

## HEALTH BELIEFS AND REGIMEN ADHERENCE OF THE AMERICAN INDIAN DIABETIC

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*Abstract: This study investigated relationships between demographic and medical variables, attitudes, perceived beliefs of others, coping methods and adherence to the regimen (diet, medications, activity, smoking and stress modification) of 30 controlled and 30 uncontrolled American Indian diabetics. At the time of the clinic visit, subjects completed a coping scale, Miller Attitude Scale, regimen adherence scale, and demographic and medical data forms. Mean scores indicated attitudes toward adherence were very favorable and coping methods used helpful for all prescriptions of the diabetic regimen. Subjects were strongly adherent to all regimen prescriptions with the highest adherence at home and the lowest adherence at work for the uncontrolled group and recreation and sports settings for the controlled group. Multiple regression analysis indicated perceived beliefs of others were strong indicators of diabetic regimen adherence. Attitudes added to the prediction of adherence for taking medications, and coping methods also added to the prediction of adherence for stress reduction. Findings indicate diabetic care plans should be individualized, include significant others, focus on specific life situations and include data on health belief variables.*

Diabetes has been noted as a major problem with the American Indian population (Bennett, Burch, & Miller, 1971; West, 1974). Obesity has surfaced as an important risk factor related to diabetes in American Indians with greater prevalence among Indian women than Indian men (Knowler, Pettit, Savage, & Bennett, 1981; Lee, Anderson, Bryan, Bahr, Coniglione, & Cleves, 1985; Young, McIntyre, Dooley, & Rodriguez, 1985; Bonham & Brock, 1985).

The medical regimen routinely prescribed for the diabetic involves following the diet, taking medications, limiting smoking, performing activities, and modifying responses to stressful situations. Long-term control of diabetes may be accurately determined by Hb Alc and fasting blood sugars. This may also serve as a validation of adherence to the regimen (Gabby, Hastings, Breslow, Ellison, Bunn, & Gallop, 1977; Fraser, Gray, Borse, Duncan, & Clark, 1982). Long-term regimen adherence is most inconsistent for the prescriptions of diet and medications. However, adherence to the other prescriptions is not without problems, but they have not been investigated to the extent of diet and medication adherence. In addition, setting has been found to present obstacles to adherence, with the greatest adherence occurring in the home setting (Cerkoney & Hart,

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1980; Delbridge, 1975; Stone, 1961; Williams, Anderson, Watkins, & Coyle, 1967a; Christensen, Terry, Wyatt, Pickert, & Lorenz, 1983). Knowledge of diabetes and the prescribed regimen has not been found to be related to regimen adherence (McCulloch, Mitchell, Ambler, & Tattersall, 1983; Williams, Martin, Hogan, Watkins, & Ellis, 1967b).

It is important to note, however, that the belief process by which diabetic patients reach decisions related to regimen adherence has not been examined. Within the sociological realm, Ajzen and Fishbein (1980) provide a model which can be utilized to examine these variables (see Figure 1). According to this model, the individual's basic information or beliefs related to concept formation are found to influence the development of attitudes toward a specific behavior. The person's behavioral intention is viewed as the function of two factors: his attitude toward the behavior and his subjective norm. The attitudinal component refers to the favorableness or unfavorableness toward the behavior in question.

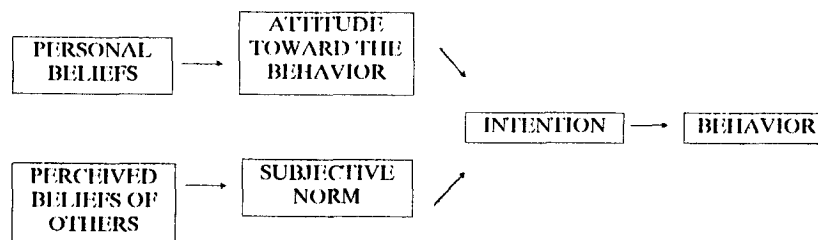


Figure 1

Ajzen, I., Fishbein, M. (1980) *Understanding Attitudes And Predicting Social Behavior* (p. 8) Englewood Cliffs: Prentice-Hall, Inc.

The subjective norm in the Fishbein model refers to individuals' beliefs that persons important to them think they should perform a specific behavior. Finally, intention is viewed as the immediate determinant of the specific behavior (Ajzen & Fishbein, 1980). Although not part of the Fishbein model, coping methods are one additional variable which is believed important to examine as coping methods are utilized by the individual to deal with difficulties related to adherence and may mediate the relationship between intentions and behaviors.

Through a series of studies, the Fishbein model, using mainly college populations, has been reported to be predictive of behavior in the sociological realm (Ajzen & Fishbein, 1974, 1980). Both Linn, Linn, Skyler, and Harris (1980) and Williams et al. (1967a) found that diabetic patients' attitudes towards their health affect both satisfaction with and adherence to the physician visit.

In support of the findings of Ajzen and Fishbein (1980) on the positive relationship of the normative component to attitudes and behavioral

intentions, parental attitudes have been found to affect childrens' adherence to the medical regimen (Hinkle & Wolf, 1952; Khurana & White, 1970). Additionally, Goldstein and Davis (1972) found that beliefs of significant others directly affected social behavior.

Few studies have examined coping methods used by patients in adjusting to diabetes and regimen adherence. Slawson, Flynn, and Kollar (1963) indicated that denial is utilized as one coping method with diabetes. Hinkle and Wolf (1952) and Tietz and Vidmar (1972) indicated that fluctuations in diabetes blood sugar do recur as a result of stress. In a different population, Miller, Garrett, McMahon, Johnson, and Wikoff (1985), using myocardial infarction patients, identified specific coping methods utilized by subjects post-infarction and further reported that the majority of coping methods used were energy-generating activities.

If the relationship of the variables identified in the Fishbein model translate to the diabetic regimen prescriptions, the following sequence should occur. First, certain information (beliefs) will be known about the diabetic condition and the medical regimen. From this basic information, values (attitudes) will be developed about both the diabetes and the diabetic regimen. These attitudes, and the patients' perceptions of others' beliefs of diabetes regimen prescriptions that they should perform (normative component), will lead to development of intentions to perform the prescribed diabetic regimen (behavior). Intentions to follow the medical regimen will then lead to performance of specific regimen prescriptions. In addition, the coping methods, although not part of the Fishbein model, may be utilized by individuals to assist them in overcoming difficulties related to diabetic regimen adherence.

Research on regimen adherence for the diabetic patient has concentrated on the risk factors concerning prevalence, incidence, and pathogenesis of diabetes among American Indians. No studies examine psychosocial factors which relate to diabetic regimen adherence of American Indian diabetics. The purpose of the present study, therefore, was to examine the relationship among attitudes, perceived beliefs of others, coping methods, demographic variables and adherence to the prescribed regimen of controlled and uncontrolled American Indian diabetic patients. Specifically, the following research hypotheses were investigated:

1. Controlled diabetics are more adherent to the prescribed regimen, have more favorable attitudes and find coping methods more helpful than uncontrolled diabetics.
2. Attitudes, perceived beliefs of others, and coping methods are indicators of regimen adherence for diabetic patients.

3. Certain demographic variables (sex, age, education, occupation, blood pressure, weight and amount smoked) are indicators of diabetic regimen adherence.

## Methods

### Subjects

Sixty subjects (30 controlled and 30 uncontrolled diabetics) were selected from a midwestern health care facility which services a specific tribal group. A multidisciplinary team (physician's assistant, nurse educator and nutritionist) instructed patients on dietary restrictions, medications, cessation of smoking, activity progression, and reduction of stress.

Subjects met the following criteria: diagnosed diabetes; literate; non-pregnant; 25 to 70 years of age; and no infections or cerebral, renal, pulmonary, or peripheral vascular disease. Patients were formed into controlled and uncontrolled diabetic subgroups. The National Diabetes Data Group Classification (1979) was used to divide subjects into the controlled and uncontrolled groups (fasting blood sugar of 70-140 mg/ml). In the controlled group, 10 subjects were insulin dependent (type I), and 20 subjects were non-insulin dependent (type II). For the uncontrolled group, 18 subjects were insulin dependent (type I) and 12 subjects were non-insulin dependent (type II). Treatment regimens for type I and type II diabetics were consistent for each group, controlled and uncontrolled. Diabinese was the main drug used for type II diabetics. In addition to the classification, subjects were to have experienced no more than 2-3 mild reactions per week for three consecutive clinic visits. All consenting subjects who met the above criteria were entered into the study sequentially as they came for their clinic appointments. One investigator was a member of the tribe, and was able to answer all questions about the project. Five subjects approached did not consent to participate because of lack of desire or not being able to meet one of the criteria.

Table 1 depicts characteristics of the study sample. There were no significant differences between controlled and uncontrolled groups on these characteristics. A profile of the study subject emerged from the demographic data. The typical subject was female, 45-57 years old, married, smoked 1/2 pack cigarettes per day, had a normal blood pressure, and was overweight. The subject had 11 years education and was employed as a skilled worker. Onset of diabetes was between 37 and 41 years of age.

### Instruments

After tribal approval and informed consent were obtained, subjects completed the following four instruments at the time of the clinic visit: Miller

Attitude Scale (MAS), Health Behavior Scale (HBS), Coping Scale and demographic and medical data form.

Table 1  
Selected Demographic and Medical Characteristics  
of 60 American Indian Diabetic Patients

Characteristic	Controlled		X	Uncontrolled		X
	Range	N(30)		Range	N(30)	
Age (yrs)	(26-69)		47.00	(25-69)		45.70
Sex						
Male		10			12	
Female		20			18	
Education (yrs)	( 3-16)		11.28	( 7-16)		11.90
Occupation						
Unemployed		5			9	
Retired		4			0	
Laborer		1			0	
Skilled worker		20			21	
Professional		0			0	
Marital Status						
Married		21			19	
Divorced		4			8	
Single		5			3	
Weight (Quetlet Index)*	(3.27-7.31)		4.70	(3.02-7.00)		4.50
Systolic B/P	(96-162)		125.90	(88-156)		122.53
Age of Onset of Diabetes (yrs)	(22-66)		41.37	(19-58)		37.87
Smoking packs/day			.616			.383

\* Quetlet Index =  $Wt - Ht \times 100$  (Normal 2.7 - 3.3, Metropolitan Life Foundation, 1983)

### The Miller Attitude Scale

The MAS is a twelve item, seven point semantic differential scale. Twelve sets of bipolar adjectives are used for each of five prescriptions of the medical regimen (medication, stress, activity, smoking, and diet). The reliability, content, and beginning construct validity of the MAS have been established (Miller, 1982b). Alpha reliabilities of the five subscales for this sample were: medications, .85; activity, .81; stress, .85; smoking, .73; and diet, .79.

### The Health Behavior Scale

The Health Behavior Scale is a five point Likert scale ranging from 1 = unlikely to 5 = likely. There are two parts to the Health Behavior Scale. Part A identifies the subject's reported adherence to the diabetic regimen, e.g., "When at home, I follow the prescribed diet." Part B indicates the subject's beliefs about what actions others most important to him think he should perform, e.g., "Most people who are important to me think I should follow the prescribed diet at home." Both Part A and Part B elicit responses related to diabetic regimen prescriptions for diet, limiting smoking, performing activities, taking medications and modifying responses to stressful situations in settings of home, work, sports/recreation and social. Scale development is described in detail by Miller et al. (1982a). Alpha reliabilities for Parts A and B of the five subscales administered during the clinic visit for this study sample ranged from .82 to .91 for all five subscales.

### Coping Scale

The Coping Scale is a twelve item, five point Likert scale ranging from 1 = "never" to 5 = "always" developed to assess which methods patients use to deal with exciting or upsetting situations. Part A identifies how frequently the method is used and Part B how helpful the methods have been for the patient. Scale development has been reported by Miller et al. (1985). Alpha reliabilities for the helpfulness scale range from .77 to .83. Because of cultural differences, examples of American Indian culture were developed for each item to maximize subject understanding. For example, the item "engaging in social activities" listed sub-items of hand games, gourd games, pow-wows, bingo, and club meetings.

### Demographic and Medical Data Form

Selected patient characteristics were recorded and included sex, age, weight, height, vital signs, smoking history, diabetic history, fasting blood sugar, numbers of reactions per week, and current diabetic regimen.

## Results

### Analysis of Data

Mean scores identified the level of adherence and favorableness of patient's attitudes and use of coping methods. Pearson correlation coefficients were calculated to identify relationships among the variables. Multiple regression analysis was used to determine if attitudes, perceived beliefs of significant others, or demographic variables added significantly to the prediction of the patient's adherence to the diabetic regimen.

Attitudes, Perceived Beliefs of Others, Coping Methods and Regimen Adherence

Attitudes were favorable for both groups in the descending order of activities, diet, and medications for the controlled group, and medications, activities, and diet for the uncontrolled group. Attitudes were least favorable for both groups toward stopping smoking (Figure 2).

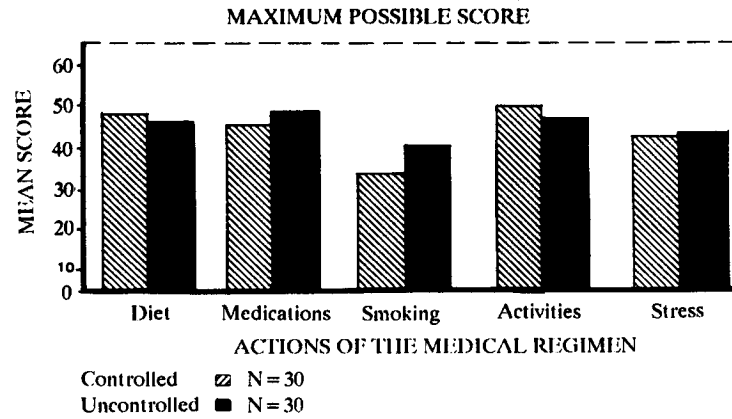


Figure 2  
Mean Scores of Attitudes Toward Actions of the Medical Regimen of 60 American Indian Diabetic Patients

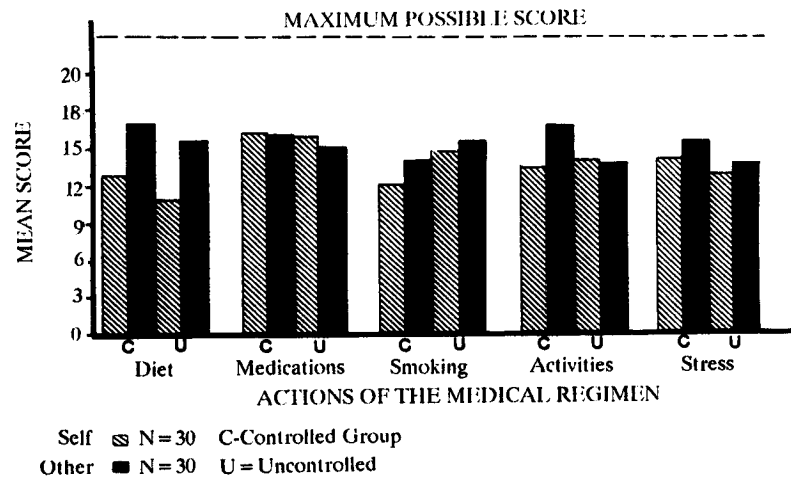


Figure 3  
Mean Scores of Subject Adherence and Perceived Beliefs of Significant Other to Perform Actions of the Medical Regimen of 60 American Indian Diabetic Patients



Regimen adherence was strong for both groups, with medications the highest for both groups. Following the diet was lowest for the uncontrolled group and smoking cessation was lowest for the controlled group (Figure 3). Perceived beliefs of others (normative component) was stronger than subject adherence for all prescriptions of the diabetic regimen, except medications for the controlled group and medications and activities for the uncontrolled group. Coping methods were viewed as helpful by both groups (scale 1-5): controlled groups  $X = 3.94$  and uncontrolled groups  $X = 3.92$ .

Most frequently used coping methods by both groups were expressing feelings and exercise. Most helpful coping methods (means above 4.0) by both groups were expressing feelings, exercise, hobbies, praying, social activities, and medication.

Adherence was high for all settings: home (controlled,  $X = 18.34$ ; uncontrolled,  $X = 18.31$ ); work (controlled,  $X = 17.48$ , uncontrolled,  $X = 16.81$ ); sports and recreation (controlled  $X = 17.04$ ; uncontrolled,  $X = 17.92$ ); social (controlled,  $X = 17.07$ ; uncontrolled,  $X = 16.85$ ). Although regimen adherence was high, it varied in different settings with highest adherence for both groups in the home setting. Lowest adherence for the controlled group was sports and recreation settings, and the work setting was lowest for the uncontrolled group.

Table 2  
Correlations of Attitudes Perceived Beliefs of Others and Coping Helpfulness with Regimen Adherence of 60 Diabetic American Indians

Adherence to Regimen Prescriptions	Attitudes	Beliefs of Others	Coping Helpfulness
Diet - u*	.29**	.43***	.19
Diet - c*	.04	.20	.21
Meds - u	.37**	.34**	-0.24
Meds - c	.18	.91****	-0.02
Smoking - u	.47***	.46***	-0.07
Smoking - c	-0.14	.36**	.01
Activity - u	.32**	.53****	.12
Activity - c	.26	.38**	.25
Stress - u	.25	.39**	.46***
Stress - c	-0.06	.38**	.33**

\*u = Uncontrolled diabetic group N=30

\*c = Controlled diabetic group N=30

\*\*p .05

\*\*\*p .01

\*\*\*\*p .001

The first hypothesis, that controlled diabetics are more adherent to the prescribed regimen, have more favorable attitudes and find coping



methods more helpful than uncontrolled diabetics, was first examined by determining Pearson correlation coefficients between key variables (Table 2). Attitudes were significantly related to regimen adherence in the uncontrolled group for prescriptions of diet, medications, smoking and activity. No significant relationships were found between attitude and adherence for the controlled group. Perceived beliefs of others were significantly related to regimen adherence in both groups for all prescriptions of the diabetic regimen except diet for the controlled group (Table 2). Coping helpfulness was significantly related to regimen adherence only for the prescription of stress reduction (Table 2). T-tests were used to determine differences in mean scores between uncontrolled and controlled groups for all variables. From the 16 variable comparisons between adherence and attitudes, perceived beliefs of others and coping helpfulness, there were only 2 significant differences between the groups: attitudes toward smoking  $t = 2.02$ ,  $p .04$ ,  $df = 50$  and beliefs of others about activity adherence  $t = -2.05$ ,  $p .04$ ,  $df = 58$ . Since these differences were minimal, it was determined that the data for the two groups could be combined in further analysis.

According to the second hypothesis, attitudes, perceived beliefs of others, and coping methods are indicators of regimen adherence. Regression analyses were calculated for each of the prescriptions using adherence as the dependent variable and perceived belief of others, coping helpfulness and attitudes as independent variables. Results of these regression analyses are shown in Table 3. A separate equation was calculated for each area in which prescriptions were given to the patients (diet, smoking, activities, medications and control of stress). All five areas were statistically significant. The perception of significant others' beliefs contributed most to the regression equation for each of the prescriptions. Attitudes contributed significantly in the case of medication, and coping methods also contributed significantly to the control of stress.

Table 3  
Regression Equations for Adherence to the Diabetic Regimen with Attitudes, Perceived Beliefs of Others and Coping Helpfulness (N = 60)

Prescription	a	Beta			R	R <sup>2</sup>	F
		Coping Helpfulness	Attitudes	Perceived Beliefs of Others			
Diet	6.47			.37	.37	.14	9.28
Smoking	6.09			.41	.41	.17	9.71
Activity	7.63			.41	.40	.16	11.44
Stress	-3.17	-.30		.45	.57	.32	13.37
Meds	4.69		.22	.55	.61	.37	16.68

Note:  $p .003$  for all prescriptions

Hypothesis three proposed that diabetic regimen adherence is related to certain demographic variables. The variables of sex, age, systolic and diastolic blood pressure, and weight were added in stepwise fashion to the regression equations of hypothesis two. No bivariate correlation coefficients were found to be significant, nor were significant relationships found by adding these variables to the regression equation.

### Discussion

This study examined the relationships between demographic and medical variables, attitudes, perceived beliefs of others, coping methods and self reported adherence to the diabetic regimen of two groups of diabetic patients.

Attitudes were favorable toward diabetic regimen adherence for both controlled and uncontrolled diabetics with the most favorable toward performing activities for the controlled group and taking medications for the uncontrolled group. For both groups, the least favorable attitude was toward stopping smoking (Figure 2). In part, this may be attributed to the tradition of smoking which has been part of the American Indian culture for centuries. A limitation rather than cessation approach may be more realistic for teaching programs. Item response indicated subjects found stopping smoking as worthless, bad, and difficult. These findings parallel those of Miller et al. (1982b) with cardiac patients. Adherence was strong for both groups, with mean scores indicating greatest adherence to taking medications and least adherence to stopping smoking for the controlled group and following diet for the uncontrolled group. This was also the area of second lowest adherence for the controlled group (Figure 3). It is of special note that obesity, which has been cited as a problem for diabetics and a special problem with American Indians, was also found in this study in addition to poor diet adherence (Christensen et al., 1983; Stone, 1961; Williams et al., 1967a). Innovative strategies should be used by the health team to tailor instructions to meet dietary life-styles, traditions, and cultures of the American Indian. Attitudes in this study were found favorable for all regimen prescriptions and were significantly related to adherence for prescriptions of diet, medication, smoking, and activity for the uncontrolled groups (Figure 2). In addition, attitudes were predictive of regimen adherence for taking medications (Table 3). The favorable attitudes of the American Indian found toward regimen adherence could be used to promote acceptance of the individualized instructions.

Home was the setting of the strongest adherence with sports and recreation the areas of weakest adherence for the controlled group and the work setting for the uncontrolled group. These findings parallel those of McMahon, Miller, Wikoff, Garrett, & Ringel (1986). With family support and assistance, home would be the expected setting of strongest adherence. The factors that inhibit adherence in work, recreation, and sports settings

need to be examined so realistic adjustments can be made to promote adherence.

A subject's beliefs about regimen prescriptions that others important to him think he should perform, were as strong or stronger than the subject's actual adherence, and were predictive of adherence for all prescriptions of the diabetic regimen (Table 3). These findings parallel those of Khurana et al. (1970), Delbridge (1975), and Miller et al. (1982a). These findings emphasize the importance of including a significant other in all aspects of the diabetic program for optimal long term subject adherence. Investigation on methods for inclusion of significant others in diabetic treatment programs is warranted.

Several coping methods were found helpful by these American Indian subjects. The coping methods found most helpful by both groups in descending order were expressing feelings, exercise, praying, and engaging in social activities and hobbies. These findings are similar to Miller et al. (1985). Coping methods identified specific to American Indian culture were: hobbies--bead work, carpentry; praying--peyote meetings, sweat lodge, church, social activities--hand games, gourd dance, pow-wows, bingo, etc. These coping methods, which subjects viewed as most helpful, also were significantly related to stress reduction and were predictive of adherence to stress reduction. This suggests that identification by the health team of frequently used helpful coping methods would allow individualizing stress modifications and promote adherence to this prescription of the diabetic regimen.

As predicted by the Fishbein model (Ajzen & Fishbein, 1980) perceived beliefs of others were predictive of diabetic regimen adherence. However, attitudes were only predictive of taking medication. Coping helpfulness also added to the prediction of adherence for stress reduction (Table 3).

In summary, findings of the study indicate that an individualized plan for the American Indian diabetic needs to be developed which includes significant others and focuses on specific life situations. In addition, the database for such plans should include attitudes, perceived beliefs of others, coping methods, and actual adherence behavior of the patient.

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