 1		9.8%
Type 2		77.7%
Do not know		12.5%

Characteristic	Range	Mean	*SD*
Age (years)	41-85	65.78	8.24
Age of diabetes onset (years)	4-75	48.26	14.94
Body Mass Index	17.15-51.76	32.18	5.95

BMI

Of the 119 participants, 109 provided their height and weight. The data indicate that the sample population had very high frequencies of overweight (BMI = 25.0-29.9; *n* = 33, 30.2%) and obese adults (BMI = 30.0 and above; *n* = 68, 62.3%).

Judgments of Personal Responsibility for Diabetes Onset

The participants' mean rating for how responsible they feel for the onset of their diabetes was 7.49 (*SD* = 3.23). In fact, 44.5% of participants rated themselves as *entirely* responsible for the onset of their diabetes. Disease type (type 1 [*M* = 8.10] or type 2 [*M* = 7.36]) was not related to perceptions of personal responsibility for disease onset [$F(2, 103) = .31, p > .05$], and the associated effect size hovered near zero ($\eta^2 = .006$, power = .10).

Secondary Measure: Depression

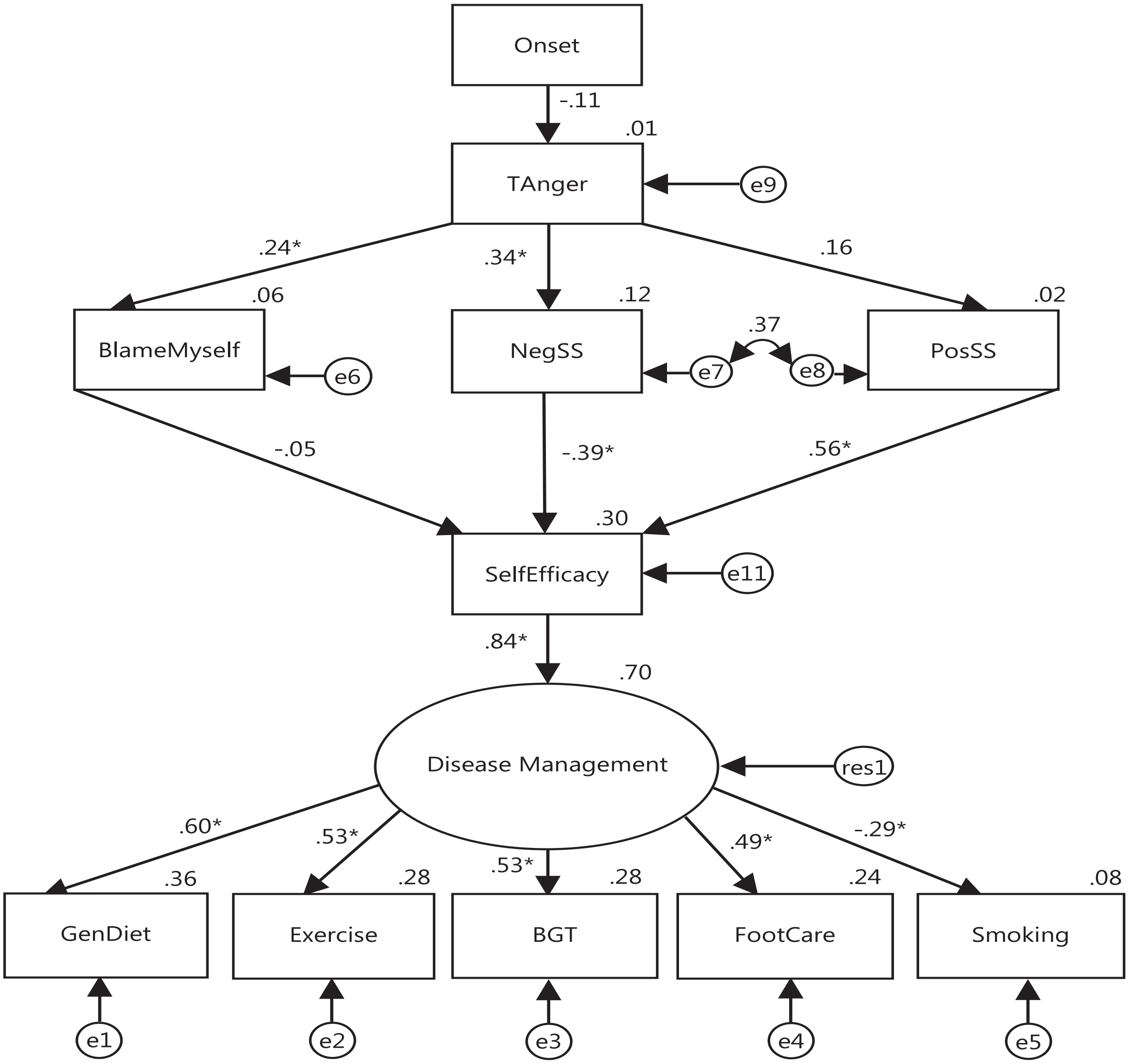
For the 81 subjects who completed the CES-D in full, scores ranged from 0-32 (*M* = 14.22, *SD* = 7.62). Analysis of the frequency distribution indicated that 37% of this sample was above the cutoff score of 16, which is typically suggestive of depression (Kim et al., 2011). Furthermore, although depression scores were uncorrelated with perceptions of personal responsibility for disease onset ($r = -.06, p > .05, \eta^2 = .004$), self-blame ($r = .22, p > .05, \eta^2 = .04$), and diabetes self-efficacy scores ($r = -.19, p > .05, \eta^2 = .04$), depression scores were positively related to trait anger ($r = .39, p < .01, \eta^2 = .15$) and negative social support ($r = .29, p < .025, \eta^2 = .08$).

Inferential analyses

SDSCA Confirmatory Factor Analysis (CFA)

The initial measurement model was evaluated using CFA techniques to predict the latent construct of disease management from the five subscales of the SDSCA (see Figure 2). Model fit statistics indicated an acceptable fit, and offered no reason to reject the model, $\chi^2\ (5) = 5.3, p = .38$; TLI = .97, CFI = .99, PCFI = .33, RMSEA = .02, Hoelter .01 = 336. As can be seen in Figure 2, measures associated with general diet, exercise, blood glucose testing, foot care, and smoking were all significantly related to the latent construct of disease management. This model is consistent with the expectation that these variables would be reliably related to diabetes self-care, and provides support for the underlying structure of the SDSCA as a measure of disease management in AI/AN samples. No theoretically meaningful modification indices were offered. This model was accepted as an adequate representation of disease management; therefore, the full latent variable model was constructed.

Figure 2
Structural Equation Model Representing the Relationship between Judgments of Responsibility for Disease Onset, Trait Anger, Self-blame, Perceived Social Support and Self-efficacy and Disease Management[1,2]



[1] Numerical output includes the standardized regression coefficients and the squared multiple correlations

[2] e1-e11 represent error terms, and res1 is the residual associated with the latent construct of disease management

* Significant pathways

The Full Latent Variable Model

The structural model represented the proposed relationship among perceptions of personal responsibility for disease onset (ONSET), anger, and self-blame (Weiner, 1995). It also incorporated the two subscales of the DFBC to represent supportive (PosSS) and nonsupportive (NegSS) social behavior, and presented diabetes self-efficacy as the mechanism by which these variables influence diabetes management (see Figure 2). Figure 2 reports the standardized regression coefficient for each path, as well as the proportion of variance explained. The initial model indicated an adequate model fit, χ^2 (41) = 42.99, $p = .39$; TLI = .98, CFI = .98, PCFI = .61, RMSEA = .02, Hoelter .01 = 180. Exploratory analyses indicated that, although depression was significantly related to anger, the incorporation of depression into the model produced inferior and unacceptable models. Similarly, depression was not significantly related to the latent construct of disease management (C.R. = -1.207, p = n.s); as a result, this variable was excluded from consideration in this model.

Contrary to our hypotheses, judgments of personal responsibility for disease onset failed to have a significant effect on any variable. Specifically, the results revealed no significant relationship between participants' perceptions of personal responsibility for diabetes onset and feelings of anger, and the associated effect size hovered near zero ($\eta^2 = .006$, power = .12). Given the proportion of participants who endorsed complete personal responsibility for diabetes onset, we performed an exploratory log transformation to normalize the variable. Even under these circumstances, there was still no significant relationship between perceptions of personal responsibility for diabetes onset and anger, and the effect size again hovered near zero ($r = .06$, $p > .05$, $\eta^2 = .004$).

Participants' level of anger, however, was significantly and positively related to self-blame and to increased perceived nonsupportive social behavior. No significant relationship between anger and perceptions of positive social support emerged. As perceptions of nonsupportive social behavior increased, diabetes self-efficacy decreased. Diabetes self-efficacy was strongly related to disease management, and, as can be seen in Figure 2, the six psychosocial variables in the model together explained 70% of the variance in self-reported disease management.

DISCUSSION

Judgments of personal responsibility for a negative event are hypothesized to produce anger, which then influences subsequent behavior (Rudolph, Roesch, Greitemeyer, & Weiner, 2004). Research has supported the causal nature of this cognition-emotion-behavior sequence, including a meta-analysis of helping behavior which examined dozens of studies (Rudolph et al., 2004). However, much of this research is of an interpersonal nature; the work largely examines the impact of cognitions and affect on judgments about, and social behavior toward, others. Although an intrapersonal application of this modeled sequence has been supported in a small sample of non-Hispanic White participants (DePalma et al., 2011), it is not consistent with how the present sample of AI/ANs represents their own disease causality. The present results indicate that nearly 45% of the AI/AN sample perceived themselves to be entirely responsible for their diabetes onset; however, this perception was unrelated to anger and diabetes self-care. This is an important finding because it indicates that different groups may have different cognitive models about disease causality that could influence social behavior (interpersonal) and, ultimately, diabetes self-care (intrapersonal). We believe that these cognitive models are not invariant, and that it is our obligation to acknowledge this, and to refine the utility of the application of these models. The primary issue now will be to identify the relevant differences in these samples that are responsible for the differences in model fit. This investigation could be initiated through qualitative semi-structured interviews within an AI/AN sample. For example, one might investigate the relevance of the concept of "fatalismo" as it relates to these interests (Walker, Smalls, Hernandez-Tejada, Campbell, Davis, & Egede, 2012). The present study serves to highlight the need for continued research that investigates the role that attitudes may play in these modeled cognitive sequences, from both inter- and intrapersonal perspectives.

Notably, AI/AN samples have been largely unrepresented in tests of this model, both in general and with specific reference to diabetes self-care. Many of the studies in this domain focus either on student samples or on non-Hispanic White participants (Henry, Reyna, & Weiner, 2004; DePalma et al., 2011; Weiner et al., 1988). Others do not have sample sizes appropriate to statistically analyzing the cognitive processes across AI/AN groups (Bauerle, Amirkhan, & Hupka, 2002; Cameron, Payne & Knobe, 2010). The present work provides support for a recommendation by Corrigan and Watson (2007), who suggest oversampling of ethnic subgroups that have not been represented, or have been underrepresented, in tests of various cognitive models.

While greater perceptions of personal responsibility for disease onset might be expected in individuals with type 2 diabetes, disease type (type 1 or type 2) was unrelated to perceptions of personal responsibility for disease onset in the present study. Although there were substantially unequal sample sizes, perceptions of personal responsibility were slightly greater in participants with type 1 diabetes; however, this trend did not approach significance. Ultimately, however, it is important to recognize that the actual disease type is not as important to the current research as is the *perception* of personal responsibility. Interestingly, in this AI/AN sample, perceptions of personal responsibility for disease onset were of little consequence to other measured variables.

The distinction between perception of personal responsibility for disease onset and disease treatment is of considerable importance. However, the impetus for the present study was to understand the implications of being held accountable for the *onset* of one's own health status. While perceptions of personal responsibility for disease treatment might actually be considered more important given that disease onset has already occurred, we were primarily directed at first understanding the nature of the influence of information about disease causality on disease management.

The present findings regarding the importance of appropriate social support closely replicate the results of previous investigations (Taylor et al., 2004; Thompson et al., 2003), but they do so in an AI/AN sample. The data suggest that social support systems could increase praise and encouragement and reduce nagging and criticism to promote better disease management. This finding appears with some consistency across cultural backgrounds, and within intra- and interpersonal domains.

Adding diabetes self-efficacy to the model significantly improves the prediction of diabetes self-care. Sarkar, Fisher, and Schillinger (2006) provided evidence that the magnitude of the association between self-efficacy and self-management was consistent across racial and ethnic groups; however, only two AI/AN participants were included in their sample of 408, making comparisons with this group impossible. Thompson et al. (2003) found that self-efficacy was important in their sample of largely Navajo and Pueblo participants, but their interest was in relating self-efficacy to physical exercise, and no information about diabetes status was presented. In the present sample, perceived supportive social behavior was positively related to increased diabetes self-efficacy. Participants who reported more praise and encouragement also reported significantly higher diabetes self-efficacy. Conversely, the data indicate that nonsupportive social behavior was significantly related to decreased diabetes self-efficacy, and AI/ANs' diabetes self-efficacy was strongly related to self-reported diabetes management. Theoretically, nagging and criticism could erode an individual's confidence in his/her ability to manage the disease, thereby diminishing diabetes self-care behavior.

Beyond the theoretical importance associated with studying attitudes about disease causality, there is also tremendous practical importance to studying the same. These data suggest that behavioral and psychosocial interventions or educational initiatives designed to incorporate information about disease causality could have an entirely different impact across groups, or perhaps have no impact at all. For example, the present data suggest that any educational initiatives designed to address information about disease causality could have little influence on the self-care behavior of these AI/ANs; instead, these data strongly suggest that educational initiatives should focus on improving social support and diabetes self-efficacy. Given the alarming rise in diabetes in AI/AN communities—particularly in adolescents—there is a clear and demonstrable need for effective biomedical and psychosocial interventions that can help improve lifelong diabetes self-care; initiatives that need to be established as effective in AI/AN populations.

Despite the strengths of this study, there are also limitations, including an overreliance on self-report. Self-report may not be entirely accurate, and may be subject to the influence of social desirability biases. Studies of this design also run the risk of suffering from issues related to common method variance, which is the spurious variance attributed to the common measurement method rather than to the constructs themselves (Chang, van Witteloostuijn, & Eden, 2010). It is important to note, however, that our decision to use different scale types with different endpoints for the predictor and criterion measures limits those concerns, as does the examination of a more complex model which is unlikely to be obvious to the participants (Chang et al., 2010). Nonetheless, supplemental measures more closely related to actual disease management (e.g., A1c levels) would increase confidence in these findings.

Similarly, future research should include item calibration components and consider the replacement of single-item measures with multi-item measures where necessary. Single-item measurement is widely considered acceptable for factually based information like demographic data, but is not considered appropriate for multidimensional, heterogeneous, and complex constructs like "personality." In the present case, a single-item measure of judgment of personal responsibility was considered appropriate, as the item is sufficiently narrow in its scope, and is theoretically attempting to capture only one aspect. Likewise, judgment of personal responsibility and self-blame measures represent the subjective experience of a single event in time. Of course, single-item measurement is also more practical. Because depression was of secondary interest and not involved in our model, the depression measure was placed at the end of our survey. Only 81 participants fully completed this measure. This could be an indication of excessive burden from the length of the survey, or it could have been specific to participants being uncomfortable answering sensitive questions about depression status. In either case, the results regarding depression should be interpreted with caution, as there may have been some response bias. Future research must achieve a healthy balance so that surveys are as brief and efficient as possible so as not to burden participants, yet the psychometric quality of the instruments must be preserved.

It is also important to note that the present convenience sample consisted primarily of older AI/AN women; thus, a better representation of age range and gender would improve the generalizability of these findings. The Hoelter indices near 200 (the structural model) or well above 200 (the measurement model) indicate that the sample size was satisfactory. However, given the cross-sectional design, only a recursive model was estimated. For example, it is possible that increased nonsupportive social behavior could increase anger, which could increase nonsupportive social behavior, creating a cycle that continues to adversely influence diabetes self-care. While structural equation modeling techniques evaluate proposed theoretical models, they cannot rule out the existence of alternative models. Given that these data are correlational in nature, there certainly continue to be ethical constraints that limit the degree to which any of these variables could—or should—be manipulated experimentally.

Diabetes is a significant health threat to AI/AN communities. It can be a burdensome disease to manage, and social support may be remarkably advantageous in meeting the challenges associated with diabetes self-care. In AI/AN communities, interventions designed to improve the presence and perception of available social support may be beneficial. These data also suggest that bolstering diabetes self-efficacy would be important, as it is strongly related to diabetes self-care. The present data provide evidence that interventions designed to improve self-efficacy associated with blood glucose monitoring, diet adherence, and exercise may prove especially important to diabetes self-care in AI/AN communities.

REFERENCES

Acton, K. J., Burrows, N. R., Moore, K., Querec, L., Geiss, L. S., & Engelgau, M. M. (2002). Trends in diabetes prevalence among American Indian and Alaska Native children, adolescents, and young adults. *American Journal of Public Health, 92*(9), 1485-1490. doi: 10.2105/AJPH.92.9.1485

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215. doi: 10.1037/0033-295X.84.2.191

Bauerle, S. Y., Amirkhan, J. H., & Hupka, R. B. (2002). An attribution theory analysis of romantic jealousy. *Motivation and Emotion, 26*(4), 297-319. doi: 10.1023/a:1022871104307

Burrows, N. R., Geiss, L. S., Engelgau, M. M., & Acton, K. J. (2000). Prevalence of diabetes among Native Americans and Alaska Natives, 1990-1997: An increasing burden. *Diabetes Care, 23*(12), 1786-1790. doi: 10.2337/diacare.23.12.1786

Cameron, C., Payne, B., & Knobe, J. (2010). Do theories of implicit race bias change moral judgments? *Social Justice Research, 23*(4), 272-289. doi:10.1007/s11211-010-0118-z

Chang, S., van Witteloostuijn, A., & Eden, L. (2010). From the editors: Common method variance in international business research. *Journal of International Business Studies, 41*(2), 178-184. doi: 10.1057/jibs.2009.88

Corrigan, P., Markowitz, F. E., Watson, A., Rowan, D., & Kubiak, M. A. (2003). An attribution model of public discrimination towards persons with mental illness. *Journal of Health and Social Behavior, 44*(2), 162-179. doi: 10.2307/1519806

Corrigan, P., & Watson, A. C. (2007). The stigma of psychiatric disorders and the gender, ethnicity, and education of the perceiver. *Community Mental Health Journal, 43*(5), 439-458. doi: 10.1007/s10597-007-9084-9

Darlington, R.B. (1990). *Regression and linear models*. NY: McGraw-Hill.

DePalma, M. T., Rollison, J., & Camporese, M. (2011). Psychosocial predictors of diabetes management. *American Journal of Health Behavior, 35*, 209-218. doi: 10.5993/AJHB.35.2.8

Devlin, H., Roberts, M., Okaya, A., & Xiong, Y. M. (2006). Our lives were healthier before: Focus groups with African American, American Indian, Hispanic/Latino, and Hmong people with diabetes. *Health Promotion Practice, 7*(1), 47-55. doi: 10.1177/1524839905275395

Diabetes Prevention Program Research Group. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *The New England Journal of Medicine, 346*(6), 393-403. doi: 10.1056/NEJMoa012512

Dillinger, T. L., Jett, S. C., Macri, M. J., & Grivetti, L. E. (1999). Feast or famine? Supplemental food programs and their impacts on two American Indian communities in California. *International Journal of Food Sciences and Nutrition, 50*(3), 173-187. doi: 10.1080/096374899101210

Gallagher, D., Visser, M., Sepúlveda, D., Pierson, R., Harris, T., & Heymsfield, S. (1996). How useful is body mass index for comparison of body fatness across age, sex, and ethnic groups? *American Journal of Epidemiology, 143*(3), 228-239. Retrieved from http://www.aje.oxfordjournals.org/

Gonzalez, J. S., Safren, S. A., Cagliero, E., Wexler, D. J., Delahanty, L., Wittenberg, E., . . . Grant, R.W. (2007). Depression, self-care, and medication adherence in type 2 diabetes: Relationships across the full range of symptom severity. *Diabetes Care, 30*(9), 2222-2227. doi: 10.2337/dc07-0158

Griffin, J. A., Gilliland, S. S., Perez, G., Upson, D., & Carter, J. S. (2000). Challenges to participating in a lifestyle intervention program: The Native American Diabetes Project. *Diabetes Education, 26*(4), 681-689. doi: 10.1177/014572170002600416

Henry, P. J., Reyna, C., & Weiner, B. (2004). Hate welfare but help the poor: How the attributional content of stereotypes explains the paradox of reactions to the destitute in America. *Journal of Applied Social Psychology, 34*(1), 34-58. doi: 10.1111/j.1559-1816.2004.tb02536.x

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods, 6*(1), 53-59. Retrieved from http://www.ejbrm.com/

Jiang, L., Beals, J., Zhang, L., Mitchell, C. M., Manson, S. M., Acton, K. J., & Roubideaux, Y. (2012). Latent class analysis of stages of change for multiple health behaviors: Results from the Special Diabetes Program for Indians Diabetes Prevention Program. *Prevention Science, 13*(5), 449-461. doi:10.1007/s11121-011-0272-z

Jones, E. J., Appel, S. J., Eaves, Y. D., Moneyham, L., Oster, R. A., & Ovalle, F. (2012). Cardiometabolic risk, knowledge, risk perception, and self-efficacy among American Indian women with previous gestational diabetes. *Journal of Obstetric, Gynecologic, & Neonatal Nursing, 41*(2), 246-257. doi: 10.1111/j.1552-6909.2012.01339.x

Karlsen, B., & Bru, E. (2002). Coping styles among adults with type 1 and type 2 diabetes. *Psychology, Health & Medicine, 7*(3), 245-259. doi: 10.1080/13548500220139403

Kim, G., DeCoster, J., Huang, C.-H., & Chiriboga, D. A. (2011). Race/ethnicity and the factor structure of the Center for Epidemiologic Studies Depression Scale: A meta-analysis. *Cultural Diversity and Ethnic Minority Psychology, 17*(4), 381-396. doi: 10.1037/a0025434

King, D. K., Glasgow, R. E., Toobert, D. J., Strycker, L. A., Estabrooks, P. A., Osuna, D., & Faber, A. J. (2010). Self-efficacy, problem solving, and social-environmental support are associated with diabetes self-management behaviors. *Diabetes Care, 33*(4), 751-753. doi: 10.2337/dc09-1746

Knowler, W. C., Fowler, S. E., Hamman, R. F., Christophi, C. A., Hoffman, H. J., Brenneman, A. T., . . .Nathan, D.M. (2009). 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet, 374*(9702), 1677-1686. doi: 10.1016/S0140-6736(09)61457-4

Lewin, A. B., Geffken, G. R., Heidgerken, A. D., Duke, D. C., Novoa, W., Williams, L. B., & Storch, E. A. (2005). The Diabetes Family Behavior Checklist: A psychometric evaluation. *Journal of Clinical Psychology in Medical Settings, 12*(4), 315-322. doi: 10.1007/s10880-005-7817-x

Li, C., Ford, E. S., Strine, T. W., & Mokdad, A. H. (2008). Prevalence of depression among U.S. adults with diabetes: Findings from the 2006 Behavioral Risk Factor Surveillance System. *Diabetes Care, 31*(1), 105-107. doi: 10.2337/dc07-1154

Nouwen, A., Ford, T., Balan, A. T., Twisk, J., Ruggiero, L., & White, D. (2011). Longitudinal motivational predictors of dietary self-care and diabetes control in adults with newly diagnosed type 2 diabetes mellitus. *Health Psychology, 30*(6), 771-779. doi: 10.1037/a0024500

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*(3), 385-401. doi: 10.1177/014662167700100306

Rudolph, U., Roesch, S. C., Greitemeyer, T., & Weiner, B. (2004). A meta-analytic review of help giving and aggression from an attributional perspective: Contributions to a general theory of motivation. *Cognition and Emotion, 18*(6), 815-848. doi: 10.1080/02699930341000248

Sacco W, & Bykowski C. (2010) Depression and hemoglobin A1c in type 1 and type 2 diabetes: The role of self-efficacy. *Diabetes Research & Clinical Practice, 90*(2), 141-146. doi:10.1016/j.diabres.2010.06.026

Sarkar, U., Fisher, L., & Schillinger, D. (2006). Is self-efficacy associated with diabetes self-management across race/ethnicity and health literacy? *Diabetes Care, 29(4),* 823-829. doi:10.2337/diacare.29.04.06.dc05-1615

Schafer, L. C., McCaul, K. D., & Glasgow, R. E. (1986). Supportive and nonsupportive family behaviors: Relationships to adherence and metabolic control in persons with type 1 diabetes. *Diabetes Care, 9*(2), 179-185. doi: 10.2337/diacare.9.2.179

Schultz, L. (2006). The relationship of educational level, reservation status and blood quantum with anger and post-colonial stress among American Indians (Doctoral dissertation, Oklahoma State University, 2006). *Dissertation Abstracts International, 66*, 7-B.

Shaw, J. L., Brown, J., Khan, B., Mau, M. K., & Dillard, D. (2013). Resources, roadblocks and turning points: A qualitative study of American Indian/Alaska Native adults with type 2 diabetes. *Journal of Community Health: The Publication for Health Promotion and Disease Prevention, 38*(1), 86-94. doi: 10.1007/s10900-012-9585-5

Shaw, J. E., Sicree, R. A., & Zimmet, P. Z. (2010). Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Research and Clinical Practice, 87*(1), 4-14. doi: 10.1016/j.diabres.2009.10.007

Spielberger, C. D. (1999). *STAXI-2: State-Trait Anger Expression Inventory - 2.* Lutz, FL: Psychological Assessment Resources (PAR), Inc.

Talbot, F., Nouwen, A., Gingras, J., Gosselin, M., & Audet, J. (1997). The assessment of diabetes-related cognitive and social factors: The Multidimensional Diabetes Questionnaire. *Journal of Behavioral Medicine, 20*(3), 291-312. doi: 10.1023/A:1025508928696

Taylor, C. A., Keim, K. S., Sparrer, A., Van Delinder, J. L., & Parker, S. P. (2004). Social and cultural barriers to diabetes prevention in Oklahoma American Indian women. *Preventing Chronic Disease, 1*(2), 1-10. doi: http://www.cdc.gov/pcd/issues/2004/apr/03_0017.htm

Thompson, J. L., Wolfe, V. K., Wilson, N., Pardilla, M. N., & Perez, G. (2003). Personal, social, and environmental correlates of physical activity in Native American women. *American Journal of Preventive Medicine. Special Issue: Physical Activity in Women from Diverse Racial/Ethnic Groups: Environmental, Policy, and Cultural Factors, 25*(3, Suppl 1), 53-60. doi: 10.1016/S0749-3797(03)00165-X

Toobert, D. J., Hampson, S. E., & Glasgow, R. E. (2000). The Summary of Diabetes Self-Care Activities measure: Results from 7 studies and a revised scale. *Diabetes Care, 23*(7), 943-950. doi: 10.2337/diacare.23.7.943

U.S. Department of Health and Human Services. (2011). *Healthy People 2020*. Washington, DC: Author. Retrieved from http://www.healthypeople.gov/

van de Laar, K. E., & van der Bijl, J. J. (2001). Strategies enhancing self-efficacy in diabetes education: A review. *Scholarly Inquiry for Nursing Practice, 15*(3), 235-248. Retrieved from http://www.springerpub.com/journals/research-and-theory-for-nursing-practice.html

Walker, R. J., Smalls, B. L., Hernandez-Tejada, M. A., Campbell, J. A., Davis, K. S., & Egede, L. E. (2012). Effect of diabetes fatalism on medication adherence and self-care behaviors in adults with diabetes. *General Hospital Psychiatry, 34*(6), 598-603. doi:10.1016/ j.genhosppsych.2012.07.005

Weijman, I., Kant, I., Swaen, G. M., Ros, W. J., Rutten, G. E., Schaufeli, W. B., . . . Winnubst, J.A.. (2004). Diabetes, employment and fatigue-related complaints: A comparison between diabetic employees, “healthy” employees, and employees with other chronic diseases. *Journal of Occupational and Environmental Medicine, 46*(8), 828-836. doi: 00043764-200408000-00012

Weiner, B. (1995). *Judgments of responsibility: A foundation for a theory of social conduct.* New York: Guilford Press.

Weiner, B., Perry, R. P., & Magnusson, J. (1988). An attributional analysis of reactions to stigmas. *Journal of Personality and Social Psychology, 55*(5), 738-748. doi: 10.1037/0022-3514.55.5.738

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objective of the present study was to examine how AI/ANs' attitudes and beliefs might influence how they experience and manage diabetes, with particular attention paid to their attitudes about disease causality and personal responsibility for disease onset.

Judgments of Personal Responsibility for Diabetes Onset

Diabetes is a potentially preventable and controllable disease, and research indicates that lifestyle change can be effective in preventing and/or delaying the onset of type 2 diabetes (Diabetes Prevention Program Research Group, 2002; Knowler et al., 2009). Based on this evidence, one governmental initiative, *Healthy People 2020*, encourages personal responsibility for reducing the risks and complications associated with diabetes (U.S. Department of Health and Human Services, 2011). Positive individual lifestyle choices, such as healthy eating and engaging in regular physical activity, are emphasized. But this type of initiative necessitates a more complete understanding of the cognitive, emotional, and sociocultural challenges and consequences of being held accountable for one's own health status.

There are at least two ways that information about personal responsibility for disease onset might influence individuals who have diabetes. First, information about disease causality might influence diabetes patients from an *interpersonal* perspective, or how others perceive them. Weiner's (1995) theory of social motivation provides a theoretical framework to examine beliefs about personal responsibility from this perspective. Weiner (1995) argued that, if there is a judgment that a particular person was the cause of a negative event, an inference that the cause was controllable, and an absence of mitigating circumstances, the individual will be judged by others to be responsible for the event onset. Weiner contends that being judged personally responsible for the onset of a negative event (e.g., diabetes) could lead others to be angry and assign blame, and could influence the person's subsequent behavior. Weiner, Perry, and Magnusson (1988) found that perceptions of personal responsibility for the onset of a variety of medical conditions (e.g., obesity, drug addiction, AIDS) were associated with more anger and blame, decreased liking, and a reduced magnitude of charitable assistance and helping behavior offered to the target.

Second, information about disease causality might influence how diabetes patients perceive themselves. A study that examined Weiner's (1995) model from an *intrapersonal* perspective found that individuals' perceptions of their personal responsibility for disease onset were significantly related to anger and self-blame (DePalma, Rollison, & Camporese, 2011). This study, however, was conducted with a small sample of largely non-Hispanic White participants; thus, the generalizability of this model to other populations remains untested.

Judgments of Personal Responsibility for Diabetes Onset in AI/AN Groups

Many AI/ANs believe that diabetes within their community is a result of the Westernization that occurred during the 19th and 20th centuries, which led to a loss of their traditional healthy diet (Devlin, Roberts, Okaya, & Xiong, 2006; Dillinger, Jett, Macri, & Grivetti, 1999). However, some AI/ANs do assign judgments of a more personal responsibility for diabetes onset, and these explanations may play an important part in disease management. In a study of AIs living in New Mexico Pueblo communities, mentors/educators suggested that the belief that one was personally at fault for his or her diabetes onset was associated with a fear of social stigma and feelings of personal shame (Griffin, Gilliland, Perez, Upson, & Carter, 2000). These factors, in turn, were thought to have discouraged participation in healthy lifestyle education sessions (Griffin et al., 2000). Thus, self-blame and fear of social stigma may negatively impact health promotion efforts associated with diet, exercise, and preventive health screening.

Interpersonal Relationships

Weiner contends that there are important social implications for individuals held accountable for a negative event; these individuals tend to elicit greater anger and blame from the people in their environment, and they tend to get less help and are liked less (Corrigan, Markowitz, Watson, Rowan & Kubiak, 2003; Weiner, 1995; Weiner et al., 1988). For these reasons it is important to examine the social implications of being held responsible for one's own diabetes onset. One dynamic feature of interpersonal relationships is the provision of social support, which has been found to be significantly related to diabetes self-care (Schafer, McCaul, & Glasgow, 1986). Supportive behaviors from friends, family, or significant others may include praise for following a healthy diet or an expressed willingness to exercise together (Lewin et al., 2005). Nonsupportive behaviors, or negative social support, may include criticism for not exercising regularly or nagging about blood glucose testing (Lewin et al., 2005). AI/AN family and community members have been shown to impact diabetes management by providing a supportive environment that encourages increased physical activity (Thompson, Wolfe, Wilson, Pardilla, & Perez, 2003). Conversely, familial constraints also have been shown to be incompatible with many AI/AN women's personal decisions to adopt a healthier diet or seek preventive screening services (Taylor, Keim, Sparrer, Van Delinder & Parker, 2004; Thompson et al., 2003). Individuals with diabetes who reported more nonsupportive social behavior from significant others also reported less effective diabetes self-care behavior (DePalma et al., 2011).

Predicting Diabetes Self-Care Behavior: The Role of Self-Efficacy

From an intrapersonal perspective, increased self-blame, in conjunction with the perceptions of nagging and criticism may serve to erode self-efficacy. Self-efficacy is confidence in one's ability to perform a particular behavior, and is expected to influence the likelihood of behavioral occurrence (Bandura, 1977). For example, if a significant other repeatedly argues with a diabetes patient about disease management, disparages the patient for not testing his/her blood sugar appropriately, or criticizes the patient for not exercising regularly, it may erode the patient's confidence in his/her ability to manage the disease appropriately.

Individuals with lower levels of self-efficacy have been shown to be more likely to perceive diabetes self-care activities as a burden (Weijman et al., 2004), and evidence indicates that enhancing self-efficacy can result in more effective diabetes management (van de Laar & van der Bijl, 2001). According to several researchers, self-efficacy may be a critical indicator of diabetes self-care (King et al., 2010; Nouwen et al., 2011; van de Laar & van der Bijl, 2001). Two qualitative studies with small AI/AN samples have examined the role of self-efficacy in diabetes management. In a sample of 22 AI/AN women with gestational diabetes, Jones et al. (2012) expressed concern that AI/AN women may not have confidence that they can prevent or delay the onset of diabetes. In a sample of 18 AI/AN adults, Shaw, Brown, Khan, Mau, and Dillard (2013) identified social support and self-efficacy as two central resources to increase the likelihood of positive health outcomes.

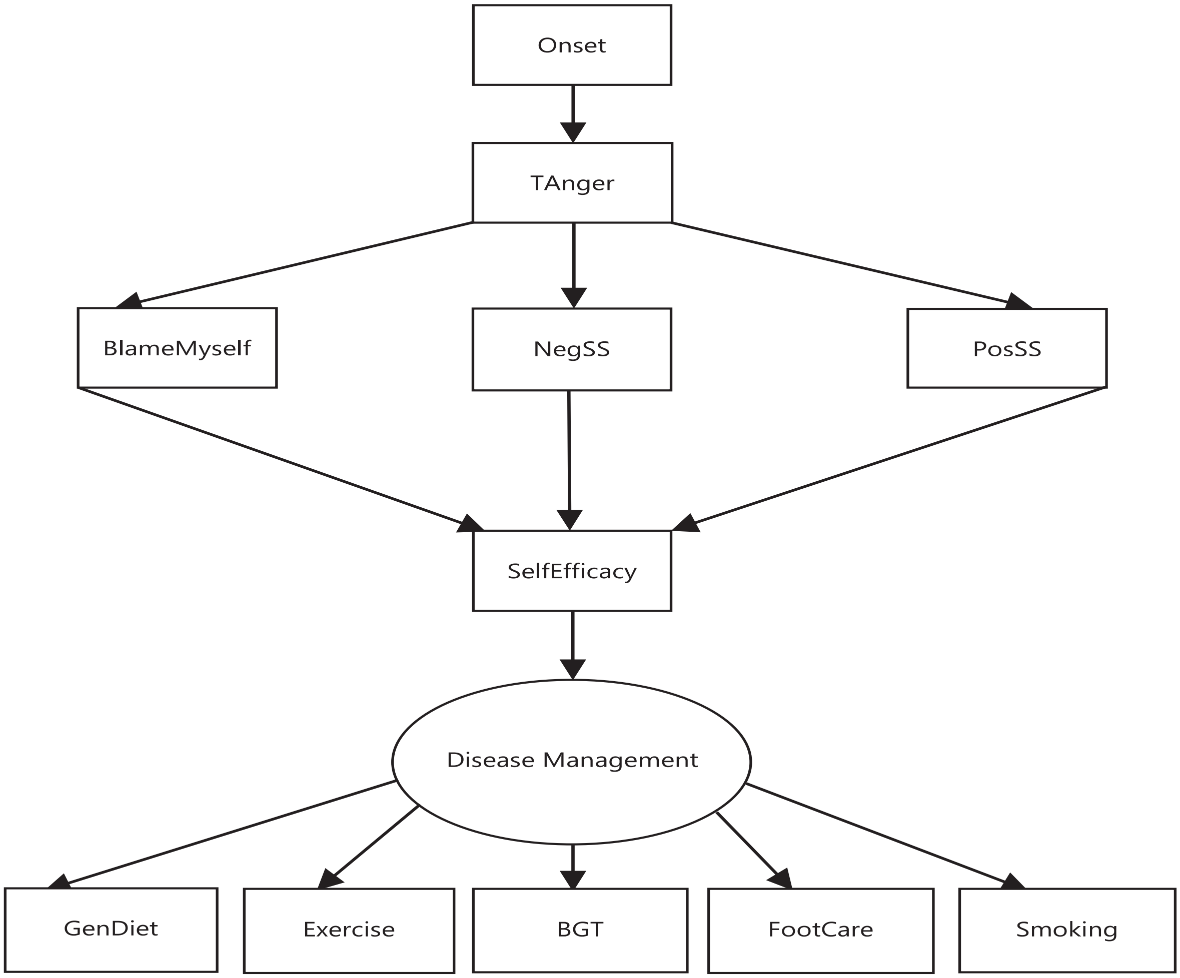
Depression

Depressive symptoms often are comorbid with diabetes (Li, Ford, Strine, & Mokdad, 2008), and depression is almost twice as common in adults with diabetes than in those without diabetes (Gonzalez et al., 2007). Gonzalez and colleagues (2007) found that major depression was significantly related to poor adherence to a number of self-care behaviors, including dietary recommendations and exercise, and to less frequent self-monitoring of blood glucose. Those individuals who reported some depressive symptoms, but did not meet the criteria for major depression, still showed lower adherence to self-care behaviors, suggesting that even mild depressive symptoms may diminish disease management. Li et al. (2008) examined data from the 2006 Behavioral Risk Factor Surveillance System and reported that the rate of major depression was 27.8% for AI/ANs—the highest rate among all ethnic groups identified. Depression may impede successful diabetes self-care behaviors in AI/AN communities, and is important to assess.

Hypotheses

The objective of the present study was to examine, from an intrapersonal perspective, how AI/ANs' perceptions of disease causality might influence how they affectively experience and behaviorally manage their diabetes. As can be seen in the proposed model in Figure 1, we hypothesized that an individual's initial judgment of personal responsibility for diabetes onset would lead to increased self-blame and anger. The increased anger also would be associated with greater perceived nonsupportive social behavior. These increases in nonsupportive social behavior would, in turn, be associated with decreases in diabetes self-efficacy. Diabetes self-efficacy was hypothesized to be the mechanism through which these psychosocial variables would ultimately influence diabetes self-care. We also explored whether increases in self-blame and decreased diabetes self-efficacy might be associated with depression.

Figure 1
Model Representing the Proposed Relationship Between Judgments of Responsibility for Disease Onset, Trait Anger, Self-blame, Perceived Social Support and Self-efficacy and Disease Management



METHODS

Procedure

Approval for this study was obtained from the College Review Board for Human Subjects Research at Ithaca College. Participants were recruited from those in attendance at a conference in North Dakota on issues related to AI/ANs and aging. A member of the Native American Council on Native American Aging provided tabled information to conference attendees, including information about personal care, home health care, respite care, and referral services. Posters were attached to the information table that advertised the survey in order to recruit participants. Participation was restricted to individuals with diabetes who were 18 years of age or older. The participants filled out a voluntary, anonymous paper-and-pencil survey, which took approximately 20 minutes. Participants placed their completed surveys in a drop box and were given a $5 gift card in appreciation of their participation.

Participants

Of the 119 individuals who participated, 117 self-identified as AI or AN. Two individuals did not self-report this information, but their inclusion did not change any result.

Materials

The survey consisted of scales measuring judgments of personal responsibility for disease onset, anger, self-blame, perceived supportive and nonsupportive social behaviors, diabetes self-efficacy, and disease management. Participants also were asked to self-report race, and chose the option: American Indian or Alaska Native. Disease type was measured by asking participants “With which type of diabetes have you been diagnosed?” (type 1, type 2, I don’t know, or I don’t have diabetes). Participants also reported other basic demographic information (e.g., age, education, marital status, height, and weight). Finally, participants responded to questions measuring depression. The reliability of the multi-item scales used in the survey also was assessed; the mean, standard deviation, and reliability for each scale can be found in Table 1. Reliability analyses indicated satisfactory internal reliability across all measures.

Table 1
Descriptive Statistics for Factors Related to Disease Management

Variable	Number of Items	Sample Score Range	Means	*SD*	Cronbach's Alpha
Personal Responsibility - Onset	1	0-10	7.49	3.23	-
State-Trait Anger Expression Inventory-2 - Trait Anger	10	10-39	14.29	4.60	.89
Self-blame	1	1-4	1.96	1.00	-
Diabetes Family Behavior Checklist - Positive	9	9-36	17.90	6.87	.78
- Negative	7	7-24	12.14	4.77	.74
Self-efficacy	7	0-10	6.15	2.73	.90
Center for Epidemiologic Studies Depression Scale	20	0-32	14.22	7.62	.77
Summary of Diabetes Self-care Activities (SDSCA) - General Diet	2	0-7	4.50	1.96	.82
SDSCA - Blood Glucose Testing	2	0-7	4.24	2.55	.91
SDSCA - Foot Care	2	0-7	4.72	2.39	.75
SDSCA - Exercise	2	0-7	3.08	2.41	.83
SDSCA - Smoking Status	1				
Yes 20.2%					
No 79.8%					

Primary Measures

Personal Responsibility and Self-Blame

Judgments of personal responsibility for disease onset was assessed by asking: "How responsible do you perceive yourself to be for the onset of your diabetes?" Responses ranged from 0 (*not at all responsible*) to 10 (*entirely responsible*). DePalma et al. (2011) adapted this item from Weiner's (1995) measures to represent a very specific personal responsibility for diabetes onset.

Consistent with the work of Karlsen and Bru (2002), self-blame was measured by asking: "How do you generally react when you experience diabetes-related stressful events: I blame myself" with response options ranging from 1 (*I usually don't do this at all*) to 4 (*I usually do this a lot*). To our knowledge, neither of these measures has been used in AI/AN samples.

Anger

The 10-item Trait-Anger subscale of the State-Trait Anger Expression Inventory-2 (Spielberger, 1999) was used to measure trait anger. Ten items assessed the degree to which an individual expressed both an angry temperament (e.g., “I am quick tempered”) and an angry reactionary style (e.g., “It makes me furious when I am criticized in front of others”). Scores range from 10-40, with internal reliability ratings surpassing .80 (Spielberger, 1999). This measure has been used successfully before in an AI/AN population (Schultz, 2006).

It was important to measure dispositional anger; that is, we wanted to know how these people believe they are *generally* (trait anger), not at a particular moment in time (state anger). Dispositional anger could create an important (and continuous) interaction with the social environment—particularly with those people who are providing social support.

Social Support

The Diabetes Family Behavior Checklist (DFBC) was selected as a diabetes-specific measure of family support of, or interference with, the diabetes self-care regimen (Schafer et al., 1986). In this 16-item scale, each item is rated on a scale of 1 (*never*) to 5 (*at least once a day*). Two separate subscales reflect perceived supportive or positive social support behaviors (e.g., encouragement and praise; 9 items) and nonsupportive or negative social support behaviors (e.g., nagging and criticism; 7 items). The nonsupportive subscale has been shown to correlate concurrently and prospectively with adherence to glucose testing, diet, and insulin injections; supportive DFBC scores were not related to these adherence measures (Schafer et al., 1986). Schafer et al. (1986) report that test-retest reliabilities ranged from .69 (nonsupportive) to .84 (supportive). Lewin et al. (2005) replicated the two-factor structure of the DFBC, and reported high internal consistency (Cronbach’s $\alpha = .71$ to .79). This measure of social support is rarely used with AI/AN adult samples, but Jiang et al. (2012) administered a 4-item subset to a very large sample of AI/AN participants, and reported reasonable internal consistency (Cronbach’s $\alpha = .64$).

Self-Efficacy

While there are global measures of general self-efficacy, measures also exist for more specific diabetes self-efficacy. Diabetes self-efficacy was measured using “Section III - Self-Efficacy” of the Multidimensional Diabetes Questionnaire (MDQ; Talbot, Nouwen, Gingras, Gosselin, & Audet, 1997). This scale consists of 7 items assessing how confident the participant is in his or her ability to perform specific diabetes self-care tasks (e.g., “How confident are you in your ability to follow your diet?” and “How confident are you in your ability to test your blood sugar at the recommended frequency?”). Talbot et al. (1997) ratings ranged from 0 (*not at all confident*) to 100 (*very confident*). In the present study, to be more consistent with the presentation of other similar included items, each item is rated on a scale of 0 (*not at all confident*) to 10 (*very confident*). That is, we changed the numerical response options, retained numbers on a comparable scale, and retained the identical text anchors. Although the psychometric properties of the MDQ have not been reported in AI/AN populations, Sacco and Bykowski (2010) report Cronbach's alpha of .90 in their study of 124 diabetes patients.

Disease Management

The Summary of Diabetes Self-Care Activities Measure (SDSCA) is an 11-item self-report scale with 6 subscales designed to assess important components of diabetes self-care: general diet (2 items), specific diet (2 items), exercise (2 items), blood glucose testing (2 items), foot care (2 items), and smoking status (1 item; Toobert, Hampson, & Glasgow, 2000). For example, participants are asked, "On how many of the last seven days did you participate in at least 30 minutes of physical activity?" In an analysis of 7 studies using the SDSCA, Toobert et al. (2000) report acceptable inter-item correlations (M=0.47) and moderate test-retest correlations (M=0.40). These authors, however, indicate that the specific diet subscale consistently exhibits poor psychometric properties, as did findings from the present study (Cronbach's $\alpha = .19$). As a result, the specific diet subscale was excluded from the present study, leaving 5 remaining subscales: general diet, exercise, blood glucose testing, smoking, and foot care (Toobert et al., 2000). To our knowledge, this measure has not been reported in an AI/AN sample.

Secondary Measures

Body Mass Index (BMI)

Participants were asked to self-report height and weight. Using this information we were able to estimate BMI using Quetelet's index, which is body weight (in pounds) divided by stature (in inches squared; Gallagher et al., 1996).

Depression

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) was used to measure depression. This scale has been shown to have high internal consistency and presents 20 items to assess the way the participant has felt during the past week (Radloff, 1977). Each item is rated from 0 to 3, where 0 = *Rarely or none of the time (less than 1 day)* and 3 = *All of the time (5-7 days)*; total scores can range from 0 to 60, with higher numbers indicating higher levels of depression. A meta-analysis conducted by Kim, DeCoster, Huang, and Chiriboga (2011) provides evidence that the factor structure of the CES-D replicates across racial/ethnic groups—a comparison which included AI samples.

Design and Analysis

We begin with a presentation of descriptive statistics of our demographic data, and include reliability analyses. We then turn to our inferential analyses. Our primary model was tested using structural equation modeling with AMOS 21.0. Given an existing theoretical model that is represented by a series of structural equations, this analytic method enables a simultaneous assessment of the overall model. Because the psychometric properties of our disease management measure (SDSCA) have not been reported in AI/AN samples, a two-stage testing sequence included first conducting a confirmatory factor analysis that tested the adequacy of the measurement model for this measure. We then tested the full latent variable model. Because there is no single accepted measure of model fit, several criteria were used to assess model fit and parsimony, including a non-significant chi-square, a high goodness of fit index, and low root mean square error approximation, which generally indicate an acceptable model (Hooper, Coughlan, & Mullen, 2008).

RESULTS

Descriptive Information

Sociodemographic and descriptive information about the sample can be found in Table 2. The sample largely consisted of older females with type 2 diabetes who were married/partnered. Participants were between the ages of 41 and 85 years ($M = 65.78$, $SD = 8.24$). The sample included 18 men and 98 women (three did not report their sex). The average level of education attained was some college credit, but less than one year; education ranged from completion of the 7th grade to the attainment of a doctoral degree.

After applying a Bonferroni correction factor for multiple comparisons (Darlington, 1990), the measures of BMI, education, gender, and marital status were not related to any of the variables in the structural model, nor were they related to the latent construct of diabetes management. As age increased, however, diabetes self-efficacy increased ($r = .36$, $p < .001$, $\eta^2 = .13$).

Table 2
Sociodemographic Information

Characteristic	Number	Percentage
Gender		
Male	18	15.5%
Female	98	84.5%
Relationship		
Married/partnered	48	41.4%
Widowed	39	33.6%
Divorced	17	14.7%
Separated	5	4.3%
Never married/partnered	7	6.0%
Education		
7th-12th grade (no diploma)	24	20.5%
High school graduate	32	27.4%
Some college	28	23.9%
Associates degree	10	8.5%
Bachelors degree	14	12.0%
Masters degree	6	5.1%
Professional degree	2	1.7%
Doctoral degree	1	0.9%
Disease Type		
Type 1		9.8%
Type 2		77.7%
Do not know		12.5%

Characteristic	Range	Mean	*SD*
Age (years)	41-85	65.78	8.24
Age of diabetes onset (years)	4-75	48.26	14.94
Body Mass Index	17.15-51.76	32.18	5.95

BMI

Of the 119 participants, 109 provided their height and weight. The data indicate that the sample population had very high frequencies of overweight (BMI = 25.0-29.9; *n* = 33, 30.2%) and obese adults (BMI = 30.0 and above; *n* = 68, 62.3%).

Judgments of Personal Responsibility for Diabetes Onset

The participants' mean rating for how responsible they feel for the onset of their diabetes was 7.49 (*SD* = 3.23). In fact, 44.5% of participants rated themselves as *entirely* responsible for the onset of their diabetes. Disease type (type 1 [*M* = 8.10] or type 2 [*M* = 7.36]) was not related to perceptions of personal responsibility for disease onset [$F(2, 103) = .31, p > .05$], and the associated effect size hovered near zero ($\eta^2 = .006$, power = .10).

Secondary Measure: Depression

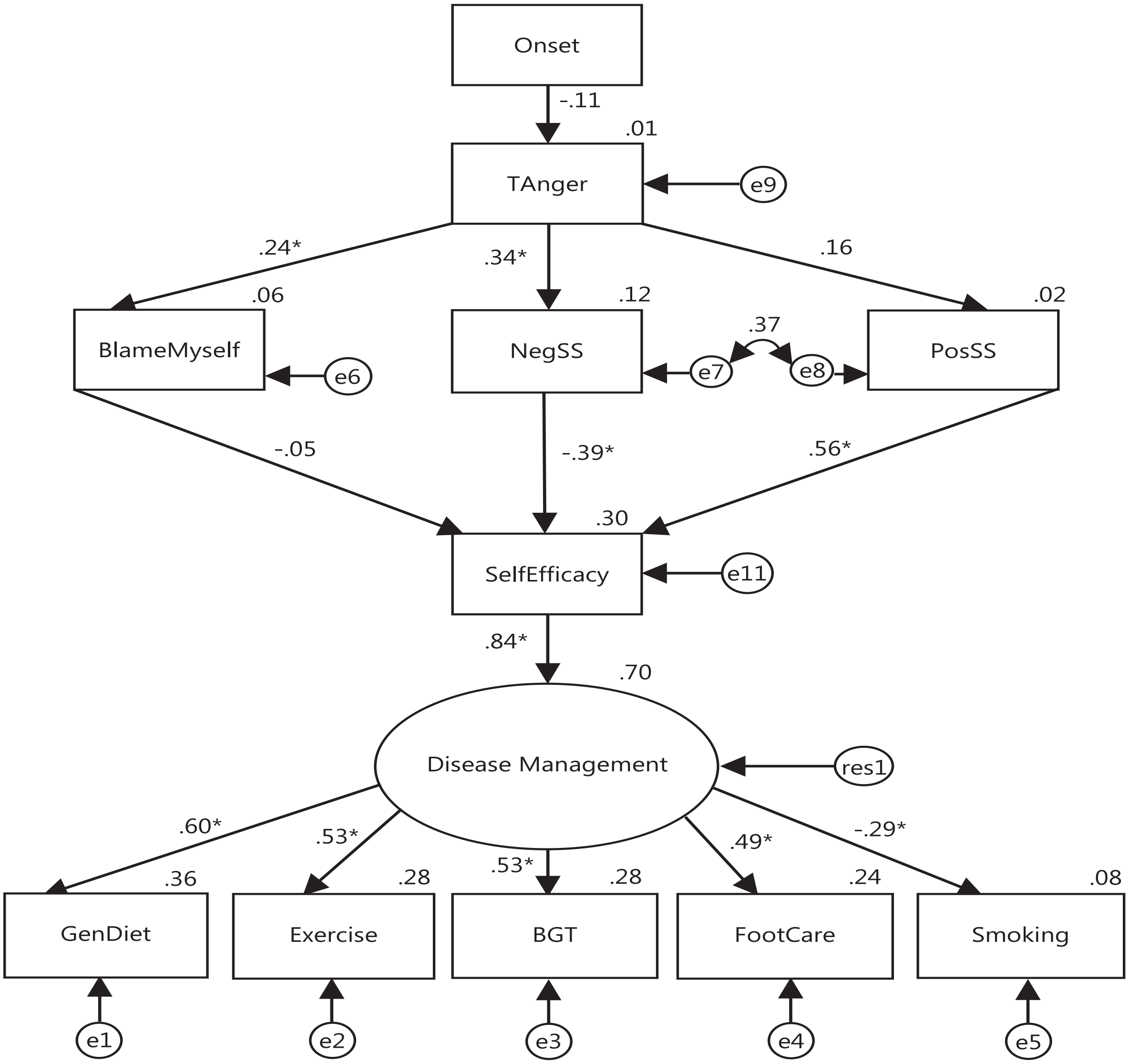
For the 81 subjects who completed the CES-D in full, scores ranged from 0-32 (*M* = 14.22, *SD* = 7.62). Analysis of the frequency distribution indicated that 37% of this sample was above the cutoff score of 16, which is typically suggestive of depression (Kim et al., 2011). Furthermore, although depression scores were uncorrelated with perceptions of personal responsibility for disease onset ($r = -.06, p > .05, \eta^2 = .004$), self-blame ($r = .22, p > .05, \eta^2 = .04$), and diabetes self-efficacy scores ($r = -.19, p > .05, \eta^2 = .04$), depression scores were positively related to trait anger ($r = .39, p < .01, \eta^2 = .15$) and negative social support ($r = .29, p < .025, \eta^2 = .08$).

Inferential analyses

SDSCA Confirmatory Factor Analysis (CFA)

The initial measurement model was evaluated using CFA techniques to predict the latent construct of disease management from the five subscales of the SDSCA (see Figure 2). Model fit statistics indicated an acceptable fit, and offered no reason to reject the model, $\chi^2 (5) = 5.3, p = .38$; TLI = .97, CFI = .99, PCFI = .33, RMSEA = .02, Hoelter .01 = 336. As can be seen in Figure 2, measures associated with general diet, exercise, blood glucose testing, foot care, and smoking were all significantly related to the latent construct of disease management. This model is consistent with the expectation that these variables would be reliably related to diabetes self-care, and provides support for the underlying structure of the SDSCA as a measure of disease management in AI/AN samples. No theoretically meaningful modification indices were offered. This model was accepted as an adequate representation of disease management; therefore, the full latent variable model was constructed.

Figure 2
Structural Equation Model Representing the Relationship between Judgments of Responsibility for Disease Onset, Trait Anger, Self-blame, Perceived Social Support and Self-efficacy and Disease Management[1,2]



[1] Numerical output includes the standardized regression coefficients and the squared multiple correlations

[2] e1-e11 represent error terms, and res1 is the residual associated with the latent construct of disease management

* Significant pathways

The Full Latent Variable Model

The structural model represented the proposed relationship among perceptions of personal responsibility for disease onset (ONSET), anger, and self-blame (Weiner, 1995). It also incorporated the two subscales of the DFBC to represent supportive (PosSS) and nonsupportive (NegSS) social behavior, and presented diabetes self-efficacy as the mechanism by which these variables influence diabetes management (see Figure 2). Figure 2 reports the standardized regression coefficient for each path, as well as the proportion of variance explained. The initial model indicated an adequate model fit, χ^2 (41) = 42.99, $p = .39$; TLI = .98, CFI = .98, PCFI = .61, RMSEA = .02, Hoelter .01 = 180. Exploratory analyses indicated that, although depression was significantly related to anger, the incorporation of depression into the model produced inferior and unacceptable models. Similarly, depression was not significantly related to the latent construct of disease management (C.R. = -1.207, p = n.s); as a result, this variable was excluded from consideration in this model.

Contrary to our hypotheses, judgments of personal responsibility for disease onset failed to have a significant effect on any variable. Specifically, the results revealed no significant relationship between participants' perceptions of personal responsibility for diabetes onset and feelings of anger, and the associated effect size hovered near zero ($\eta^2 = .006$, power = .12). Given the proportion of participants who endorsed complete personal responsibility for diabetes onset, we performed an exploratory log transformation to normalize the variable. Even under these circumstances, there was still no significant relationship between perceptions of personal responsibility for diabetes onset and anger, and the effect size again hovered near zero ($r = .06$, $p > .05$, $\eta^2 = .004$).

Participants' level of anger, however, was significantly and positively related to self-blame and to increased perceived nonsupportive social behavior. No significant relationship between anger and perceptions of positive social support emerged. As perceptions of nonsupportive social behavior increased, diabetes self-efficacy decreased. Diabetes self-efficacy was strongly related to disease management, and, as can be seen in Figure 2, the six psychosocial variables in the model together explained 70% of the variance in self-reported disease management.

DISCUSSION

Judgments of personal responsibility for a negative event are hypothesized to produce anger, which then influences subsequent behavior (Rudolph, Roesch, Greitemeyer, & Weiner, 2004). Research has supported the causal nature of this cognition-emotion-behavior sequence, including a meta-analysis of helping behavior which examined dozens of studies (Rudolph et al., 2004). However, much of this research is of an interpersonal nature; the work largely examines the impact of cognitions and affect on judgments about, and social behavior toward, others. Although an intrapersonal application of this modeled sequence has been supported in a small sample of non-Hispanic White participants (DePalma et al., 2011), it is not consistent with how the present sample of AI/ANs represents their own disease causality. The present results indicate that nearly 45% of the AI/AN sample perceived themselves to be entirely responsible for their diabetes onset; however, this perception was unrelated to anger and diabetes self-care. This is an important finding because it indicates that different groups may have different cognitive models about disease causality that could influence social behavior (interpersonal) and, ultimately, diabetes self-care (intrapersonal). We believe that these cognitive models are not invariant, and that it is our obligation to acknowledge this, and to refine the utility of the application of these models. The primary issue now will be to identify the relevant differences in these samples that are responsible for the differences in model fit. This investigation could be initiated through qualitative semi-structured interviews within an AI/AN sample. For example, one might investigate the relevance of the concept of "fatalismo" as it relates to these interests (Walker, Smalls, Hernandez-Tejada, Campbell, Davis, & Egede, 2012). The present study serves to highlight the need for continued research that investigates the role that attitudes may play in these modeled cognitive sequences, from both inter- and intrapersonal perspectives.

Notably, AI/AN samples have been largely unrepresented in tests of this model, both in general and with specific reference to diabetes self-care. Many of the studies in this domain focus either on student samples or on non-Hispanic White participants (Henry, Reyna, & Weiner, 2004; DePalma et al., 2011; Weiner et al., 1988). Others do not have sample sizes appropriate to statistically analyzing the cognitive processes across AI/AN groups (Bauerle, Amirkhan, & Hupka, 2002; Cameron, Payne & Knobe, 2010). The present work provides support for a recommendation by Corrigan and Watson (2007), who suggest oversampling of ethnic subgroups that have not been represented, or have been underrepresented, in tests of various cognitive models.

While greater perceptions of personal responsibility for disease onset might be expected in individuals with type 2 diabetes, disease type (type 1 or type 2) was unrelated to perceptions of personal responsibility for disease onset in the present study. Although there were substantially unequal sample sizes, perceptions of personal responsibility were slightly greater in participants with type 1 diabetes; however, this trend did not approach significance. Ultimately, however, it is important to recognize that the actual disease type is not as important to the current research as is the *perception* of personal responsibility. Interestingly, in this AI/AN sample, perceptions of personal responsibility for disease onset were of little consequence to other measured variables.

The distinction between perception of personal responsibility for disease onset and disease treatment is of considerable importance. However, the impetus for the present study was to understand the implications of being held accountable for the *onset* of one's own health status. While perceptions of personal responsibility for disease treatment might actually be considered more important given that disease onset has already occurred, we were primarily directed at first understanding the nature of the influence of information about disease causality on disease management.

The present findings regarding the importance of appropriate social support closely replicate the results of previous investigations (Taylor et al., 2004; Thompson et al., 2003), but they do so in an AI/AN sample. The data suggest that social support systems could increase praise and encouragement and reduce nagging and criticism to promote better disease management. This finding appears with some consistency across cultural backgrounds, and within intra- and interpersonal domains.

Adding diabetes self-efficacy to the model significantly improves the prediction of diabetes self-care. Sarkar, Fisher, and Schillinger (2006) provided evidence that the magnitude of the association between self-efficacy and self-management was consistent across racial and ethnic groups; however, only two AI/AN participants were included in their sample of 408, making comparisons with this group impossible. Thompson et al. (2003) found that self-efficacy was important in their sample of largely Navajo and Pueblo participants, but their interest was in relating self-efficacy to physical exercise, and no information about diabetes status was presented. In the present sample, perceived supportive social behavior was positively related to increased diabetes self-efficacy. Participants who reported more praise and encouragement also reported significantly higher diabetes self-efficacy. Conversely, the data indicate that nonsupportive social behavior was significantly related to decreased diabetes self-efficacy, and AI/ANs' diabetes self-efficacy was strongly related to self-reported diabetes management. Theoretically, nagging and criticism could erode an individual's confidence in his/her ability to manage the disease, thereby diminishing diabetes self-care behavior.

Beyond the theoretical importance associated with studying attitudes about disease causality, there is also tremendous practical importance to studying the same. These data suggest that behavioral and psychosocial interventions or educational initiatives designed to incorporate information about disease causality could have an entirely different impact across groups, or perhaps have no impact at all. For example, the present data suggest that any educational initiatives designed to address information about disease causality could have little influence on the self-care behavior of these AI/ANs; instead, these data strongly suggest that educational initiatives should focus on improving social support and diabetes self-efficacy. Given the alarming rise in diabetes in AI/AN communities—particularly in adolescents—there is a clear and demonstrable need for effective biomedical and psychosocial interventions that can help improve lifelong diabetes self-care; initiatives that need to be established as effective in AI/AN populations.

Despite the strengths of this study, there are also limitations, including an overreliance on self-report. Self-report may not be entirely accurate, and may be subject to the influence of social desirability biases. Studies of this design also run the risk of suffering from issues related to common method variance, which is the spurious variance attributed to the common measurement method rather than to the constructs themselves (Chang, van Witteloostuijn, & Eden, 2010). It is important to note, however, that our decision to use different scale types with different endpoints for the predictor and criterion measures limits those concerns, as does the examination of a more complex model which is unlikely to be obvious to the participants (Chang et al., 2010). Nonetheless, supplemental measures more closely related to actual disease management (e.g., A1c levels) would increase confidence in these findings.

Similarly, future research should include item calibration components and consider the replacement of single-item measures with multi-item measures where necessary. Single-item measurement is widely considered acceptable for factually based information like demographic data, but is not considered appropriate for multidimensional, heterogeneous, and complex constructs like “personality.” In the present case, a single-item measure of judgment of personal responsibility was considered appropriate, as the item is sufficiently narrow in its scope, and is theoretically attempting to capture only one aspect. Likewise, judgment of personal responsibility and self-blame measures represent the subjective experience of a single event in time. Of course, single-item measurement is also more practical. Because depression was of secondary interest and not involved in our model, the depression measure was placed at the end of our survey. Only 81 participants fully completed this measure. This could be an indication of excessive burden from the length of the survey, or it could have been specific to participants being uncomfortable answering sensitive questions about depression status. In either case, the results regarding depression should be interpreted with caution, as there may have been some response bias. Future research must achieve a healthy balance so that surveys are as brief and efficient as possible so as not to burden participants, yet the psychometric quality of the instruments must be preserved.

It is also important to note that the present convenience sample consisted primarily of older AI/AN women; thus, a better representation of age range and gender would improve the generalizability of these findings. The Hoelter indices near 200 (the structural model) or well above 200 (the measurement model) indicate that the sample size was satisfactory. However, given the cross-sectional design, only a recursive model was estimated. For example, it is possible that increased nonsupportive social behavior could increase anger, which could increase nonsupportive social behavior, creating a cycle that continues to adversely influence diabetes self-care. While structural equation modeling techniques evaluate proposed theoretical models, they cannot rule out the existence of alternative models. Given that these data are correlational in nature, there certainly continue to be ethical constraints that limit the degree to which any of these variables could—or should—be manipulated experimentally.

Diabetes is a significant health threat to AI/AN communities. It can be a burdensome disease to manage, and social support may be remarkably advantageous in meeting the challenges associated with diabetes self-care. In AI/AN communities, interventions designed to improve the presence and perception of available social support may be beneficial. These data also suggest that bolstering diabetes self-efficacy would be important, as it is strongly related to diabetes self-care. The present data provide evidence that interventions designed to improve self-efficacy associated with blood glucose monitoring, diet adherence, and exercise may prove especially important to diabetes self-care in AI/AN communities.

REFERENCES

Acton, K. J., Burrows, N. R., Moore, K., Querec, L., Geiss, L. S., & Engelgau, M. M. (2002). Trends in diabetes prevalence among American Indian and Alaska Native children, adolescents, and young adults. *American Journal of Public Health, 92*(9), 1485-1490. doi: 10.2105/AJPH.92.9.1485

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191-215. doi: 10.1037/0033-295X.84.2.191

Bauerle, S. Y., Amirkhan, J. H., & Hupka, R. B. (2002). An attribution theory analysis of romantic jealousy. *Motivation and Emotion, 26*(4), 297-319. doi: 10.1023/a:1022871104307

Burrows, N. R., Geiss, L. S., Engelgau, M. M., & Acton, K. J. (2000). Prevalence of diabetes among Native Americans and Alaska Natives, 1990-1997: An increasing burden. *Diabetes Care, 23*(12), 1786-1790. doi: 10.2337/diacare.23.12.1786

Cameron, C., Payne, B., & Knobe, J. (2010). Do theories of implicit race bias change moral judgments? *Social Justice Research, 23*(4), 272-289. doi:10.1007/s11211-010-0118-z

Chang, S., van Witteloostuijn, A., & Eden, L. (2010). From the editors: Common method variance in international business research. *Journal of International Business Studies, 41*(2), 178-184. doi: 10.1057/jibs.2009.88

Corrigan, P., Markowitz, F. E., Watson, A., Rowan, D., & Kubiak, M. A. (2003). An attribution model of public discrimination towards persons with mental illness. *Journal of Health and Social Behavior, 44*(2), 162-179. doi: 10.2307/1519806

Corrigan, P., & Watson, A. C. (2007). The stigma of psychiatric disorders and the gender, ethnicity, and education of the perceiver. *Community Mental Health Journal, 43*(5), 439-458. doi: 10.1007/s10597-007-9084-9

Darlington, R.B. (1990). *Regression and linear models*. NY: McGraw-Hill.

DePalma, M. T., Rollison, J., & Camporese, M. (2011). Psychosocial predictors of diabetes management. *American Journal of Health Behavior, 35*, 209-218. doi: 10.5993/AJHB.35.2.8

Devlin, H., Roberts, M., Okaya, A., & Xiong, Y. M. (2006). Our lives were healthier before: Focus groups with African American, American Indian, Hispanic/Latino, and Hmong people with diabetes. *Health Promotion Practice, 7*(1), 47-55. doi: 10.1177/1524839905275395

Diabetes Prevention Program Research Group. (2002). Reduction in the incidence of type 2 diabetes with lifestyle intervention or metformin. *The New England Journal of Medicine, 346*(6), 393-403. doi: 10.1056/NEJMoa012512

Dillinger, T. L., Jett, S. C., Macri, M. J., & Grivetti, L. E. (1999). Feast or famine? Supplemental food programs and their impacts on two American Indian communities in California. *International Journal of Food Sciences and Nutrition, 50*(3), 173-187. doi: 10.1080/096374899101210

Gallagher, D., Visser, M., Sepúlveda, D., Pierson, R., Harris, T., & Heymsfield, S. (1996). How useful is body mass index for comparison of body fatness across age, sex, and ethnic groups? *American Journal of Epidemiology, 143*(3), 228-239. Retrieved from http://www.aje.oxfordjournals.org/

Gonzalez, J. S., Safren, S. A., Cagliero, E., Wexler, D. J., Delahanty, L., Wittenberg, E., . . . Grant, R.W. (2007). Depression, self-care, and medication adherence in type 2 diabetes: Relationships across the full range of symptom severity. *Diabetes Care, 30*(9), 2222-2227. doi: 10.2337/dc07-0158

Griffin, J. A., Gilliland, S. S., Perez, G., Upson, D., & Carter, J. S. (2000). Challenges to participating in a lifestyle intervention program: The Native American Diabetes Project. *Diabetes Education, 26*(4), 681-689. doi: 10.1177/014572170002600416

Henry, P. J., Reyna, C., & Weiner, B. (2004). Hate welfare but help the poor: How the attributional content of stereotypes explains the paradox of reactions to the destitute in America. *Journal of Applied Social Psychology, 34*(1), 34-58. doi: 10.1111/j.1559-1816.2004.tb02536.x

Hooper, D., Coughlan, J., & Mullen, M. R. (2008). Structural equation modelling: Guidelines for determining model fit. *Electronic Journal of Business Research Methods, 6*(1), 53-59. Retrieved from http://www.ejbrm.com/

Jiang, L., Beals, J., Zhang, L., Mitchell, C. M., Manson, S. M., Acton, K. J., & Roubideaux, Y. (2012). Latent class analysis of stages of change for multiple health behaviors: Results from the Special Diabetes Program for Indians Diabetes Prevention Program. *Prevention Science, 13*(5), 449-461. doi:10.1007/s11121-011-0272-z

Jones, E. J., Appel, S. J., Eaves, Y. D., Moneyham, L., Oster, R. A., & Ovalle, F. (2012). Cardiometabolic risk, knowledge, risk perception, and self-efficacy among American Indian women with previous gestational diabetes. *Journal of Obstetric, Gynecologic, & Neonatal Nursing, 41*(2), 246-257. doi: 10.1111/j.1552-6909.2012.01339.x

Karlsen, B., & Bru, E. (2002). Coping styles among adults with type 1 and type 2 diabetes. *Psychology, Health & Medicine, 7*(3), 245-259. doi: 10.1080/13548500220139403

Kim, G., DeCoster, J., Huang, C.-H., & Chiriboga, D. A. (2011). Race/ethnicity and the factor structure of the Center for Epidemiologic Studies Depression Scale: A meta-analysis. *Cultural Diversity and Ethnic Minority Psychology, 17*(4), 381-396. doi: 10.1037/a0025434

King, D. K., Glasgow, R. E., Toobert, D. J., Strycker, L. A., Estabrooks, P. A., Osuna, D., & Faber, A. J. (2010). Self-efficacy, problem solving, and social-environmental support are associated with diabetes self-management behaviors. *Diabetes Care, 33*(4), 751-753. doi: 10.2337/dc09-1746

Knowler, W. C., Fowler, S. E., Hamman, R. F., Christophi, C. A., Hoffman, H. J., Brenneman, A. T., . . .Nathan, D.M. (2009). 10-year follow-up of diabetes incidence and weight loss in the Diabetes Prevention Program Outcomes Study. *Lancet, 374*(9702), 1677-1686. doi: 10.1016/S0140-6736(09)61457-4

Lewin, A. B., Geffken, G. R., Heidgerken, A. D., Duke, D. C., Novoa, W., Williams, L. B., & Storch, E. A. (2005). The Diabetes Family Behavior Checklist: A psychometric evaluation. *Journal of Clinical Psychology in Medical Settings, 12*(4), 315-322. doi: 10.1007/s10880-005-7817-x

Li, C., Ford, E. S., Strine, T. W., & Mokdad, A. H. (2008). Prevalence of depression among U.S. adults with diabetes: Findings from the 2006 Behavioral Risk Factor Surveillance System. *Diabetes Care, 31*(1), 105-107. doi: 10.2337/dc07-1154

Nouwen, A., Ford, T., Balan, A. T., Twisk, J., Ruggiero, L., & White, D. (2011). Longitudinal motivational predictors of dietary self-care and diabetes control in adults with newly diagnosed type 2 diabetes mellitus. *Health Psychology, 30*(6), 771-779. doi: 10.1037/a0024500

Radloff, L. S. (1977). The CES-D Scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*(3), 385-401. doi: 10.1177/014662167700100306

Rudolph, U., Roesch, S. C., Greitemeyer, T., & Weiner, B. (2004). A meta-analytic review of help giving and aggression from an attributional perspective: Contributions to a general theory of motivation. *Cognition and Emotion, 18*(6), 815-848. doi: 10.1080/02699930341000248

Sacco W, & Bykowski C. (2010) Depression and hemoglobin A1c in type 1 and type 2 diabetes: The role of self-efficacy. *Diabetes Research & Clinical Practice, 90*(2), 141-146. doi:10.1016/j.diabres.2010.06.026

Sarkar, U., Fisher, L., & Schillinger, D. (2006). Is self-efficacy associated with diabetes self-management across race/ethnicity and health literacy? *Diabetes Care, 29(4),* 823-829. doi:10.2337/diacare.29.04.06.dc05-1615

Schafer, L. C., McCaul, K. D., & Glasgow, R. E. (1986). Supportive and nonsupportive family behaviors: Relationships to adherence and metabolic control in persons with type 1 diabetes. *Diabetes Care, 9*(2), 179-185. doi: 10.2337/diacare.9.2.179

Schultz, L. (2006). The relationship of educational level, reservation status and blood quantum with anger and post-colonial stress among American Indians (Doctoral dissertation, Oklahoma State University, 2006). *Dissertation Abstracts International, 66*, 7-B.

Shaw, J. L., Brown, J., Khan, B., Mau, M. K., & Dillard, D. (2013). Resources, roadblocks and turning points: A qualitative study of American Indian/Alaska Native adults with type 2 diabetes. *Journal of Community Health: The Publication for Health Promotion and Disease Prevention, 38*(1), 86-94. doi: 10.1007/s10900-012-9585-5

Shaw, J. E., Sicree, R. A., & Zimmet, P. Z. (2010). Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Research and Clinical Practice, 87*(1), 4-14. doi: 10.1016/j.diabres.2009.10.007

Spielberger, C. D. (1999). *STAXI-2: State-Trait Anger Expression Inventory - 2.* Lutz, FL: Psychological Assessment Resources (PAR), Inc.

Talbot, F., Nouwen, A., Gingras, J., Gosselin, M., & Audet, J. (1997). The assessment of diabetes-related cognitive and social factors: The Multidimensional Diabetes Questionnaire. *Journal of Behavioral Medicine, 20*(3), 291-312. doi: 10.1023/A:1025508928696

Taylor, C. A., Keim, K. S., Sparrer, A., Van Delinder, J. L., & Parker, S. P. (2004). Social and cultural barriers to diabetes prevention in Oklahoma American Indian women. *Preventing Chronic Disease, 1*(2), 1-10. doi: http://www.cdc.gov/pcd/issues/2004/apr/03_0017.htm

Thompson, J. L., Wolfe, V. K., Wilson, N., Pardilla, M. N., & Perez, G. (2003). Personal, social, and environmental correlates of physical activity in Native American women. *American Journal of Preventive Medicine. Special Issue: Physical Activity in Women from Diverse Racial/Ethnic Groups: Environmental, Policy, and Cultural Factors, 25*(3, Suppl 1), 53-60. doi: 10.1016/S0749-3797(03)00165-X

Toobert, D. J., Hampson, S. E., & Glasgow, R. E. (2000). The Summary of Diabetes Self-Care Activities measure: Results from 7 studies and a revised scale. *Diabetes Care, 23*(7), 943-950. doi: 10.2337/diacare.23.7.943

U.S. Department of Health and Human Services. (2011). *Healthy People 2020*. Washington, DC: Author. Retrieved from http://www.healthypeople.gov/

van de Laar, K. E., & van der Bijl, J. J. (2001). Strategies enhancing self-efficacy in diabetes education: A review. *Scholarly Inquiry for Nursing Practice, 15*(3), 235-248. Retrieved from http://www.springerpub.com/journals/research-and-theory-for-nursing-practice.html

Walker, R. J., Smalls, B. L., Hernandez-Tejada, M. A., Campbell, J. A., Davis, K. S., & Egede, L. E. (2012). Effect of diabetes fatalism on medication adherence and self-care behaviors in adults with diabetes. *General Hospital Psychiatry, 34*(6), 598-603. doi:10.1016/ j.genhosppsych.2012.07.005

Weijman, I., Kant, I., Swaen, G. M., Ros, W. J., Rutten, G. E., Schaufeli, W. B., . . . Winnubst, J.A.. (2004). Diabetes, employment and fatigue-related complaints: A comparison between diabetic employees, “healthy” employees, and employees with other chronic diseases. *Journal of Occupational and Environmental Medicine, 46*(8), 828-836. doi: 00043764-200408000-00012

Weiner, B. (1995). *Judgments of responsibility: A foundation for a theory of social conduct.* New York: Guilford Press.

Weiner, B., Perry, R. P., & Magnusson, J. (1988). An attributional analysis of reactions to stigmas. *Journal of Personality and Social Psychology, 55*(5), 738-748. doi: 10.1037/0022-3514.55.5.738

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ADHD SYMPTOMS IN AMERICAN INDIAN/ALASKA NATIVE BOYS AND GIRLS

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Abstract: Despite the commonality of attention-deficit/hyperactivity disorder (ADHD), the diagnostic criteria are based largely on research with European American boys. Much less research is available regarding the prevalence of ADHD in other groups, specifically American Indian/Alaska Native (AI/AN) children. Moreover, research on sex differences in ADHD has typically not included AI/AN children. The current study examined parent- and teacher-reported ADHD symptoms in 72 AI children from one region in the Southern U.S., with a focus on sex differences. Data showed that AI children may have more pronounced sex differences in ADHD symptomology than is found in studies with primarily European American children. Implications, limitations, and future directions are discussed.

Attention-deficit/hyperactivity disorder (ADHD), as defined by the *Diagnostic and Statistical Manual of Mental Disorders, 5th Edition* (*DSM-5*; American Psychological Association [APA], 2013), is among the most common mental health problems of childhood, affecting approximately 5 to 10% of school-age children in the U.S. (APA, 2013; Barkley, 2006; Pelham & Gnagy, 1999; Ramtekkar, Reiersen, Todorov, & Todd, 2010; Remschmidt et al., 2005; Rowland, Lesesne, & Abramowitz, 2002) and worldwide (Polanczyk, de Lima, Horta, Biederman, & Rohde, 2007). In a community sample of over 9,000 participants, Ramtekkar et al. (2010) found that ADHD prevalence rates are highest in children and decrease in adolescents, but ADHD is still seen in approximately 5% of adults (Willcutt, 2012). ADHD is characterized by developmentally inappropriate levels of inattention (e.g., difficulty sustaining attention, forgetfulness) and/or hyperactivity/impulsivity (e.g., excessive talking, often being “on the go”). This two-factor structure results in three subtypes of ADHD: Predominately Inattentive, Predominately Hyperactive/Impulsive, and Combined (APA, 2013). These clusters of symptoms show developmental variability. Hyperactivity and impulsivity appear at ages 3 to 4 years, whereas inattention appears at ages 5 to 7 years (Hart et al., 1995). Hyperactivity and impulsivity decline with age, but stay at levels above those of non-ADHD peers through adolescence (Fischer, Barkley, Fletcher, & Smallish, 1993; Hart et al., 1995). Inattention is stable in childhood and adolescence, and, although it decreases in late adolescence, it tends to stay above normative levels (Fischer et al., 1993; Hart et al., 1995).

Despite the commonality of ADHD, the diagnostic criteria are based on studies involving primarily school-age European American boys (Faraone, Biederman, Keenan, & Tsuang, 1991; Gingerich, Turnock, Litfin, & Rosén, 1998; Hartung & Widiger, 1998; Lahey et al., 1994). Therefore, the generalizability of ADHD symptoms for girls, preschoolers, adolescents, adults, and ethnic minorities is questionable, and more research examining sex differences in the disorder, as well as research on the disorder in understudied populations, is needed.

Ethnicity and ADHD

Although ADHD has been referred to as the most extensively studied childhood mental health disorder (Wolraich, 1999), only a small percentage of research has examined ethnic differences in this disorder. Information regarding differential prevalence rates by ethnicity is limited (Gingerich et al., 1998). The *DSM-5* states that cultural variations may affect prevalence estimates, but differences among minority groups in the U.S. are not reported (APA, 2013). It is believed that ADHD affects children of all cultures and ethnicities (e.g., Bauermeister et al., 2005; Jacobsen, 2002; Rasmussen et al., 2002; Remschmidt et al., 2005; Wolraich et al., 2003), but more research is warranted. Therefore, and because only relatively recently have researchers begun to examine ADHD in girls, the purpose of the current study was to examine sex differences in ADHD symptoms in one of these understudied groups: American Indian/Alaska Native (AI/AN) children.[1]

Although our understanding of ADHD in ethnic minority groups is limited, the literature has been expanding. Existing studies have suggested that ADHD may be more common or more severe in African American children than in other ethnic groups in the U.S. (Arnold et al., 2003; Cuffe, Moore, & McKeown, 2005; DuPaul et al., 1998; Epstein, March, Conners, & Jackson, 1998; Epstein et al., 2005; Martel, 2013; Nolan, Gadow, & Sprafkin, 2001; Reid, Casat, Norton, Anastopoulos, & Temple, 2001). However, as noted by Barbarin and Soler (1993), this higher rate of ADHD may be due to chronically unpredictable and stressful life situations. A meta-analysis by Miller, Nigg, and Miller (2009) suggests that African American children have more *symptoms* of ADHD than European American children, but lower rates of *diagnosis* and *treatment*. The authors suggested that this seemingly contradictory finding was due to the fact that many African American children and families have limited access to medical/psychological services (Miller et al., 2009).

Additionally, the limited research on ADHD in Hispanic children is mixed. Some studies have suggested that ADHD is more common or more severe in Hispanic children than in those of other ethnic groups (Arnold et al., 2003), whereas others have suggested that it is less so (Cuffe et al., 2005; Domingeuz de Ramirez & Shapiro, 1998; Goyette, Conners, & Ulrich, 1978). In adults, there is some preliminary evidence that Hispanics have lower rates of ADHD than European Americans (Kessler et al., 2006). Further, findings by Nguyen and colleagues (2004) suggest that Asian American children have lower rates of ADHD than other groups.

Data regarding ADHD in AI/AN children are very limited. Costello, Farmer, Angold, Burns and Erkanli (1997) reported that AI/AN youth ages 9 to 13 years had marginally, but not statistically significantly, lower rates of ADHD than European American youth. In another research group, AI/AN children were combined with Asian American and Pacific Islander children because the sample was too small to analyze each group separately (Cuffe et al., 2005). Nonetheless, based on parent report, this combined group, ages 4 to 17 years, had lower rates of ADHD than European American and African American children. Additionally, Beiser, Dion, and Gotwiec (2000) reported some evidence that the two-factor structure of *DSM* ADHD symptoms found in AI/AN children was as valid in this group as in other ethnic groups. Taken together, these data suggest that AI/AN youth might have slightly lower levels of ADHD diagnoses when compared to European or African American youth, and that the two-factor structure of ADHD may hold for AI/AN youth. However, much more research is warranted. The paucity of research regarding ADHD in AI/AN populations may lead to inappropriate assessment procedures, diagnostic considerations, and treatment options for these groups.

Sex and ADHD

The *DSM-5* (APA, 2013) states that, in children, the male-to-female ratio for ADHD is approximately 2:1, and this seems to be consistent across studies (Ramtekkar et al., 2010; Willcutt, 2012). Two meta-analyses, conducted by Gaub and Carlson (1997) and Gershon (2002), presented a comprehensive examination of sex differences in ADHD. The two meta-analyses had many similar findings, including: (1) community sample boys had higher rates of inattention and hyperactivity than community sample girls, (2) community sample boys had higher rates of comorbid externalizing disorders than community sample girls, (3) girls with ADHD might be more cognitively impaired than boys with ADHD (but possibly only in clinic samples), and (4) there were no sex differences on math or reading achievement, nor on social impairment.

In the years since the publication of these meta-analyses, more data have been presented. For example, Hartung et al. (2002) found that boys displayed more symptoms of ADHD, especially in educational settings. Conversely, Fedele, Lefler, Hartung, and Canu (2012) found that, in college-age young adults, women with ADHD actually reported higher levels of ADHD symptoms and related impairment than men. Moreover, Martel (2013) indicated that in very young children (ages 3-6 years), no sex differences in ADHD symptoms were found, but that the cumulative risk of being male, African American, and of low socioeconomic status was predictive of ADHD symptoms.

Despite this growing literature base, few studies have examined ethnicity along with sex. That is, although we have increasing amounts of information about sex and ADHD, the field is still in need of data regarding the interaction of sex and ethnicity. Thus, it is imperative to examine sex differences in AI/AN populations to understand more fully the manifestation of ADHD symptoms in AI/AN boys and girls.

The Current Study

Information about ADHD symptoms in AI/AN children may have implications for accurate identification and effective treatment. It is important to note that the current study does not examine differences in diagnostic base rates between AI/AN children and other ethnic groups. The aim of the current study was to determine whether AI boys and girls from a geographic region in the Southern U.S. differ in terms of ADHD *symptoms*. Based on the results of the Gaub and Carlson (1997) and Gershon (2002) meta-analyses, as well as more recent studies (Hartung et al., 2002; Martel, 2013), it was hypothesized that AI boys would have higher rates of ADHD symptomology than AI girls, as this pattern has been shown in other ethnic groups. Because these sex differences are highly important for understanding the etiology of ADHD, it is critical to determine whether this pattern is replicated in understudied groups.

METHOD

Procedure

IRB approval was obtained from both the university (prior to data collection) and the tribe (prior to data collection, before manuscript submission, and upon final revision for publication). The current study was one part of a larger neuropsychological study of ADHD (Bartgis, Lefler, Hartung, & Thomas, 2009). The initial study did not find neuropsychological differences between AI children and non-AI children, and, therefore, results in Bartgis et al. (2009) were presented for the group as a whole. Sex differences were not reported in the Bartgis et al. (2009) study, but are analyzed here as they are central to the current study. Only relevant procedures and materials from the larger study are discussed here.

Children ranging in age from 6 to 13 years (*M* = 9.32, *SD* = 2.09) were recruited from health clinics within a Southern Plains tribe that serve individuals from over 180 different tribes, thus representing an entire tribal service population. Parents presenting at the clinic were seeking a psychoeducational evaluation for their child; thus, they are representative of those seeking outpatient mental or behavioral health evaluation and/or treatment for their child.

Upon contacting the tribal health clinic, these parents were provided with information about the study and were asked about their willingness to allow their child to participate. Children also were recruited from families who expressly asked to be involved in the research project after seeing posted advertisements. A majority of parents who decided to participate had concerns about their child's behavior (e.g., possible ADHD or Oppositional Defiant Disorder). Thus, this is a convenience sample that was over-selected for possible ADHD.

Families who chose to participate began the research protocol in lieu of an evaluation with the staff psychologist, as the protocol included all testing that would have been done by the psychologist, as well as some additional testing (see Bartgis et al., 2009 for details on the full protocol). Doctoral students in a clinical psychology program conducted the testing. Informed consent from parents and teachers, and assent from children, were obtained. Parents completed parent rating forms and teachers completed teacher rating forms for the measures described below. Parents provided the teacher-report and consent forms to their children's teachers, and were responsible for returning them to the research team. Both forms included sections that measured ADHD symptoms, but in slightly different ways. Families were paid $25 total for their participation and travel expenses.

After all data were collected, the researchers provided a clinical report to the tribal health clinic's licensed psychologist, then met with every family and made appropriate diagnoses and treatment recommendations where necessary.

Overall, 72 AI children participated in this study. Children with parent-reported neurological impairment resulting from injury or illness, prenatal substance exposure, and pervasive developmental disorders were excluded from the study prior to scheduling the initial session. Children with full scale IQ below 80 (as measured for the purposes of the larger study) were excluded from data analyses after participation. Of the participants, 41 (57%) were boys and 31 (43%) were girls.

Measures

Child Symptom Inventory, Fourth Edition (CSI-4)

The CSI-4 is a rating scale designed to assess specific symptoms of a wide range of childhood disorders founded on *DSM* criteria (Gadow & Sprafkin, 1994). The CSI-4 provides both parent and teacher report versions for measuring the behavior of children ages 5 to 14 years, and includes responses on a 4-point Likert-type scale (*never* through *very often*). For the ADHD subscale of the parent CSI-4, sensitivity was estimated at .80, and for the ADHD subscale of the teacher CSI-4, sensitivity was estimated at .60 (Gadow & Sprafkin, 1998). For the ADHD subscale of the parent CSI-4, specificity was estimated at .74, and for the ADHD subscale of the teacher CSI-4, specificity was estimated at .86 (Gadow & Sprafkin, 1998). Because the CSI-4 was designed based on *DSM* criteria, it has limited normative data and is not recommended for normative interpretations (Frick & Kamphaus, 2001). However, given that *DSM* ADHD criteria were derived from research with European American boys (Lahey et al., 1994) and the CSI-4 is directly based on the *DSM*, it can be assumed that AI/AN children were not central in the construction of this measure.

Behavior Assessment System for Children (BASC)

The BASC rating scales were designed as an integrated system to facilitate differential diagnosis of a variety of emotional and behavioral disorders in children (Reynolds & Kamphaus, 1992). In the current study, the BASC Parent Rating Scales and Teacher Rating Scales were used. Both of these versions measure a wide range of symptoms, and include a 4-point Likert-type scale (*never* through *almost always*). The BASC has good internal consistency, with subscale alphas averaging .80, and the composite alphas averaging in the mid .90s (Reynolds & Kamphaus, 1992). The BASC was normed on a nationally representative sample that was not over-selected for AI/AN children; thus, very few AI/AN children were included in the initial normative sample.

Data Preparation and Analysis

The dependent variables (DV) in the current study were CSI-4 summary scores for inattention and hyperactivity, as well as BASC summary scores for attention problems and hyperactivity. All four of these subscales were reported by parents and teachers, creating a total of eight DVs. It should be noted that far fewer people ($n = 46$) completed the BASC than the CSI-4 because of a data collection error. CSI-4 and BASC summary scores were computed by assigning 0 points for a response of *never* through 3 points for a response of *very often* or *almost always*, and then summing all scores from each subscale. BASC summary scores were used in place of BASC t-scores because the t-scores control for age and sex, and the current study aimed to examine sex differences. We did not combine parent and teacher reports, as Shemmassian and Lee (2012) found that parent and teacher reports tend to predict different types of impairment, and no one method of combining reports or using reports independently was found to be clearly superior to other methods.

Demographic variables were examined as possible covariates (Table 1). Only one variable, family income, was significantly different between boys and girls. Specifically, family income was higher for girls than boys, $t = 2.47$, $p = .017$. Thus, in the following analyses family income was included as a covariate where appropriate.

Table 1
Demographic Variables for Boys and Girls

	Sex		*t*-test		
	Boys	**Girls**	***t***	**df**	***p* value**
Age	9.04 (2.04)	9.69 (2.12)	1.31	70	.196
Mother's education level	3.18 (1.25)	3.62 (1.44)	1.29	63	.201
Father's education level	2.36 (1.31)	2.76 (1.59)	1.10	62	.276
Family income	1.87 (1.28)	2.76 (6.21)	2.47	62	.017

Note: Education level was rated on a 7-point scale; Family income was rated on a 5-point scale.

To test the primary hypothesis, that AI boys from the sampled tribal service area will have higher levels of ADHD symptoms than AI girls, we used Analyses of Covariance (ANCOVA) with family income as the covariate (see Tables 2 and 3, in Results). Specifically, four ANCOVAs were conducted for the CSI subscales (i.e., parent-rated inattention and hyperactivity and teacher-rated inattention and hyperactivity; see Table 2) and four ANCOVAs were conducted for the BASC subscales (i.e., parent-rated attention problems and hyperactivity and teacher-rated attention problems and hyperactivity; see Table 3). No alpha correction was made per Crick and Zahn-Waxler (2003), who recommend not performing an alpha correction when Type II error risk is high. In particular, in ADHD research where there are fewer girls than boys, the power is often too low to detect sex differences; therefore, an alpha correction would be overly conservative.

RESULTS

Regarding family income, 45.3% of families earned less than $25,000 per year; 21.9% earned between $26,000 and $40,000; 21.9% earned between $41,000 and $70,000; and 10.9% earned more than $70,000. Regarding mother's highest level of education, 4.6% of mothers did not have a high school diploma, 26.2% had a high school diploma or GED, 37.5% had an associate's degree or some college, and 27.7% had a bachelors or master's degree. As for father's highest level of education, 21.9% of fathers did not have a high school diploma, 42.2% had a high school diploma or GED, 21.9% had an associate's degree or some college, and 14.1% had a bachelors or master's degree.

Before testing the primary hypothesis, we calculated correlation coefficients between BASC and CSI-4 scores. BASC and CSI-4 parent-rated inattention were positively correlated ($r = .79$, $p < .001$), as were BASC and CSI-4 parent-rated hyperactivity ($r = .88$, $p < .001$). Likewise, BASC and CSI-4 teacher-rated inattention and BASC and CSI-4 teacher-rated hyperactivity were significantly positively correlated ($r = .94$, $p < .001$; $r = .94$, $p < .001$, respectively).

CSI-4

All four CSI-4 ANCOVAs (i.e., parent-rated inattention and hyperactivity and teacher-rated inattention and hyperactivity) were statistically significant, such that boys had higher symptomology than girls (see Table 2). Also, all four ANCOVAs had medium effect sizes (Partial Eta Squared > .08; see Table 2).

Table 2
Parent- and Teacher-rated Child Symptom Inventory, Fourth Edition (CSI-4)
Scores for Boys and Girls

	Sex		ANCOVA			
	Boys	**Girls**	***F***	**df**	***p* value**	**Par Eta Sq**
Parent-rated CSI-4 Inattention	12.77 (7.77)	8.12 (7.38)	5.57	64	.022	.08
Parent-rated CSI-4 Hyperactivity	10.46 (7.89)	6.28 (7.50)	5.29	64	.025	.08
Teacher-rated CSI-4 Inattention	15.69 (8.35)	8.52 (9.55)	6.48	53	.014	.12
Teacher-rated CSI-4 Hyperactivity	9.13 (7.89)	3.95 (6.04)	5.17	53	.027	.09

Note: All scores are on a scale of 0-27. Data were excluded listwise, resulting in slightly reduced *n*s

BASC

Again, far fewer people (*n* = 46) completed the BASC than the CSI-4 because of a data collection error. Nonetheless, even with lower *n*s, two of the four BASC ANCOVAs (i.e., parent-rated attention problems and teacher-rated attention problems) were statistically significant such that boys had higher symptomology that girls (see Table 3). Parent- and teacher-rated hyperactivity were not statistically significant. Also, both significant ANCOVAs had large effect sizes (Partial Eta Squared > .29; see Table 3). It is possible that the non-significant ANCOVAs can be attributed to low power due to the lower *n*.

Table 3
Parent- and Teacher-rated Behavior Assessment System for Children (BASC)
Scores for Boys and Girls

	Sex		ANCOVA			
	Boys	**Girls**	***F***	**df**	***p* value**	**Par Eta Sq**
Parent-rated BASC Attention Problems	11.00 (3.16)	6.91 (3.11)	9.06	25	.006	.29
Parent-rated BASC Hyperactivity	11.86 (6.50)	6.09 (6.23)	3.87	25	.062	.15
Teacher-rated BASC Attention Problems	15.17 (6.71)	5.11 (6.58)	11.88	21	.003	.40
Teacher-rated BASC Hyperactivity	13.17 (11.30)	5.78 (8.50)	2.16	21	.159	.11

Note: BASC summary score for Parent-rated BASC Attention Problems is on a scale of 0-21. Parent-rated BASC Hyperactivity score is on a scale of 0-30. Teacher-rated BASC Attention Problems score is on a scale of 0-24. Teacher-rated BASC Hyperactivity score is on a scale of 0-39.

Internal Consistency Reliability

In addition to the primary analyses, internal consistency reliability was examined for each of the eight DVs (four from the CSI-4 and four from the BASC; see Table 4). Seven of eight alphas showed good or better internal consistency reliability (alpha coefficients > .89), with the parent report BASC inattention subscale showing poor internal consistency (alpha coefficient = .53).

Table 4
Internal Consistency Reliability for the *DV*s

	Alpha Coefficient
Parent-rated CSI-4 Inattention	.95
Parent-rated CSI-4 Hyperactivity	.95
Teacher-rated CSI-4 Inattention	.97
Teacher-rated CSI-4 Hyperactivity	.95
Parent-rated BASC Attention Problems	.53
Parent-rated BASC Hyperactivity	.89
Teacher-rated BASC Attention Problems	.94
Teacher-rated BASC Hyperactivity	.94

Discussion

The results of the current study show that, in a convenience sample from one tribal service area, AI boys have higher ADHD symptomology (inattention and hyperactivity) than AI girls. The Gaub and Carlson (1997) and Gershon (2002) meta-analyses came to this conclusion regarding studies of primarily European American children, and, thus, the current study extends those sex difference findings to AI youth, albeit from only one geographic region of the U.S.

Interestingly, however, although the meta-analyses found sex differences, the effect sizes in the current study are somewhat larger than the effect sizes reported in the meta-analyses. Specifically, Partial Eta Squared for the CSI-4 analyses in the current study ranged from .08 to .12 (medium), and Partial Eta Squared for the significant BASC analyses in the current study ranged from .29 to .40 (large). Compared to the Gaub and Carlson (1997) meta-analysis, where the average Cohen's *d* was .16 for hyperactivity and .19 for inattention (both small), and the Gershon (2002) meta-analysis, where the average Cohen's *d* was .29 for hyperactivity and .23 for inattention (both small), the current study suggests that AI youth from this sample may have more pronounced sex differences than participants in studies including primarily European American children. However, this interpretation warrants caution given the small sample size, recruiting limitations, limited normative data for assessment tools for this population, and need for replication. Nevertheless, this finding suggests a need for more research on ADHD symptoms in AI/AN populations. It should be noted that AI boys do not necessarily have higher levels of ADHD psychopathology than boys of other ethnic groups; boys have consistently been found to have higher levels of ADHD symptomology than girls, regardless of ethnic group (Gaub & Carlson, 1997; Gershon, 2002). It is also possible that AI girls from the current sample were particularly low on ADHD symptomology.

This finding of pronounced sex differences has several possible explanations. First, it is possible that data collection procedures (i.e., oversampling children whose parents or teachers had concerns about ADHD vs. using a pure community sample) explain the results; the current study used a convenience sample that was overselected for possible ADHD, whereas the meta-analyses used both community and clinic samples. However, the sample alone is unlikely to explain the robust finding that these AI youth have more pronounced sex differences because it cannot explain why girls' symptoms are lower than boys' symptoms.

Second, given that the data collection procedure difference alone likely cannot account for the larger-than-expected effect sizes between AI/AN boys and girls, there could be a cultural explanation. For example, it has been posited that AI/AN men and boys have unique experiences of and responses to historical trauma when compared to AI/AN women and girls because of the loss of their traditional male role as the protector of the community (Brave Heart, Elkins, Tafoya, Bird, & Salvador, 2012). Thus, the entangled histories of historical trauma and intergenerational trauma may have a unique manifestation for AI/AN men and boys. Research has shown that direct exposure to trauma is a factor in increased disruptive behavior problems, including ADHD and ADHD-like symptoms (Ford, Gagnon, Connor, & Pearson, 2011; Villodas, Litrownik, & Roesch, 2012). Therefore, it is conceivable that the high level of historical trauma faced by AI/AN communities plays some unique role in the findings of the current study. Future studies on ADHD symptomatology in AI/AN populations should take into account the role of historical and intergenerational trauma as a potential variable.

Third, in some AI/AN cultures women and girls are held to different standards of behavior than men and boys. For example, the Southern Plains tribe from which a majority of the current sample was drawn is a traditionally matriarchal society in which women and girls often are expected to be the household and community managers (Mann, 2006). This is, of course, not representative of every tribe or even every family unit within a particular tribe, but it is possible that some AI/AN girls are earlier and more strongly reprimanded for disorganized behavior than are AI/AN boys (and possibly girls of other ethnic groups), and consequently may learn to inhibit their behavior at a younger age. Of course, this is an empirical question that warrants additional research.

Fourth, this difference may be due to a form of rater bias or bias related to the use of assessment tools that were not developed with AI/AN communities (e.g., construct, items). All of the parents and many of the teachers who were raters in this study were of AI/AN descent. Because of this fact, and because most raters in prior studies utilizing the BASC and CSI-4 were European American, it is possible that some questions were interpreted differently by AI/AN raters. Moreover, given that the BASC was normed on a nationally representative sample (Reynolds & Kamphaus, 1992) and not one that over-selected for AI/AN families, it might not be valid for use with this population, as only a few AI/ANs may have been in the normative sample.

Finally, teachers rated boys' ADHD symptoms more highly than did parents, especially on the BASC. As noted earlier, parent and teacher report are both valid in predicting different types of impairment (Shemmassian & Lee, 2012), but it is possible that teachers in the current study had a rater bias where they artificially rated boys as more symptomatic, girls as less symptomatic, or both, which has been found in prior research (Ullebø, Posserud, Heiervang, Obel, & Gillberg, 2012). Such bias could explain some of the significant results and strong effect sizes. Alternatively, parents may be less susceptible to such a rater bias (Ullebø et al., 2012), and/or boys may be more readily referred to a mental health professional when they display externalizing behaviors (Coles, Slavec, Bernstein, & Baroni, 2012). Again, more research is needed to address these subtle issues.

Implications

AI/AN families are in need of affordable, empirically based, reliable mental health care (Gone & Alcantara, 2007), and the first step in delivering that care is understanding the manifestation of mental health and behavior problems in AI/AN groups. Although it is premature to generalize beyond the present sample and tribe, given our finding that AI/AN boys may be displaying higher rates of ADHD symptoms than AI/AN girls, this need may be especially apparent for AI/AN boys with early warning signs of behavior problems. Therefore, training primary care providers in identification and referral procedures, disseminating empirically based treatments to AI/AN communities, understanding whether our current assessment measures are appropriate for AI/AN children, and continuing research with these understudied populations are of utmost importance. Additionally, continuing research on ADHD sex differences with other diverse, underserved populations is warranted.

While studies have indicated that AI/AN adults have higher levels of many mental health problems than other groups (Huang et al., 2006), it is important to examine cultural and contextual factors more closely before making assumptions about prevalence rates. In addition to the possibility that historical and intergenerational trauma may be a unique risk factor for AI/AN boys, AI/ANs also face serious access-to-care issues, due to significant underfunding of the Indian health care system, which may contribute to such findings. Specifically, AI/AN families have less access to mental health care as compared to other ethnic groups (Office of Inspector General, 2011; Urban Indian Health Commission, 2007); therefore, problems tend to go untreated and may worsen. Examining potential cultural and contextual factors related to ADHD symptomology will be important for future studies to understand more fully gender differences in AI/AN populations and to support early identification of and prevention efforts for at-risk youth.

Limitations and Future Directions

The primary dependent measures used in this study were parent and teacher report behavior rating forms. The findings may be limited by the fact that only two measures were used, and the results must be interpreted within the parameters of these measures, especially given that the internal consistency of one subscale was poor in this sample. Also, because the measures were not created with large samples of AI/AN children, the results may be suspect. However, given the relatively small amount of data available related to ADHD in AI/AN children, these findings can still be viewed as important and informative, albeit preliminary. Another limitation is that the AI/AN children in this study were mainly from one Southern geographic region, which limits the generalizability of the results. Specifically, there are hundreds of AI/AN tribes in the U.S., and it would be a great oversimplification to assume that the results found in this study are relevant for all AI/AN children. In the future, researchers may want to consider engaging tribal communities in the design of such studies to support more culturally driven assessments that include full diagnostic interviews and account for related cultural and contextual factors. Further, a convenience sample was used in this study, and symptoms, rather than diagnoses, were analyzed. Other research teams should consider alternative sampling and analytic procedures to gain a better understanding of this disorder in AI/AN children.

This study is one of only a few studies of ADHD symptoms in an AI/AN population. There is little research on AI/AN mental health problems in general, and this study can be viewed as part of a growing trend to examine one of these issues. In the future, researchers should use larger samples, a wider array of assessment measures, and more diverse AI/AN samples that address the unique cultural and contextual factors facing these populations.

REFERENCES

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

Arnold, L. E., Elliott, M., Sachs, L., Bird, H., Kraemer, H. C., Wells, K. C., . . . Wigal, T. (2003). Effects of ethnicity on treatment attendance, stimulant response/dose and 14-month outcome in ADHD. *Journal of Consulting and Clinical Psychology, 71*, 713-727. doi: 10.1037/0022-006X.71.4.713

Barbarin, O. A., & Soler, R. E. (1993). Behavioral, emotional, and academic adjustment in a national probability sample of African American children: Effects of age, gender, and family structure. *Journal of Black Psychology, 19*, 423-446. doi: 10.1177/00957984930194004

Barkley, R. A. (2006). *Attention-deficit hyperactivity disorder: A handbook for diagnosis and treatment* (3rd ed.). New York: Guilford.

Bartgis, J., Lefler, E. K., Hartung, C. M., & Thomas, D. G. (2009). Contrast sensitivity in children with and without attention deficit hyperactivity disorder symptoms. *Developmental Neuropsychology, 34*, 663-682. doi: 10.1080/87565640902964474

Bauermeister, J. J., Matos, M., Reina, G., Salas, C. C., Martínez, J. V., Cumba, E., & Barkley, R. A. (2005). Comparison of the DSM-IV-TR combined and inattentive types of ADHD in a sample of Latino/Hispanic children. *Journal of Child Psychology and Psychiatry, 46*, 166-179. doi: 10.1111/j.1469-7610.2004.00343.x

Beiser, M., Dion, R., & Gotowiec, A. (2000). The structure of attention-deficit and hyperactivity symptoms among Native and non-Native elementary school children. *Journal of Abnormal Child Psychology, 28*, 425-437. doi: 10.1023/A:1005179521820

Brave Heart, M.Y.H., Elkins, J., Tafoya, G., Bird, D., & Salvador, M. (2012). Wicasa Was'aka: Restoring the traditional strength of American Indian boys and men. *American Journal of Public Health, 102*(Supplement 2), S177-S183. doi: 10.2105/AJPH.2011.300511

Bureau of Indian Affairs. (2001). *Bureau of Indian Affairs: Answers to frequently asked questions*. Washington, DC: Author. Retrieved from http://www.dshs.wa.gov/pdf/esa/dcs/tribal/bia.pdf

Coles, E. K., Slavec, J., Bernstein, M., & Baroni, E. (2012). Exploring the gender gap in referrals for children with ADHD and other disruptive behavior disorders. *Journal of Attention Disorders, 16*(2), 101-108. doi:10.1177/1087054710381481

Costello, E. J., Farmer, E. M. Z., Angold, A., Burns, B. J., & Erkanli, A. (1997). Psychiatric disorders among American Indian and White youth in Appalachia: The Great Smoky Mountains Study. *American Journal of Public Health, 87*, 827-832. doi: 10.2105/AJPH.87.5.827

Crick, N. R., & Zahn-Waxler, C. (2003). The development of psychopathology in females and males: Current progress and future challenges. *Developmental Psychopathology, 15*, 719-742. doi: 10.1017/S095457940300035X

Cuffe, S. P., Moore, C. G., & McKeown, R. E. (2005). Prevalence and correlates of ADHD symptoms in the National Health Interview Survey. *Journal of Attention Disorders, 9*, 392-401. doi: 10.1177/1087054705280413

Dominguez de Ramirez, R. R., & Shapiro, E. S. (1998). Teacher ratings of attention deficit hyperactivity disorder symptoms in Hispanic children. *Journal of Psychopathology and Behavioral Assessment, 20,* 275-293. doi: 10.1023/A:1021934705392

DuPaul, G. J., Anastopoulos, A. D., Power, T. J., Reid, R., Ikeda, M. J., & McGoey, K. E. (1998). Parent ratings of attention-deficit hyperactivity disorder symptoms: Factor structure and normative data. *Journal of Psychopathology and Behavioral Assessment, 20*, 275-293. doi: 10.1023/A:1023087410712

Epstein, J. N., March, J. S., Conners, C. K., & Jackson, D. L. (1998). Racial differences on the Conners Teacher Rating Scale. *Journal of Abnormal Child Psychology, 26*, 109-118. doi: 10.1023/A:1022617821422

Epstein, J. N., Willoughby, M., Valencia, E. Y., Tonev, E. Y., Abikoff, H. B., Arnold, L. E., & Hinshaw, S. P. (2005). The role of children's ethnicity in the relationship between teacher ratings of attention-deficit/hyperactivity disorder and observed classroom behavior. *Journal of Consulting and Clinical Psychology, 73*, 424-434. doi: 10.1037/0022-006X.73.3.424

Faraone, S. V., Biederman, J., Keenan, K., & Tsuang, M. T. (1991). A family-genetic study of girls with *DSM-III* attention deficit disorder. *The American Journal of Psychiatry, 148*, 112-117. Retrieved from www.ajp.psychiatryonline.org

Fedele, D. A., Lefler, E. K., Hartung, C. M., & Canu, W. H. (2012). Sex differences in the manifestation of ADHD in emerging adults. *Journal of Attention Disorders, 16*(2), 109-117. doi:10.1177/1087054710374596

Fischer, M., Barkley, R. A., Fletcher, K. E., & Smallish, L. (1993). The stability of dimensions of behavior in ADHD and normal children over an 8-year follow-up. *Journal of Abnormal Child Psychology, 21*, 315-337. doi:10.1007/BF00917537

Ford, J. D., Gagnon, K., Connor, D. F., & Pearson, G. (2011). History of interpersonal violence, abuse, and nonvictimization trauma and severity of psychiatric symptoms among children in outpatient psychiatric treatment. *Journal of Interpersonal Violence, 26*, 3316-3337. doi: 10.1177/0886260510393009

Frick, P. J., & Kamphaus, R. W. (2001). Standardized rating scales in the assessment of children's behavioral and emotional problems. In C.E. Walker and M.C. Roberts (Eds.), *Handbook of Clinical Child Psychology* (3rd ed.; pp. 190-206). New York: Wiley.

Gadow, K. D., & Sprafkin, J. (1994). *Child Symptom Inventory 4 manual*. New York: Checkmate Plus.

Gadow, K. D., & Sprafkin, J. (1998). *Child Symptom Inventory 4 screening manual*. New York: Checkmate Plus.

Gaub, M., & Carlson, C. L. (1997). Gender differences in ADHD: A meta-analysis and critical review. *Journal of the American Academy of Child and Adolescent Psychiatry, 36*, 1036-1045. doi: 10.1097/00004583-199708000-00011

Gershon, J. (2002). A meta-analytic review of gender differences in ADHD. *Journal of Attention Disorders, 5*, 143-154. doi: 10.1177/108705470200500302

Gingerich, K. J., Turnock, P., Litfin, J. K., & Rosén, L. A. (1998). Diversity and attention deficit hyperactivity disorder. *Journal of Clinical Psychology, 54*, 415-426. doi: 10.1002/(SICI)1097-4679(199806)54:4<415::AID-JCLP3>3.0.CO;2-M

Gone, J. P., & Alcantara, C. (2007). Identifying effective mental health interventions for American Indians and Alaska Natives: A review of the literature. *Cultural Diversity and Ethnic Minority Psychology, 13*, 356-363. doi: 10.1037/1099-9809.13.4.356

Goyette, C. H., Conners, C. K., & Ulrich, R. F. (1978). Normative data on Revised Conners Parent and Teaching Rating Scales. *Journal of Abnormal Child Psychology, 6*, 221-236. doi: 10.1007/BF00919127

Hart, E. L., Lahey, B. B., Loeber, R., Applegate, B., Green, S. M., & Frick, P. J. (1995). Developmental change in attention-deficit hyperactivity disorder in boys: A four-year longitudinal study. *Journal of Abnormal Child Psychology, 23*, 729-749. doi:10.1007/BF01447474

Hartung, C. M., & Widiger, T. A. (1998). Gender differences in the diagnosis of mental disorders: Conclusions and controversies of the *DSM-IV-TR*. *Psychological Bulletin, 123*, 260-278. doi: 10.1037/0033-2909.123.3.260

Hartung, C. M., Willcutt, E. G., Lahey, B. B., Pelham, W. E., Loney, J., Stein, M. A., & Keenan, K. (2002). Sex differences in young children who meet criteria for attention deficit hyperactivity disorder. *Journal of Clinical Child and Adolescent Psychology, 31*(4), 453-464. doi:10.1207/153744202320802133

Huang, B., Grant, B. F., Dawson, D. A., Stinson, F. S., Chou, S. P., Saha, T. D., . . . Pickering, R. P. (2006). Race-ethnicity and the prevalence and co-occurrence of *DSM-IV-TR* alcohol and drug use disorders and Axis I and II disorders: United States, 2001 to 2002. *Comprehensive Psychiatry, 47*, 252-257. doi: 10.1016/j.comppsych.2005.11.001

Jacobsen, K. (2002). ADHD in cross-cultural perspective: Some empirical results. *American Anthropologist, 104*, 283-287. doi: 10.1525/aa.2002.104.1.283

Kessler, R. C., Adler, L., Barkley, R., Biederman, J., Conners, C., Demler, O., . . . Zaslavsky, A. M. (2006). The prevalence and correlates of adult ADHD in the United States: Results from the National Comorbidity Survey replication. *The American Journal of Psychiatry, 163*(4), 716-723. doi:10.1176/appi.ajp.163.4.716

LaFromboise, T. D. (1988). American Indian mental health policy. *American Psychologist, 43*, 388-397. doi: 10.1037/0003-066X.43.5.388

Lahey, B. B., Applegate, B., McBurnett, K., Biederman, J., Greenhill, L., Hynd, G. W., . . . Shaffer, D. (1994). *DMS-IV* field trials for attention deficit hyperactivity disorder in children and adolescents. *The American Journal of Psychiatry, 151*(11), 1673-1685. Retrieved from www.ajp.psychiatryonline.org

Mann, B.A. (Ed.). (2006). *Daughters of Mother Earth: The wisdom of Native American women*. Westport, CT: Praeger Publishers.

Martel, M. M. (2013). Individual differences in attention deficit hyperactivity disorder symptoms and associated executive dysfunction and traits: Sex, ethnicity, and family income. *American Journal of Orthopsychiatry, 83*(2-3), 165-175. doi:10.1111/ajop.12034

Miller, T. W., Nigg, J. T., & Miller, R. L. (2009). Attention deficit hyperactivity disorder in African American children: What can be concluded from the past ten years? *Clinical Psychology Review, 29*(1), 77-86. doi:10.1016/j.cpr.2008.10.001

Nguyen, L., Arganza, G. F., Huang, L. N., Liao, Q., Nguyen, H. T., & Santiago, R. (2004). Psychiatric diagnoses and clinical characteristics of Asian American youth in children's services. *Journal of Child and Family Studies, 13*(4), 483-495. doi:10.1023/B:JCFS.0000044729.93879.c2

Nolan, E. E., Gadow, K. D., & Sprafkin, J. (2001). Teacher reports of DSM-IV-TR ADHD, ODD, and CD symptoms in schoolchildren. *Journal of the American Academy of Child & Adolescent Psychiatry, 42*, 241-249. doi: 10.1097/00004583-200102000-00020

Office of Inspector General. (2011). *Access to mental health services at Indian Health Service and tribal facilities* (OEI-09-08-00580). Washington, DC: Government Printing Office.

Pelham, W. E., & Gnagy, E. M. (1999). Psychosocial and combined treatments for ADHD. *Mental Retardation and Developmental Disabilities Research Reviews, 5*, 225-236. doi: 10.1002/(SICI)1098-2779(1999)5:3<225::AID-MRDD9>3.0.CO;2-E

Polanczyk, G., de Lima, M., Horta, B., Biederman, J., & Rohde, L. (2007). The worldwide prevalence of ADHD: A systematic review and metaregression analysis. *The American Journal of Psychiatry, 164*(6), 942-948. doi:10.1176/appi.ajp.164.6.942

Ramtekkar, U. P., Reiersen, A. M., Todorov, A. A., & Todd, R. D. (2010). Sex and age differences in attention-deficit/hyperactivity disorder symptoms and diagnoses: Implications for DSM-V and ICD-11. *Journal of the American Academy of Child & Adolescent Psychiatry, 49*(3), 217-228. doi:10.1097/00004583-201003000-00005

Rasmussen, E. R., Todd, R. D., Neuman, R. J., Heath, A. C., Reich, W., & Rohde, L. A. (2002). Comparison of male adolescent-report of ADHD symptoms across two cultures using latent class and principal components analysis. *Journal of Child Psychology and Psychiatry, 43*, 797-805. doi: 10.1111/1469-7610.00081

Reid, R., Casat, C. D., Norton, H. J., Anastopoulos, A. D., & Temple, E. P. (2001). Using behavior rating scales for ADHD across ethnic groups: The IOWA Conners. *Journal of Emotional & Behavioral Disorders, 9*, 210-219. doi: 10.1177/106342660100900401

Reynolds, C.R., & Kamphaus, R.W. (1992). *Behavior Assessment System for Children (BASC)*. Circle Pines, MN: American Guidance Service.

Remschmidt, H., Banaag, C., Bange, F., Bouvard, M., Castellanos, X., Coghill, D., . . . Whiting, K. (2005). Global consensus on ADHD/HKD. *European Journal of Child and Adolescent Psychiatry, 14*, 127-137. doi: 10.1007/s00787-005-0439-x

Rowland, A. S., Lesesne, C. A., & Abramowitz, A. J. (2002). The epidemiology of attention-deficit/hyperactivity disorder (ADHD): A public health view. *Mental Retardation and Developmental Disabilities Research Reviews, 8*, 162-170. doi: 10.1002/mrdd.10036

Shemmassian, S. K., & Lee, S. S. (2012). Comparing four methods of integrating parent and teacher symptom ratings of attention-deficit/hyperactivity disorder (ADHD). *Journal of Psychopathology and Behavioral Assessment, 34*(1), 1-10. doi:10.1007/s10862-011-9262-5

Ullebø, A., Posserud, M., Heiervang, E., Obel, C., & Gillberg, C. (2012). Prevalence of the ADHD phenotype in 7- to 9-year-old children: Effects of informant, gender and non-participation. *Social Psychiatry and Psychiatric Epidemiology, 47*(5), 763-769. doi:10.1007/s00127-011-0379-3

U.S. Census Bureau. (2010). *American Indian and Alaska Native populations*. Retrieved from http://www.census.gov/population/www/socdemo/race/indian.html

Urban Indian Health Commission. (2007). *Invisible tribes: Urban Indians and their health in a changing world*. Seattle: Author. Retrieved from http://www.issuelab.org/resource/invisible_tribes_urban_indians_and_their_health_in_a_changing_world

Villodas, M. T., Litrownik, A. J., & Roesch, S. C. (2012). Latent classes of externalizing behaviors in youth with early maltreatment histories. *Measurement and Evaluation in Counseling and Development, 45*, 49-63. doi: 10.1177/0748175611423563

Willcutt, E. G. (2012). The prevalence of *DSM-IV* attention-deficit/hyperactivity disorder: A meta-analytic review. *Neurotherapeutics, 9*, 490-499. doi:10.1007/s13311-012-0135-8

Wolraich, M. L. (1999). Attention deficit hyperactivity disorder: The most studied and yet most controversial diagnosis. *Mental Retardation and Developmental Disabilities Research Reviews, 5*, 163-168. doi: 10.1002/(SICI)1098-2779(1999)5:3<163::AID-MRDD1>3.0.CO;2-T

Wolraich, M. L., Lambert, E. W., Baumgaertel, A., Garcia-Tornel, S., Feurer, I. D., Bickman, L., & Doffing, M. A. (2003). Teachers' screening for attention deficit/hyperactivity disorder: Comparing multinational samples of teacher ratings of ADHD. *Journal of Abnormal Child Psychology, 31*, 445-455. doi: 10.1023/A:1023847719796

ENDNOTE

[1] The term AI/AN herein refers to the current day descendants of North American indigenous peoples who inhabited the continent centuries before the arrival of European settlers. They are organized by governments of nations, tribes, and other land areas (e.g., pueblos, rancherias, villages, tribal consortiums), with over 550 of these governments in the U.S. alone (Bureau of Indian Affairs, 2001). They each maintain distinct and longstanding cultural practices, and are not homogeneous (LaFromboise, 1988; U.S. Census Bureau, 2010; Urban Indian Health Commission, 2007).

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AMERICAN INDIAN SUBSTANCE ABUSE PREVENTION EFFORTS: A REVIEW OF PROGRAMS, 2003-2013

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Abstract: The purpose of the review was to assess substance abuse prevention (SAP) efforts in American Indian and Alaska Native (AI/AN) communities from 2003-2013. In the past, many SAP programs were unable to meet the unique cultural needs of AI/AN communities adequately. It has been suggested that a disconnect may exist between the theories that are used to guide development of prevention programs in AI/AN communities and culturally appropriate theoretical constructs of AI/AN worldviews. To explore this possible disconnect further, Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were used to assess a total of 18 articles (N = 31 programs) on program location and method, participant characteristics, described program cultural elements, use of theory, program outcomes, program measures, and future recommendations. Results indicated that SAP programs in AI/AN communities vary widely in their use of theory, implementation strategies, view and definition of cultural constructs, overall evaluational rigor, and reporting methods. Future research is needed to integrate appropriate theory and cultural elements into SAP programs to tie them to measurable outcomes for AI/AN communities.

INTRODUCTION

As documented by several studies, substance abuse prevention (SAP) programs implemented in American Indian and Alaska Native (AI/AN) communities frequently have not been able to meet the unique cultural needs of AI/ANs (Beauvais & LaBoueff, 1985; Hawkins, Cummins & Marlatt, 2004; May, 1999; Whitbeck, Walls, & Welch, 2012). Not surprisingly, some AI/AN communities continue to have high rates of substance abuse and addiction compared with the rest of the U.S. (Indian Health Service, 2011; Hawkins et al., 2004). Some researchers have posited that a disconnect exists between the theories used to guide development of prevention programs in AI/AN communities and culturally appropriate theoretical constructs of AI/AN worldviews, that, when combined, might lead to greater success (Champagne, 2007; Frank, Moore, & Ames, 2000; Walsh, 2014). The general research literature suggests that theory-driven programs are more effective than programs that are not theoretically based (Donaldson & Gooler, 2003; Frank et al., 2000). Furthermore, programs that do employ theory are more likely to become incorporated into communities when the chosen theoretical framework matches the needs of the community (Green & Kreuter, 2005). When interventions and programs are theoretically driven, their components are more easily constructed; they are measured, evaluated, and replicated more accurately; and they are sustained for longer periods of time (Glanz, Rimer, & Viswanath, 2008). We hypothesized that, if SAP programs were theoretically connected and driven by AI/AN communities, it is more likely that they would be integrated into those communities; to be measured and evaluated accurately; to be sustained; and to be deemed successful for those participating. Due especially to the diversity of AI/ANs in the U.S., addressing the apparent gap in culturally relevant SAP services is paramount.

As of 2010, the U.S. Census reported 5.2 million individuals who identified as AI/AN, alone or in combination with one or more other races (U.S. Census Bureau, 2012). AI/ANs live throughout the U.S., in urban, rural, and remote rural areas and on reservation lands, with high population centers in the desert Southwest, Pacific Northwest, and Midwestern Plains (Brown, Baldwin, & Walsh, 2011). To date, there are 566 federally recognized tribes (U.S. Department of the Interior, Bureau of Indian Affairs, 2012) and a number of state tribes recognized by the National Congress of American Indians (National Congress of American Indians, 2014). Each of these tribes has distinct and unique traditions, customs, language, and teachings, making it difficult to generalize characteristics found among different communities (Brown et al., 2011).

AI/AN communities continue to have rates of adult substance abuse consistently higher than national averages for other racial and ethnic groups (National Survey on Drug Use and Health [NSDUH], 2010). An average 43.9% of AI/AN adults reported using alcohol within the last month, higher than the national average of 30.6% (Substance Abuse and Mental Health Services Administration [SAMHSA], 2011). Additionally, of those AI/ANs reporting alcohol use within the last month, 30% also reported engaging in binge drinking episodes (consuming 5 or more alcoholic beverages in one sitting; SAMHSA, 2011), higher than the national average of 24.6% (National Institutes of Alcohol Abuse and Alcoholism, 2014). AI/AN youth alcohol consumption rates are higher than rates of all substance use combined (alcohol, tobacco, and other drugs [ATOD]) when compared to national averages (NSDUH, 2011).

Although there are SAP efforts underway, it is a complex task to determine what programs have made an impact in AI/AN communities (Whitbeck et al., 2012). It is even more difficult to determine if those programs are theoretically driven, and, if so, on what theoretical perspective(s) they are based. To assess whether those programs are successful, and by what definition of success they are measured, adds more complexity to an already multifaceted task. Whitbeck et al. (2012) stated that, despite the necessary and useful community-based participatory research (CBPR) that is being conducted in AI/AN communities, many non-Native "researchers continue to work from a Western colonial paradigm that ignores, diminishes, and reinterprets native ways of knowing" (pp. 432-433). Furthermore, Frank, Moore, and Ames (2000) also state that the theories being used to guide program development may not appropriately match beliefs and cultural nuances in many AI/AN communities; as such many AI/AN-designed programs are theoretically driven, but the theories do not reflect Western values. There is a need for research that acknowledges that grassroots programs are not atheoretical, but are very much grounded in traditional worldviews and guided by strong assumptions pertaining to risk and protective factors.

The purpose of this review was to assess SAP efforts in the U.S. for AI/AN communities over the last 10 years, from 2003-2013. Our intent was to focus on articles describing alcohol-specific and other drug-specific programs. Program impacts and outcomes, common programmatic elements, and, most importantly, the theories that guide programming were assessed. For this review, we hypothesized that most SAP programs are not theoretically based when applied to AI/AN populations. If theory is being used, the theories may not be appropriate for the culture, thereby calling into question the actual success of these programs. Furthermore, if programs claim to incorporate cultural elements, are those elements actually representative of the AI/AN communities in which programming is being implemented?

We conducted a systematic review following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Liberati et al., 2009). The PRISMA flowchart is included in Appendix A. Furthermore, the current review followed the Matrix Method, a structure and process for systematically reviewing the literature that includes 1) a detailed record of the search process, 2) saving all articles retrieved, 3) a review matrix to organize abstracted information, and 4) a written synthesis of the reviewed literature (Garrard, 2011). The current review specifically addressed the following questions:

- Within the last 10 years (2003-2013):
    1. What programs have made an impact on substance abuse in AI/AN communities?
    2. What were those outcomes and impacts in AI/AN communities?
    3. What are the common programmatic and cultural elements across these efforts? and
    4. What are the common theories, if any, that have guided these SAP programs for AI/ANs?

METHOD

Data Sources/Retrieval

To answer the research questions noted above, we included the terms “substance abuse,” “prevention,” “program,” “American Indian,” and “Native American” in our search. Only programs or interventions that had been implemented were included. Any program or intervention that was in the formative research or developmental stages was not included, as it is difficult to ascertain the impact or outcomes that these efforts may have in AI/AN communities. We intentionally omitted a specific search term for theory, because we anticipated that many SAP programs may include theoretical constructs but not implicitly state them; a review on the need for theory in AI/AN studies has highlighted that concern (Champagne, 2007).

Three bibliographic databases were searched: Web of Science, PubMed, and PsycINFO. Databases were chosen based on the number of records pertaining to behavioral sciences, mental health, and public health. References from all of the included articles were also reviewed for additional relevant publications.

Inclusion and Exclusion Criteria and Study Selection

Articles were included if they: a) were published in a peer-reviewed English-language journal (inclusive of review papers), b) were published between 2003 and 2013, c) involved research relating to humans, d) included description of a prevention program, e) examined programs that mentioned use or abuse of ATOD, f) provided impact and/or outcome data, and g) discussed or inferred use of theory in relation to substance abuse primary prevention with AI/ANs. Studies were excluded from this review if they: a) were published in non-English-language journals; b) summarized studies conducted outside of the U.S. (e.g., in Australia or Canada); and/or c) primarily focused on substance abuse treatment, recovery, or treatment interventions (i.e., secondary or tertiary prevention).

After removing duplicates, the initial search yielded 29 results from the three databases using the predetermined search terms. We then applied the inclusion criteria to focus the types of articles to be reviewed. When these parameters were applied, a total of 12 abstracts remained. After further review of the selected article’s references, we identified 18 additional publications, 6 of which met both the inclusion and exclusion criteria. These steps resulted in a total of 18 articles for this systematic review.

Data Extraction

Each of the 18 articles was assessed based upon the program location and method (i.e., school-based curriculum or after-school programs), participant characteristics (i.e., age and gender of the target population), described cultural elements, use of theory, program outcomes, and additional recommendations. Some of the 18 articles (*n* = 6) reviewed multiple programs, increasing the total number of programs discussed (*N* = 31). A matrix listing all of the programs reviewed and a summary of information extracted can be found in Appendix B.

RESULTS

Following data extraction, the main categories of interest were assessed thoroughly. For each category of interest, we read through and counted the results twice, to ensure accurate reporting. Additionally, when pertinent, we explored associations between main categories.

Participant Characteristics

Of 31 total programs reviewed, the majority were targeted toward AI/AN youth and adolescents (71%, *n* = 22). Other programs were targeted toward a combination of individuals, families, and communities (25%, *n* = 8); only one program was designed explicitly for adult women. When locations were named in the articles, they fell into expected classifications: Plains (23%, *n* = 7), Pacific Northwest (19%, *n* = 6), Southwest (16%, *n* = 5), California (10%, *n* = 3), Upper Midwest (7%, *n* = 2), and Alaska (3%, *n* = 1). A total of 23% (*n* = 7) of the reviewed programs did not specify the geographic location. Programs were implemented in a combination of urban and non-urban locations (32%, *n* = 10), urban-only locations (23%, *n* = 7), and non-urban only locations (13%, *n* = 4). The other articles gave no indication (32%, *n* = 10) if they were implemented in urban or non-urban settings.

Program Focus

The overwhelming majority of reviewed programs were aimed at combined prevention approaches (ATOD; 77%, *n* = 24) and only a few (16%, *n* = 5) were explicitly focused on alcohol use or abuse. Additionally, a small number of the ATOD programs addressed prevention of other behaviors, such as high-risk behaviors leading to HIV/AIDS (7%, *n* = 2).

Program Implementation

Frequently, programs took place as in-school and/or curriculum-based interventions (29%, *n* = 9) or in after-school settings (13%, *n* = 4). Many of the programs utilized multiple locations for implementation (32%, *n* = 10). Some articles gave no indication as to where program implementation occurred (19%, *n* = 6).

Program Approaches

The methods used to implement the programs varied greatly. Most articles detailed a multitude of activities as a means for describing the intervention/program (52%, *n* = 16). Other programs were described as a curriculum (26%, *n* = 8), an electronic intervention (7%, *n* = 2), a community media campaign (3%, *n* = 1), or an environmental approach (3%, *n* = 1). Many (39%, *n* = 12) of the described programs focused on life skills-building activities as a main approach. Other programs descriptions (10%, *n* = 3) did not provide any information on the program/intervention approach.

Common Cultural Elements

There was wide variation in the cultural elements presented for each of the 31 programs. The vast majority described some cultural factors that had been integrated, adapted, or tailored into the programs (77%, *n* = 24). These cultural factors included the incorporation of AI teachings (23%, *n* = 7), involvement of tribal community members or leaders (19%, *n* = 6), cultural enrichment exercises (13%, *n* = 4), other culturally relevant or appropriate activities (13%, *n* = 4), and integration of described core AI values (10%, *n* = 3), yet further description of these integrated, adapted, or tailored factors was lacking (77%, *n* = 24). However, some articles (23%, *n* = 7) described explicitly the cultural elements that were part of the program activities; these included using talking circles (10%, *n* = 3), providing program materials in AI/AN languages (7%, *n* = 2), and using the canoe journey (3%, *n* = 1); one program used dance, drums, sweat lodge ceremonies, medicine men, and multiple other cultural elements.

Program Outcomes

Of the articles reviewed, almost all claimed positive programmatic outcomes (87%, *n* = 27), a few did not report any outcomes (10%, *n* = 3), and one program reported a negative outcome. Of the articles reporting positive programmatic outcomes, these outcomes were categorized as specifically showing increases in: knowledge of substance abuse (7%, *n* = 2), overall negative attitudes toward substance abuse (7%, *n* = 2), refusal skills (7%, *n* = 2), general self-efficacy or confidence of participants (7%, *n* = 2), negative social normative beliefs toward substance abuse (3%, *n* = 1), awareness of substance abuse (3%, *n* = 1), decreases or delays in alcohol or other drug use (26%, *n* = 8), and a combination of the previous outcomes (23%, *n* = 7). Yet, two articles (7%) did not describe any programmatic outcomes. Finally, of all programs reporting positive outcomes (*n* = 27), a few (11%, *n* = 3) described increases in connection between program participants and their families and/or communities. Furthermore, many articles (42%, *n* = 13) reported only immediate, short-term outcomes.

The measures used to assess outcomes consisted of pre/post surveys (16%, *n* = 5), control or comparison groups (13%, *n* = 4), state- or county-level data (7%, *n* = 2), one-on-one interviewing (3%, *n* = 1), and counting referrals to services (3%, *n* = 1). Nine programs (29%) utilized assessments with at least one additional follow-up more than 6 months after the initial intervention. Measures were not described in one quarter (26%, *n* = 8) of all articles.

Use of Theory

The inclusion criteria for this systematic review required articles to discuss or, at the very least, infer use of theory in the program. Inference of use of theory was based on provided descriptions of constructs, methods, or mechanisms through which the program was developed, implemented, or evaluated. Programs were divided into those explicitly using theory (39%, *n* = 12) and those not explicitly using theory (61%, *n* = 19). Of the articles that contained an explicit use of theory, the theories included: social cognitive theory (6%, *n* = 2), Cherokee Self-Reliance (6%, *n* = 2), community empowerment theory (3%, *n* = 1), cultural compatibility theory (3%, *n* = 1), cognitive theory (3%, *n* = 1), cultural historical theory (3%, *n* = 1), community competence theory (3%, *n* = 1), ecological risk theory (3%, *n* = 1), and resiliency theory (3%, *n* = 1). One program was "based on a theoretical perspective that reflects the culture and values of Native Americans" (Wright et al., 2011, p. 1423). Often, more than one theory was named in a single article (26%, *n* = 8).

Furthermore, articles often included methods or approaches to research, and not necessarily theories, as their guiding framework. As an example, CBPR was named or inferred in some articles (16%, *n* = 5) as a guiding framework. Depending on how the program was described, for the remaining programs (61%, *n* = 19) the following theories were inferred based on provided descriptions: family systems theory, linguistic theory, community readiness model, empowerment theory, social cognitive theory, socioecological model, and the ecological framework. Often there were indications of constructs, such as resiliency, self-efficacy, skill-building, and environment adjustment, that were described but not linked to named theoretical constructs or approaches (32%, *n* = 10).

Program Recommendations

Notably, all of the articles recommended some level of incorporation of AI/AN culture, values, and/or beliefs, into programs. The need for cultural specificity of SAP programs was mentioned repeatedly (35%, *n* = 11), as was the need for community-based and community-driven interventions (32%, *n* = 10). Some articles detailed a need for holistic approaches to SAP in AI/AN communities (19%, *n* = 6). Only four articles (13%) recommended assessing the fidelity of current programs in AI/AN communities before continued use.

A number of articles (55%, *n* = 17) emphasized the need for evaluation of SAP programs for AI/ANs, or indicated a need for culturally relevant theory integration into such programs (35%, *n* = 11). Some articles (19%, *n* = 6) alluded to evaluation outcomes through statements, such as "fostered a sense of community" (Moore et al., 2012).

DISCUSSION

In the current systematic review, we describe SAP efforts in Native communities in the U.S. over the last 10 years (2003-2013). The review identifies programs that have made an impact on substance use in Native communities and describes the common programmatic and cultural elements across these successful efforts. Additionally, this review identifies named and inferred theories, theoretical constructs, frameworks, and models used in these SAP programs for AI/ANs. Lastly, we ascertain evidence of program evaluation by assessing the methods used by programs to measure their outcomes. These results are discussed further below.

Use of Theory

We hypothesized that theories being used in SAP programs for AI/ANs may not be based appropriately on cultural relevance. Although the reviewed articles did not provide enough information on the use of theory to address the hypothesis, findings from the systematic review support the fact that there is wide variation in theories driving SAP programming for AI/ANs, as well as in program implementation and fidelity, measurements, and evaluations. Therefore, it is difficult to measure what collective impact SAP programs may have had in Native communities.

Based on this systematic review, we know that many program descriptions are not explicit in how theory is integrated into development and implementation. It is also known that the theories being used to guide program development may not appropriately match beliefs and cultural nuances in communities (Frank et al., 2000). Many AI/AN communities typically operate from a collectivistic worldview, rather than an individualistic stance (Champagne, 2007; Duran, 2006; Vandello & Cohen, 1999; Walsh & Baldwin, 2012; Whitbeck et al., 2012). Research has shown that it is possible to integrate scientific theories of behavior change (Western-based) with Indigenous holistic health belief systems (Baldwin, Johnson, & Benally, 2009). However, even with a movement toward more community-driven prevention strategies and recognition of the need for cultural specificity, as noted by many programs (68%, *n* = 21), much SAP program development continues to be based on theories with an individualistic worldview (Nation et.al, 2003). Many SAP programs throughout the U.S. and in AI/AN communities are based on an individual risk-factors approach, opposed to a strengths-based approach, adding to a disconnect with the collectivist worldview of many AI/AN communities (Whitbeck et al., 2012).

Program Participants and Prevention Approaches

Many programs described in this review were targeted to youth (71%, *n* = 22) and occurred in school (29%, *n* = 9) or in after-school settings (13%, *n* = 4), and in multiple locations, such as school-based and community centers (32%, *n* = 10). The vast majority (84%, *n* = 26) addressed ATOD and/or other behaviors, and only a handful (16%, *n* = 5) specifically addressed alcohol use and abuse in AI/AN communities. Combining prevention messaging can be problematic, as substances are very different from one another, especially when used or abused by youth (Luna, 2002). Prevention efforts work best if targeted specifically in relation to the substance of interest (Gabrielsen, 2002). There are universal approaches that can have a positive influence on the use and abuse of ATOD in all populations, e.g., improving refusal skills, increasing self-efficacy, addressing attitudes and beliefs, and increasing overall awareness (Baldwin, Brown, Wayment, Nez, & Brelsford, 2011; Hawkins, Catalano, & Miller, 1992). Yet, there are precise areas that, when addressed and tailored for SAP, have been shown to be more influential. These areas include addressing and altering social norms surrounding alcohol and drug use and abuse, navigating peer pressure related to substance use, addressing environmental triggers, and, most importantly, involving family, friends, schools, and community members to reinforce positive nondrug-related behaviors of youth (Hanson & Dusenbury, 2004). However, it should be noted that the efficacy of these target areas has not been assessed rigorously for AI/AN youth; the assessments that have been done included only a handful of AI/AN youth and therefore are not necessarily representative of all AI/AN youth (Hanson & Dusenbury, 2004; Whitbeck et al., 2012).

Program Evaluation

These findings lead to the complicated, yet necessary, discussion of what success looks like for SAP programs, and whether those successes are different for AI/AN communities. From an individualistic viewpoint, a successful SAP outcome would be to not engage in the targeted behavior (Nation et al., 2003). Yet, only 26% of the reviewed programs (*n* = 8) reported decreases or delays in substance use and/or abuse. The rest of the programs (74%, *n* = 23) did not report any impact on or outcomes related to substance abuse behavior. Does that mean the rest of the programs were unsuccessful in preventing substance use and abuse? Not if the positive findings were categorized in other ways (e.g., changes in beliefs or attitudes). In fact, of the programs reporting outcomes (87%, *n* = 27), a few (11%, *n* = 3) also described increases in connection between program participants and their families and/or communities. It is unknown whether this program outcome was intended, yet the authors thought it was important enough to frame the success of their programs in that context.

Program success appears to be dependent on how the program developer, implementer, or evaluator defines it. To address program outcomes for the current review, it would have been beneficial if the expected program success outcomes had been stated explicitly. The outcomes from these programs were almost all positive (87%, *n* = 27), and authors called for other programs to follow their program format and/or methods in other AI communities. However, many articles (42%, *n* = 13) reported only immediate, short-term outcomes, or did not describe the measures used to determine outcomes (26%, *n* = 8). Only nine programs (29%) used multiple-timepoint measures to assess outcomes over time. Therefore, it is difficult to assess the programs' impacts and outcomes, and whether these outcomes were (or are) sustainable. In the past, SAP efforts in AI/AN communities frequently have lacked efficacy evaluation (Beauvais & Trimble, 2003; Dixon et al., 2007; Hawkins et al., 2004), and have been based on "commentary and recommendations and not on the science of prevention" (Beauvais & Trimble, 2003, p. 397). Specific program details often are unpublished or are unavailable for review (Hawkins et al., 2004). Evaluation is an area of much-needed attention for AI/AN SAP programs, as there appears to be a relationship between clarity of SAP program design and associated approaches to evaluation (Dixon et al., 2007; Hawkins et al., 2004; Whitbeck et al., 2012).

There are recommendations for SAP program success to be measured based on what is relevant to the communities in which they are taking place (Hernandez, Nesman, Mowery, Acevedo-Polakovich, & Callejas, 2009; Martinez, Callejas, & Hernandez, 2010). Using practice-based evidence or community-defined evidence programs could facilitate reporting representative outcomes of success (Hernandez et al., 2009; Martinez et al., 2010). Practice-based evidence has been defined as more reflective, based on personal experiences and theoretical knowledge, whereas community-defined evidence is just that—evidence defined by the community in which an intervention is taking place (Hernandez et al., 2009; Martinez et al., 2010). Additionally, there has been an upsurge in the use of CBPR to guide SAP programs in AI/AN communities (Whitbeck et al., 2012). CBPR provides opportunities for communities to be actively involved throughout the process of program development, implementation, evaluation, and dissemination of findings (Minkler & Wallerstein, 2003).

Limitations

The current review is not without limitations. The intent of the systematic review was to identify SAP programs for Native communities, yet it was not feasible to assess the strength of the program evaluations rigorously to show whether they were successful. Nor was the intent of review to evaluate programs' use of theory, or how (or what) cultural elements were utilized. Merely identifying a theory does not mean that a program was theoretically driven. Nor does lack of an identified theory indicate that a program was without a theoretical basis or framework. It is possible that authors did not include information on their guiding theories, did not elaborate on the use of theory, or inadvertently misidentified the type of theory used. The same can be said regarding the cultural elements of the reviewed programs. Without access to actual program materials, it is difficult to state what the specific program approaches, methods, and elements might have been.

One of the main limitations of the current systematic review was the inclusion criterion requiring an article to have been published in a peer-reviewed journal. There are "numerous community-based prevention programs currently in progress that have yet to complete randomized control trials or otherwise have been unpublished in academic journals" (Whitbeck et al., 2012, pp. 431). Descriptions of prevention programs that have not been published often can be found in the grey literature, defined as written material that has been published informally (Childress & Jul, 2003). Programs may be extremely successful, yet not published in peer-reviewed journals. For example, program staff may post their information on a website (SAMHSA, n.d.) or write a white paper (Association for Experiential Education, 2011). Furthermore, many current and/or discontinued SAP programs simply may not be reporting their findings.

Numerous articles (n = 24) were not included in the current review because they were descriptive pieces on SAP policies, strategies, approaches, and/or research projects (i.e., not program based). Many excluded articles (50%, n = 12) focused on the CBPR processes in AI/AN communities, and, although those processes may have resulted in program development or implementation, additional information on those pieces was not provided. Furthermore, a number of articles from the initial search were excluded (n = 17) because they combined primary prevention programs with treatment and recovery programs (tertiary prevention programs).

Implications for Future Research

It would be informative to conduct a review of the literature prior to 2003, to gain greater insight into the history of SAP efforts in AI/AN communities and how that information might contextualize the current state of affairs. Furthermore, to address the high rates of AI/AN substance abuse, there is a need to understand why certain SAP programs work in Native communities. One way to increase understanding is by linking theoretical underpinnings of program development with appropriate measures and ensuring accurate program evaluation (Weiss, 2004). A critical assessment of SAP program evaluations in Native communities, regardless of theory inclusion, is necessary (Dixon et al., 2007; Hawkins et.al, 2004; Muraskin, 1993; Whitbeck, 2012); in particular, differing cultural practices and their influences on theoretical fit between smaller reservation tribes and the larger populations of non-reservation and urban AI/AN tribes should be explored.

As AI/AN communities continue to experience the detrimental effects associated with substance abuse, there is a need to design and integrate applicable prevention methods effectively (Coyhis & Simonelli, 2008; Noe, Fleming & Manson, 2003). Ways to accomplish this include identifying appropriate theories to guide development and adaptation of prevention programs (Champagne, 2007), integrating AI/AN cultural elements into programming (Goodkind, LaNoue, & Milford, 2010; Nebelkopf & Wright, 2011), and using CBPR to assist in understanding what AI/AN communities want and need (Teufel-Shone, Siyuha, Watahomigie, & Irwin, 2006; Thomas, Donovan, Sigo, Austin, & Marlatt, 2009). Yet, these efforts are in vain if results are not properly evaluated and reported (Edgerly et al., 2009; Goodkind et al., 2011; Gorman et al., 2013; Montag, Clapp, Calac, Gorman, & Chambers, 2012; Nelson & Tom, 2011).

REFERENCES

(*denotes reviewed articles)

*Aguilera, S., & Plasencia, A. V. (2005). Culturally appropriate HIV/AIDS and substance abuse prevention programs for urban Native youth. *Journal of Psychoactive Drugs, 37*(3), 299-304. doi:10.1080/02791072.2005.10400523

Association for Experiential Education. (2011). *White papers: Adventure therapy with American Indian youth*. Boulder, CO: AEE Council on Core Research & Evaluation. Retrieved from http://0-files.eric.ed.gov.opac.msmc.edu/fulltext/ED531759.pdf

Baldwin, J. A., Johnson, J. L., & Benally, C. C. (2009). Building partnerships between Indigenous communities and universities: Lessons learned in HIV/AIDS and substance abuse prevention research. *American Journal of Public Health, 88*(S1), S77-S83. doi:10.2105/AJPH. 2008.134585

Baldwin, J. A., Brown, B. G., Wayment, H. A., Nez, R. A., & Brelsford, K. M. (2011). Culture and context: Buffering the relationship between stressful life events and risky behaviors in American Indian youth. *Substance Use & Misuse, 46*, 1380-1394. doi: 10.3109/10826084.2011.592432

Beauvais, F., & LaBoueff, S. (1985). Drug and alcohol abuse intervention in American Indian communities. *The International Journal of the Addictions, 20*(1),139-171.Retrieved from https://www.ncjrs.gov/App/Publications/abstract.aspx?ID=131933

Beauvais, F., & Trimble, J. E. (2003). The effectiveness of alcohol and drug abuse prevention among American-Indian youth. In Z. Sloboda & W.J. Bukoski (Eds.), *Handbook of drug abuse prevention: Theory, science, and practice* (pp. 393-410). New York: Kluwer.

*Beckett, C. D. (2011). Fetal Alcohol Spectrum Disorders: A Native American journey to prevention. *Family Community Health, 34*(3), 242-245. doi: 10.1097/FCH.0b013e31821962a8

Bogenschneider, K. (1996). An ecological risk protective theory for building prevention programs, policies, and community capacity to support youth. *Family Relations, 15*, 127-138. Retrieved from http://onlinelibrary.wiley.com/journal/10.1111/%28ISSN%291741-3729

Brown, B. G., Baldwin, J. A., & Walsh, M. L. (2011). Putting tribal national first: Historical trends, current needs, and future directions for substance use prevention for American Indian and Alaska Native youths. In S.R. Notaro (Ed.), *Health disparities among children of color: Interventions that work, Vol. 9*. (pp. 3-47). Ithaca, NY: Emerald Publishing.

Castro, F. G., Barrera, M. Jr., & Martinez, C. R. Jr. (2004). The cultural adaptation of prevention interventions: Resolving tensions between fidelity and fit. *Prevention Science, 5*(1), 41-45. doi: 10.1023/B:PREV.0000013980.12412.cd

Champagne, D. (2007). In search of theory and method in American Indian studies. *American Indian Quarterly, 31*(3), 353-372. doi: 10.1353/aiq.2007.0028

Childress, E,. & Jul, E. (2003). Going gray: Gray literature and metadata. *Journal of Internet Cataloging, 6*(3), 3-6.doi: 10.1300/J141v06n03_02

Coyhis, D., & Simonelli, R. (2008). The Native American healing experience. *Substance Use & Misuse, 43*, 1927-1949. doi: 10.1080/10826080802292584

*Dixon, A. L., Yabiku, S. T., Okamoto, S. K., Tann, S. S., Marsiglia, F. F., Kulis, S., & Burke, A. M. (2007). The efficacy of a multicultural prevention intervention among urban American Indian youth in the southwest U.S. *Journal of Primary Prevention, 28*(6), 547-568. doi: 10.1007/s10935-007-0114-8

Donaldson, S. I., & Gooler, L. E. (2003). Theory-driven evaluation in action: Lessons from a $20 million statewide work and health initiative. *Evaluation Program Planning, 26*, 355-366. doi: doi:10.1016/S0149-7189(03)00052-1

Duran, E. (2006). *Healing the soul wound: Counseling with American Indians and other Native peoples*. New York: Teachers College Press.

Edgerly, C. C., Laing, S. S., Day, A. G., Blackinton, P. M., Pingatore, N. L, Haverkate, R. T., & Heany, J.F. (2009). Steps to a healthier Anishinaabe, Michigan: Strategies for implementing health promotion programs in multiple American Indian communities. *Health Promotion Practice*, *10*(2), 109S-117S. doi:10.1177/1524839908331270

*Ellis, B. H. (2003). Mobilizing communities to reduce substance abuse in Indian Country. *Journal of Psychoactive Drugs, 35*(1), 89-96. doi: 10.1080/02791072.2003.10399999

Frank, J. W., Moore, R. S., & Ames, G. M. (2000). Public health then and now: Historical and cultural roots of drinking problems among American Indians. *American Journal of Public Health*, *90*(3), 344-351. Retrieved from http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1446168/

Gabrielsen, K. R. (2002). Prevention program planning. In J. Hogan, K. Gabrielsen, N. Luna, & D. Grothaus (Eds.), *Substance abuse prevention: The intersection of science and practice* (pp. 64-75). Bakersfield, CA: Allyn & Bacon.

Garrard, J. (2011). *Health sciences literature review made easy: The Matrix method*. Boston: Jones Bartlett Learning.

Glanz, K., Rimer, B. K., & Viswanath, K. (2008). *Health behavior and health education: Theory, research, and practice*. San Francisco: Jossey Bass.

Goodkind, J. R., LaNoue, M. D., & Milford, J. (2010). Adaptation and implementation of cognitive behavioral intervention for trauma in schools with American Indian youth. *Journal of Clinical Child & Adolescent Psychology, 39*(6), 858-872. doi: 10.1080/15374416.2010.517166

Goodkind, J. R., Ross-Toledo, K., John, S., Hall, J. L., Ross, L., Freeland, L., . . . Becenti-Fundark, T. (2011). Rebuilding trust: A community, multiagency, state, and university partnership to improve behavioral health care for American Indian youth, their families, and communities. *Journal of Community Psychology, 39*(4), 452-477. doi: 10.1002/jcop.20446

Gorman, J. R., Clapp, J. D., Calac, D., Kolander, C., Nyquist, C., & Chambers, C. D. (2013). Creating a culturally appropriate web-based behavioral intervention for American Indian/Alaska Native women in southern California: The Healthy Women Healthy Native Nation study. *American Indian and Alaska Native Mental Health Research, 20*(1), 1-16. doi: 10.5820/aian.2001.2013.1

Gosin, M., Marsiglia, F. F., & Hecht, M. L. (2003). keepin' it REAL: A drug resistance curriculum tailored to the strengths and needs of preadolescents of the Southwest. *Journal of Drug Education, 33*(2),119-142. doi: 10.2190/DXB9-1V2P-C27J-V69V

Green, L. W., & Kreuter, M. W. (2005). *Health program planning: An educational and ecological approach.* Boston; McGraw-Hill.

*Hanson, J. D., Winberg, A., & Elliott, A. (2012). Development of a media campaign on Fetal Alcohol Spectrum Disorders for Northern Plains American Indian communities. *Health Promotion and Practice, 13*, 842-849. doi: 10.1177/1524839911404232

Hanson, W., & Dusenbury, L. (2004). Alcohol use and misuse: Prevention strategies with minors. In R. J. Bonnie & M. E. O'Connell (Eds.), *Reducing underage drinking: A collective responsibility* (pp. 437-457). Washington, DC: National Academies Press.

Harthun, M. L., Drapeau, A. E., Dustman, P. A., & Marsiglia, F. F. (2002). Implementing a prevention curriculum: An effective researcher-teacher partnership. *Education and Urban Society, 34*, 353-364. doi: 10.1177/0013124502034003005

*Hawkins, E. H., Cummins, L. H., & Marlatt, G. A. (2004). Preventing substance abuse in American Indian and Alaska Native youth: Promising strategies for healthier communities. *Psychological Bulletin, 130*, 304-323. doi: 10.1037/0033-232909.130.2.304

Hawkins, J. D., Catalano, R. F., & Miller, J. Y. (1992). Risk and protective factors for alcohol and other drug problems in adolescents and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin, 112*(1), 64-105. doi: 10.1037/0033-2909.112.1.64

*Henry, D., Allen, J., Fok, C. C. T., Rasmus, S., Charles, B., & People Awakening Team. (2012). Patterns of protective factors in an intervention for the prevention of suicide and alcohol abuse in Yup'ik Alaska Native youth. *The American Journal of Drug and Alcohol Abuse, 38*(5), 476-482. doi: 10.3109/00952990.2012.704460

Hernandez, M., Nesman, T., Mowery, D., Acevedo-Polakovich, I. D., & Callejas, L. M. (2009). Cultural competence: A literature review and conceptual model for mental health services. *Psychiatric Services, 60*(8), 1046-1050.

Indian Health Service. (2011). *American Indian and Alaskan Native behavioral health briefing book*. Rockville, MD: Author. Retrieved from http://www.ihs.gov/medicalprograms/Behavioral/documents/AIANBHBriefingBook.pdf

*Jackson, K. F., & Hodge, D. (2010). Native American youth and culturally sensitive interventions: A systematic review. *Research on Social Work Practice, 20*(3), 260-270. doi: 10.1177/1049731509347862

*Kulis, S., Dustman, P.A., Brown, E. F., & Martinez, M. (2013). Expanding urban American Indian youths' repertoire of drug resistance skills: Pilot results from a culturally adapted prevention program. *American Indian and Alaska Native Mental Health Research, 20*(1), 35-56. doi: 10.5820/aian.2001.2013.35

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gotzsche, P. C., Ioannidis, J. P. A., . . . Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: Explanation and elaboration. *British Medical Journal Online*, *3*(b2700), 1-27 doi: 10.1136/bmj.b2700

*Lowe, J. (2006). Teen Intervention Project-Cherokee (TIP-C). *Pediatric Nursing, 32(5)*:495-500. Retrieved from http://www.ncbi.nlm.nih.gov/pubmed/17100083?dopt=Abstract

*Lowe, J., Liang, H., Riggs, C., & Henson, J. (2012). Community partnership to affect substance abuse among Native American adolescents. *The American Journal of Drug and Alcohol Abuse, 38*(5), 450-455. doi: 10.3109/00952990.2012.694534

Luna, N. (2002). Facts about drugs. In J. Hogan, K. Gabrielsen, N. Luna, & D. Grothaus (Eds.), *Substance abuse prevention: The intersection of science and practice* (pp. 89-102). Bakersfield, CA: Allyn & Bacon.

*Marlatt, G. A., Larimer, M. E., Mail, P. D., Hawkins, E. H., Cummins, L. H., Blume, A. W., . . . Gallion, S. (2003). Journeys of the circle: A culturally congruent life skills intervention for adolescent Indian drinking. *Alcoholism: Clinical and Experimental Research, 27*(8), 1327-1329. doi: 10.1097/01.ALC.0000080345.04590.52

Martinez, K., Callejas, L., & Hernandez, M. (2010). Community-defined evidence: A bottom-up behavioral health approach to measure what works in communities of color. *Report on Emotional & Behavioral Disorders in Youth: Evidence-based Assessments, 10*(1), 11-16. Retrieved from http://nned.net/index-nned.php/NNED_wiki/Report-on-Emotional-%26-Behavioral-Disorders-in-Youth%3A-Evidence-Based-Assessments

May, P. A. (1999). The epidemiology of alcohol abuse among American Indians: The mythical and real properties. In D.A. Champagne (Ed.), *Contemporary Native American cultural issues* (pp. 227-244). Walnut Creek, CA: Altamira Press.

Minkler, M. & Wallerstein, N. (2003). Introduction to community-based participatory research. In M. Minkler & N. Wallerstein (Eds.), *Community-based participatory research for health: From process to outcomes* (pp. 3-26). San Francisco: Jossey-Bass.

Moher, D., Liberati, A., Tetzlaff, J., Altman, D. G., & The PRISMA Group. (2009). Preferred reporting items for systematic reviews and meta-analyses: The PRISMA statement. *British Medical Journal Online, 339*(b2535), 332-339. doi: 10.1136/bmj.b2535

Montag, A., Clapp, J. D., Calac, D., Gorman, J., & Chambers, C. (2012). A review of evidence-based approaches for reduction of alcohol consumption in Native women who are pregnant or of reproductive age. *The American Journal of Drug and Alcohol Abuse, 38*(5), 436-443. doi: 10.3109/00952990.2012.694521

*Moore, R. S., Roberts, J., McGaffigan, R., Clac, D., Grube, J. W., Gildern, D. A., & Ehlers, C. L. (2012). Implementing a reward and reminder underage drinking prevention program in convenience stores near southern California American Indian reservations. *American Journal of Drug and Alcohol Abuse, 38*(5), 456-460. doi:10.3109/00952990.2012.696758

*Moran, J. R., & Bussey, M. (2007). Results of an alcohol prevention program with urban American Indian youth. *Child and Adolescent Social Work Journal, 24*(1), 1-22. doi: 10.1007/s10560-006-0049-6

Muraskin, L. D. (1993). *Understanding evaluation: The way to better prevention programs*. Publication No. ED/OESE92-41. Washington, DC: U.S. Department of Education. Retrieved from http://www2.ed.gov/PDFDocs/handbook.pdf

Nation, M., Crusto, C., Wandersman, A., Kumpfer, K. L., Seybolt, D., Morrissey-Kane, E., & Davino, K. (2003). What works in prevention: Principles of effective prevention programs. *American Psychologist, 58*, 449-456. doi: 10.1037/0003-066X.58.6-7.449

National Congress of American Indians. (2014) *State recognition*. Washington, DC: Author. Retrieved from www.ncai.org/policy-issues/tribal-governance/federal-recognition

National Institutes of Alcohol Abuse and Alcoholism. (2014). *Alcohol facts and statistics*. Washington, DC: Author. Retrieved from http://www.niaaa.nih.gov/alcohol-health/overview-alcohol-consumption/alcohol-facts-and-statistics

National Survey on Drug Use and Health (NSDUH). (2010). *The NSDUH report: Substance use among American Indian or Alaska Native adults*. Washington, DC: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. Retrieved from http://www.samhsa.gov/data/2k10/182/AmericanIndian.htm

NSDUH. (2011). *The NSDUH report: Substance use among American Indian or Alaska Native adolescents*. Washington, DC: Center for Behavioral Health Statistics and Quality, Substance Abuse and Mental Health Services Administration. Retrieved from http://www.samhsa.gov/data/2k11/WEB_SR_005/WEB_SR_005.htm

Nebelkopf, E. & Wright, S. (2011). Holistic system of care: A ten-year perspective. *Journal of Psychoactive Drugs, 43*(4), 302-308. doi: 10.1080/02791072.2011.628922

Nelson, K., & Tom, N. (2011). Evaluation of a substance abuse, HIV and hepatitis prevention initiative for urban Native Americans: The Native Voices program. *Journal of Psychoactive Drugs, 43*(4), 349-354. doi: 10.1080/02791072.2011.629158

Noe, T., Fleming, C., & Manson, S. (2003). Healthy nations: Reducing substance abuse in American Indian and Alaska Native communities. *Journal of Psychoactive Drugs, 35*(1), 15-26. doi: 10.1080/02791072.2003.10399989

*Raghupathy, S., & Go Forth, A. L. (2012). The HAWK^2 program: A computer-based drug prevention intervention for Native American youth. *The American Journal of Drug and Alcohol Abuse, 38*(5), 461-467. doi: 10.3109/00952990.2012.694531

*Ringwalt, C., & Bliss, K. (2006). The cultural tailoring of a substance use prevention curriculum for American Indian youth. *Journal of Drug Education, 36*(2), 159-177. doi: 10.1007/s10935-008-0150-z

Spitzberg, B. II., & Cupach, W. R. (1984). *Interpersonal communication competence*. Beverly Hills, CA: Sage Publications.

Substance Abuse and Mental Health Services Administration (SAMHSA). (n.d.). *Annual Native American Service to Science Academy Meets in DC*. Rockville, MD: Author. Retrieved from http://captus.samhsa.gov/news-and-events/annual-native-american-service-science-academy-meets-dc

SAMHSA. (2011). *Results from the 2010 National Survey on Drug Use and Health: Summary of national findings*. NSDUH Series H-41, HHS Publication No. (SMA) 11-4658. Rockville, MD: Author.

Teufel-Shone, N. I., Siyuha, T., Watahomigie, H. J., & Irwin, S. (2006). Community-based participatory research: Conducting a formative assessment of factors that influence youth wellness in the Hualapai community. *American Journal of Public Health, 96*(9), 1622-1628. doi:10.2105/AJPH.2004.054254

Thomas, L. R., Donovan, D. M., Sigo, R. L. W., Austin, L., & Marlatt, A. G. (2009). The community pulling together: A tribal community-university partnership project to reduce substance abuse and promote good health in a reservation tribal community. *Journal of Ethnicity in Substance Abuse, 8*(3), 283-300. doi: 10.1080/15332640903110476

U.S. Census Bureau. (2012). *The American Indian and Alaska Native Population: 2010 Census Briefs*. Suitland, MD: Author. Retrieved from http://www.census.gov/prod/cen2010/briefs/c2010br-10.pdf

U.S. Department of the Interior, Bureau of Indian Affairs. (2012). Indian entities recognized and eligible to receive services from the Bureau of Indian Affairs. *Federal Register 77(155)*, 47868-47873. Retrieved from: http://www.bia.gov/cs/groups/public/documents/text/idc-041248.pdf

Vandello, J. A., & Cohen, D. (1999). Patterns of individualism and collectivism across the United States. *Journal of Personality and Social Psychology, 77*(2), 279-292. doi: http://dx.doi.org/10.1037/0022-3514.77.2.279

Walsh, M. L. (2014). *Substance abuse prevention in American Indian and Alaska Native communities: Exploration of guiding theoretical underpinnings and theoretical fit in practice.* Unpublished doctoral dissertation, University of South Florida, Tampa.

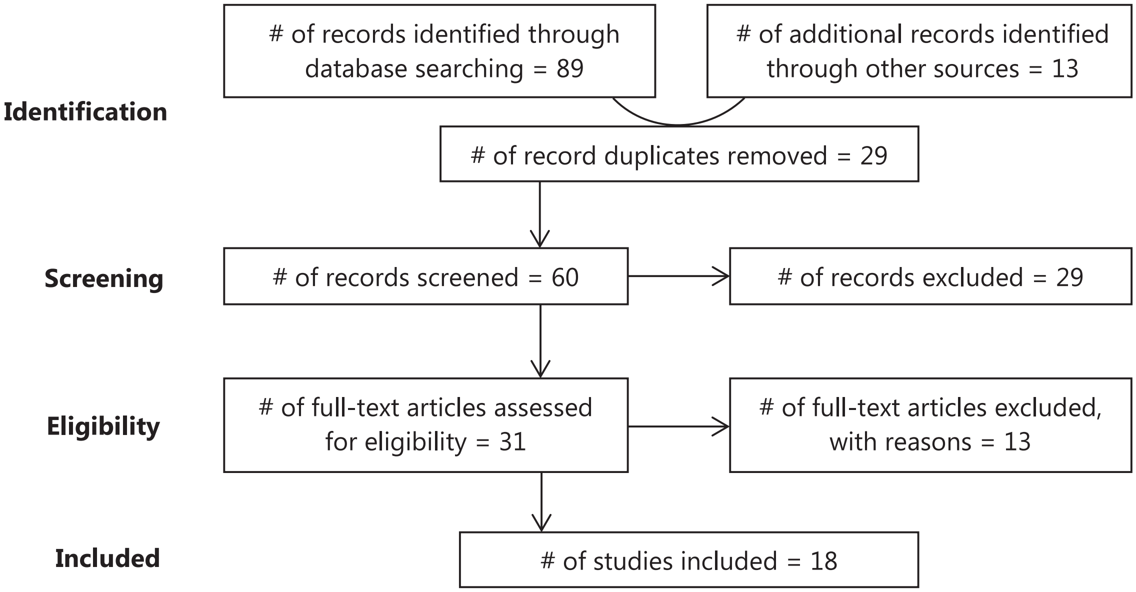
Walsh, M. L., & Baldwin, J. A. (2012, September). *Designing theoretically-based substance abuse prevention interventions for American Indians: Reflections on the need for community-driven creation*. Paper presented at the meeting of the International Network of Indigenous Health Knowledge and Development , Brisbane, Australia.

Weiss, C. H. (2004). Theory-based evaluation: Past, present and future. *New Directions for Evaluation, 76*(Winter), 41-55.

*Whitbeck, L. B., Walls, M. L., & Welch, M. L (2012). Substance abuse prevention in American Indian and Alaska Native communities. *The American Journal of Drug and Alcohol Abuse, 38*(5), 428-435. doi: 10.3109/00952990.2012.695416

*Wright, S., Nebelkopf, E., King, J., Maas, M., Patel, C., & Samuel, S. (2011). Holistic system of care: Evidence of effectiveness. *Substance Use & Misuse, 46*, 1420-1430. doi: 10.3109/10826084.2011.592438

Appendix A
Flow of Information Through Different Phases of the Systematic Review[1]



[1] **Moher, Liberati, Tetzlaff, Altman, & the PRISMA Group, 2009**

Appendix B
Matrix

1	Citation	Aguilera & Plasencia (2005)
	Program Name	1. Native American Health Center's Family & Child Guidance Clinic 2. Youth Services Program
	Participant Characteristics	Native youth ages 9-22 years, Oakland, California
	Approach	Integrating traditional healing and cultural wellness education, life skills training, school-based services, and collaborative prevention-focused activities
	Substance	Alcohol, tobacco, and other drugs (ATOD), safer sex practices, prevention of HIV/AIDS
	Cultural Elements	Holistic model based on Native American Wellness concepts involving four traditional, sacred elements: air, water, fire, and earth. Gathering of Native Americans (GONA) cultural enrichment exercises and experiential activities to create positive change.
	Theory	GONA: connections to family, culture, teachings, and belonging NOT EXPLICIT: Process described is similar to Socioecological Model, Family Systems Theory, and/or Empowerment Theory
2	Citation	Beckett (2011)
	Program Name	Navajo Nation Fetal Alcohol Spectrum Disorders Prevention Program
	Participant Characteristics	Navajo women of childbearing years, youth ages 11-18 years across the Navajo Nation, families, community members
	Approach	Participation in health and community fairs, Navajo Nation Fun Runs, veterans' events, Navajo puberty ceremonies, school education programs, and media relations. Peer Educator Program. Billboard messaging.
	Substance	Alcohol

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Appendix B, Continued
Matrix

	Cultural Elements	Incorporation of cultural factors and practices into mainstream methods
	Theory	NOT EXPLICIT: None mentioned
3	Citation	Dixon et al. (2007)
	Program Name	*keepin' it REAL*.
	Participant Characteristics	4,222 students (685 who claimed any AI ethnicity and 3537 who did not claim this ethnicity)
	Approach	A culturally grounded, video-enhanced prevention intervention that was developed and normed from the narratives of Latino, African American, and European American youth (Gosin et al. 2003), and validated (Gosin et al., 2003; Harthun et al., 2002)
	Substance	ATOD
	Cultural Elements	The cultural specificity of the program components is based on prior research, which found ethnic differences in common communication styles, competencies, and norms
	Theory	EXPLICIT: Draws from a variety of theoretical frameworks, such as communication competence theory (Spitzberg & Cupach, 1984) and ecological risk and resiliency theory (Bogenschneider, 1996)
4	Citation	Ellis (2003)
	Program Name	Part of multiple policy, programmatic, and community efforts: 1. Pathfinder 2. Adolescent program for underage drinking prevention
	Participant Characteristics	Pathfinder is an alternative high school for students who have dropped out or have been removed from other school settings
	Approach	Communities mobilized their leadership and citizenry to address local substance abuse prevention and treatment problems through coordinated and community-supported initiatives. Developed a long-term mentoring relationship to enhance substance abuse effort; modeled the benefits of specific policies and programs, and have helped lead successful efforts to extend these innovations statewide.
	Substance	ATOD, special focus on alcohol
	Cultural Elements	Incorporating key stakeholders from the tribal communities (community-based particpatory research [CBPR]) from the beginning of coalition development
	Theory	NOT EXPLICIT: Ecological Framework—the communities mobilized at multiple levels (individual, interpersonal, community, policy, system)
5	Citation	Hanson, Winberg, & Elliott (2012)
	Program Name	The purpose of the project was to develop a culturally and linguistically appropriate media campaign focused on fetal alcohol spectrum disorder (FASD) prevention and awareness for AIs
	Participant Characteristics	AI populations in the Northern Plains
	Approach	Media campaign to prevent FASD using marketing campaign and grassroots outreach, with AI community members overseeing the outreach
	Substance	Alcohol

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Appendix B, Continued
Matrix

	Cultural Elements	Traditional language and images from the tribal communities were incorporated into the marketing campaign of three posters and five radio ads
	Theory	NOT EXPLICIT: Use of CBPR approach to development of the media campaign
6	Citation	Hawkins, Cummins, & Marlatt (2004)
	Program Name	Review of strategies and programs in AI communities 1. Red Cliff Wellness School Curriculum 2. Target Community Partnership 3. PRIDE (Positive Reinforcement in Drug Education) 4. Bicultural Competence study 5. Cognitive Behavioral Therapy (CBT) life skills study 6. Seventh Generation project
	Participant Characteristics	1. Red Cliff: youth grades 4-12 2. Target Community Partnership Project: an effort that utilized the community empowerment approach to address substance abuse with an AI tribe in Washington State 3. PRIDE: Puyallup Tribe of Indians, high school youth, urban 4. Bicultural Competence study: participants included 137 youth (mean age = 11.5 years) living on two western Washington reservations 5. CBT life skills study: 1,396 Native youth grades K-12 from 10 reservations 6. Seventh Generation project: urban AI youth grades 4-7 in Denver
	Aproach	1. Red Cliff: a culturally focused, skills-based substance abuse curriculum in school 2. Target Community Partnership Project Strategies included: (a) creating partnerships among community members, professional services staff, and tribal departments; (b) implementing a process of ongoing training for the community around ATOD issues; (c) organizing community-wide alcohol- and drug-free events; (d) enhancing health, welfare, and youth services for those individuals with substance abuse or children affected by substance-abusing parents; and (e) advocating for new tribal policies restricting the use and abuse of drugs and alcohol 3. PRIDE: a prevention program conceived and developed through the guidance of the Puyallup Tribal Council and local school administration included four components: (a) development of students' cultural identity through both curricular and extracurricular instruction and activities in the schools; (b) implementation of a school-based prevention curriculum dealing with health awareness, drug and alcohol awareness, refusal skills, and life skills; (c) enforcement of a security policy for reducing in-school drug use and development of a drug-free environment on school campuses; and (d) coordinated counseling, referral, and/or case management services for those students identified as drug users 4. Bicultural Competence study: bicultural competence skills intervention for preventing substance abuse. Students were instructed in and practiced communication, coping, and discrimination skills using behavioral and cognitive methods to address culturally relevant examples of verbal and nonverbal influences on substance use, were guided in self-instruction and relaxation techniques to help cope with the pressure of substance use situations, and were taught techniques to anticipate temptations and explore healthier alternatives to substance use

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Appendix B, Continued
Matrix

	Approach, continued	5. CBT life skills study: two of the three conditions involved 15- to 50-minute weekly sessions focusing on cognitive-behavioral life skills training. Youth learned problem-solving, coping, and communication skills for preventing substance abuse. The standard life skills training techniques and content were expanded and adapted to fit the bicultural world of AI adolescents 6. Seventh Generation project: after-school alcohol prevention program utilized a life skills approach with the following content areas: correcting misperceptions of alcohol use norms, enhancing values that conflict with alcohol use, improving self-esteem, learning structured decision making, increasing refusal skills, and making a personal commitment to sobriety
	Substance	Programs 1-6: ATOD
	Cultural Elements	1. Culturally focused 2. Cultural life skills 3. Cultural identity 4. Bicultural competence focused 5. Bicultural skill building 6. Local community-based focus groups determined seven culturally specific core values, which were emphasized throughout the curriculum: harmony, respect, generosity, courage, wisdom, humility, and honesty.
7	Citation	Henry et al. (2012)
	Program Name	People Awakening (Qungasvik intervention)
	Participant Characteristics	Families and communities throughout Alaska
	Approach	Qungasvik, a Yup'ik word meaning "toolbox," is a prevention program toolkit providing very basic outlines for prevention activities the community can choose from and adapt. Each activity stresses 1 or more of 12 protective factors, identified through a program of collaborative research between university researchers and AN leadership.
	Substance	ATOD
	Cultural Elements	All activities were culturally relevant and based on AN beliefs, values, traditions
	Theory	NOT EXPLICIT: Article referenced community-based participatory research, but is not a theory
8	Citation	Jackson & Hodge (2010)
	Program Name	Review of 4 programs: 1. Native American Prevention Project against AIDS and Substance Abuse 2. Skill enhancement program 3. Not explicit—referred to as "culturally sensitive interventions" (CSI) 4. Bicultural skills program

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Appendix B, Continued
Matrix

	Participant Characteristics	1. 2,704 primarily Native youth from schools in Arizona (790 grade 8; 1,021 grade 9; 227 grades 8-9) 2. 102 urban and rural Native youth residing in the Pacific Northwest were randomly assigned via site to an intervention or a non-treatment control condition 3. Rural Native youth population; 1,937 surveys were collected over 3 years from participating students (grades 4-12) across eight schools and five communities in northern Wisconsin and Minnesota 4. 137 Native students from tribal and public schools from two western Washington reservations
	Approach	No information provided in the article about the interventions in Programs 1, 3, 4. 1. Outcomes were assessed pre-/post-test and at 1-year follow-up using the American Drug and Alcohol Survey, and the NAPPASA Health Behavior Survey (attitude, knowledge, and behavior questions on non-substance use topics, i.e., sex, HIV/AIDS, STDs) 2. Culturally tailored 10-sessions delivered in school and tribal center classrooms 3. The pre-/post-test survey assessed substance use, school bonding, and the relationship between cultural affiliation and substance use 4. Measures to assess participants' knowledge of substance use and health, attitudes about substance use in AI culture, interactive peer influences, and recent substance use at pre-/post-test and at 6-month follow up
	Substance	Programs 1-4: ATOD
	Cultural Elements	1. The CSI involved local Native community members in the development, facilitation, and evaluation of the project. Native community leaders participated in interviews and focus groups designed to identify and incorporate cultural values and beliefs into the curriculum. 2. The CSI incorporated trained AI research staff and guest speakers from local tribal alcohol treatment programs. 3. The CSI incorporated tribal legends and cooperative learning techniques associated with the Red Cliff Band of Lake Superior Chippewa. 4. The CSI incorporated AI cultural beliefs and values and was administered by AI group counselors.
	Theory	Review did not specify theories of programs and not implied
9	Citation	Kulis, Dustman, Brown, & Martinez (2013)
	Program Name	Living in 2 Worlds (L2W): Based on *keepin' It REAL* program
	Participant Characteristics	Urban AI youth
	Approach	L2W teaches four drug resistance strategies (refuse, explain, avoid, leave [R-E-A-L]) in culturally appropriate ways. The adaptation of *keepin' it REAL* for urban AI youth followed the cultural adaptation model (Castro, Barrera, & Martinez, 2004).
	Substance	ATOD
	Cultural Elements	Referred to culturally appropriate ways and incorporation of cultural values and heritage
	Theory	NOT EXPLICIT: Ecological framework likely would be a good match

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Appendix B, Continued
Matrix

10	Citation	Lowe (2006)
	Program Name	Teen Intervention Project-Cherokee (TIP-C)
	Participant Characteristics	High school Cherokee adolescent substance abusers
	Approach	10-week, school-based, group intervention over 3 years
	Substance	ATOD
	Cultural Elements	Culturally relevant programming, use of talking circle, tribal leader led program activities
	Theory	EXPLICIT: Cherokee self-reliance
11	Citation	Lowe, Liang, Riggs, & Henson (2012)
	Program Name	Cherokee Talking Circle
	Participant Characteristics	Oklahoma; 179 United Keetoowah Band of Cherokee Indian high school students, ages 13-18 years
	Approach	10-session manual based interventions, led by counselor in a talking circle format done in 45 minutes over 10 weeks
	Substance	ATOD
	Cultural Elements	Talking circle
	Theory	Cherokee Self-Reliance
12	Citation	Marlatt et al. (2003)
	Program Name	Journeys of the Circle project is a partnership between the University of Washington, Department of Psychology, Addictive Behaviors Research Center, and the Seattle Indian Health Board (SIHB)
	Participant Characteristics	A sample population of 117 youth was recruited from Seattle Public School enrollments and outpatient service contacts at SIHB. The majority of participants were Native adolescents living in an urban setting.
	Approach	The project developed a culturally congruent life skills course entitled Canoe Journey, Life's Journey. The Northwest Native tradition of the canoe journey served as a metaphor for life skills essential to bicultural competence. Participants received an 8-session life skills course, which used aspects of the canoe journey as well as other Native symbols (e.g., the Medicine Wheel) to teach skills such as communication, decision making, and goal setting as well as providing information about alcohol and drug use and its consequences.
	Substance	ATOD
	Cultural Elements	Canoe journey, bicultural competence, Native symbols and stories
	Theory	NOT EXPLICIT: Social cognitive theory (self-efficacy)
13	Citation	Moore et al. (2012)
	Program Name	Culturally tailored "reward and reminder" program aimed at reducing convenience store alcohol sales to youth living on or near 9 AI reservations.

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Appendix B, Continued
Matrix

	Participant Characteristics	12 purchase attempts, three repeated reward and reminder visits were made to 13 convenience stores selling alcohol within 10 miles of the reservations (*n* = 51 total attempts).
	Approach	Use of decoys to assess alcohol sales to youth. The buyer also recorded additional descriptive information about the interior of the outlet (e.g., number of cash registers, presence of signs stating age identification policies).
	Substance	Alcohol
	Cultural Elements	Culturally tailored prevention program described as “involving tribal members”
	Theory	NOT EXPLICIT: Similar to Socioecological model
14	Citation	Moran & Bussey (2007)
	Program Name	Seventh Generation Program
	Participant Characteristics	257 AI youth in grades 4-7 were recruited for the intervention; Lakota and Navajo
	Approach	The intervention focused on decision making and problem solving, resistance skills, enhancement of self-esteem, strategies to cope with stress and anxiety, and general social skills. The 13-week after-school program was divided into seven main topics. Six months after the completion of the program, a series of booster sessions was offered to all children in the intervention group. The 6 booster sessions reviewed the basic content of the 13-week program.
	Substance	Alcohol
	Cultural Elements	To address culture in a meaningful manner, a multigenerational concept of responsible decision making became the focal point for much of the program. The Seventh Generation program incorporated the general ideas of harmony and balance as part of its cultural components. For Northern plains tribes such as the Lakota, the Medicine Wheel carried great significance. However, for the Southwest tribes such as the Navajo, it had little meaning and in fact was considered inappropriate. After extended conversations with people from a variety of tribal backgrounds, the metaphor Circle of Life was settled on to represent the ideas of harmony and balance.
	Theory	NOT EXPLICIT: Social Cognitive Theory, holistic approach
15	Citation	Raghupathy & Go Forth (2012)
	Program Name	HAWK^2 (Honoring Ancient Wisdom and Knowledge; Prevention and Cessation)
	Participant Characteristics	Native youth grades 4-6
	Approach	Computer-based version of the Statewide Indian Drug Prevention Program; seven 25- to 30-minute lessons; use of facilitator, workbooks, homework exercises
	Substance	ATOD
	Cultural Elements	Bicultural competence; AI legends, youth representation reflected in videos
	Theory	NOT EXPLICIT: Community Readiness Model, Empowerment and Self-Efficacy, Cultural tailoring

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Appendix B, Continued
Matrix

16	Citation	Ringwalt & Bliss (2006)
	Program Name	"Protecting You/Protecting Me" (alcohol prevention curriculum)
	Participant Characteristics	Curricula for a program for youth, no human participants
	Approach	Application of models of cultural tailoring. Program tested the applicability of this model to real-world situations, with a curriculum that has recently undergone a conscious and deliberate cultural tailoring process to accommodate it to AI youth in three Nebraska tribes.
	Substance	Alcohol
	Cultural Elements	Cultural tailoring by changing language, images, deep/structural sociocultural elements, and evidential strategies, and use of culturally appropriate implementation methods
	Theory	EXPLICIT: Cultural Compatibility Theory, Cognitive theory, Cultural Historical Activity Theory NOT EXPLICIT: Linguistic theory
17	Citation	Whitbeck, Walls, & Welch (2012)
	Program Name	1. Botvin's Life Skills Training 2. Seventh Generation Program 3. Bii-Zin-Da-De-Dah (Listening to One Another) Program
	Participant Characteristics	1. 1,396 AI students from 27 elementary schools in five states were randomized into two intervention arms and one control arm, with three annual follow ups 2. 257 intervention students and 127 controls in grades 4-7 3. Ojibwe children (ages 10-12 years in grades 5-8) and families
	Approach	1. School-based adaptation 2. School-based adaptation 3. 8 sessions based on Strengthening Families Program curricula
	Substance	1. Alcohol and marijuana 2. ATOD 3. ATOD
	Cultural Elements	Cultural adaptation (Programs 1-3)
	Theory	NOT EXPLICIT: Programs 1-3
18	Citation	Wright et al. (2011)
	Program Name	Under the Holistic System of Care (HSOC) 1. Gathering of Native Americans (GONA) 2. Positive Indian Parenting (PIP)
	Participant Characteristics	AI youth and families

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Appendix B, Continued
Matrix

Approach	HSOC is a flexible service provision framework that allows a variety of cultural practices to be incorporated with evidence-based practices such as motivational interviewing and manualized "best practices" such as GONA and PIP. 1. Consists of a curriculum that provides a structured format for AIs to address substance use issues in a historical, social, and cultural context 2. Provides a structured format for AIs to develop and incorporate traditional practices into modern-day child-rearing
Substance	Programs 1 & 2: ATOD
Cultural Elements	HSOC: Smudging, talking circles, powwows, use of tribal leaders and medicine men, sweat lodge ceremony, acknowledgment of spirit in every aspect of life; teaching about the essential need for balance and harmony in everyday life; exposure to positive AI role models; opportunity to participate in ceremonies with Native healers. 1. Native values such as traditional and historical teachings, storytelling, ceremony, and spirituality provide a foundation for developing community cohesion 2. Incorporating traditional parenting approaches
Theory	EXPLICIT: HSOC perspective—AIs have a relational worldview, rooted in tribal culture. Interventions are focused on bringing the person back into balance. 1. EXPLICIT: based on a theoretical perspective that reflects the culture and values of AIs 2. NOT EXPLICIT

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