



*Southern Online Journal of Nursing Research*

www.snrs.org

*Issue 1, Vol. 5*  
**March, 2004**

**Leisure Time Physical Activity in Adult Native Americans**

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**ABSTRACT**

The problem addressed by this study was to determine the influences of personal and motivational factors on leisure-time physical activity (LTPA) among Native Americans (NAs). Based on Pender's Revised Health Promotion Model, the study purpose was to 1) discover the best fitting and most parsimonious model that describes the relationship between LTPA and explanatory variables, and 2) to discover model differences between men and women regarding personal and motivating factors for LTPA. Only the variables of self-motivation, physical self-efficacy, and barriers were common to both men and women as an explanation for exercising behavior. The model

for females correctly identified 32.3% of the nonexercisers and 92.2% of the exercisers, with an overall correct identification rate of 74.3%. For the male model, corresponding values were 63.7%, 83.3%, and 74.8%. These findings suggest that variables that explain exercising behavior in the Caucasian population may also fit the Native American population.

**Keywords:** *Native American, leisure-time physical activity, motivation, revised health promotion model, barriers and benefits, self-motivation, physical self-efficacy*

## Introduction

Cardiovascular disease is the leading cause of death in American Indians and Alaska Natives who are over the age of 45.<sup>1</sup> There is evidence that physical inactivity is a modifiable risk factor that could substantially reduce this disease rate.<sup>2</sup> Physical activity has also been known to reduce and control serum insulin levels among ethnic populations at high risk for diabetes.<sup>3,4</sup> While exercise at 40-60% or more of aerobic capacity at a rate of at least 30 minutes per day on most days of the week, is recommended by the American Heart Association,<sup>5</sup> only a few Native Americans (NAs) subscribe to this regimen.<sup>1,4,6,7</sup> NA culture has valued occupational physical activity, as evidenced by a long-ago lifestyle of hunting, fishing, and gathering.

Socioeconomic, industrial, and lifestyle changes of the last century have contributed to a sedentary lifestyle for most NAs<sup>7</sup> and possibly less motivation for habitual leisure-time physical activity (LTPA).<sup>7</sup> Factors that motivate NAs to exercise cannot be assumed from research findings about the dominant culture and may vary from those found in other minority people. These factors require careful examination in order to determine ways that will ultimately attract NA back to an active lifestyle. The problem addressed by this study was to determine the influences of personal and motivational factors on LTPA among NA people. The Revised Health Promotion Model<sup>8</sup> provided a relevant framework for the investigation. The study purpose was to 1) discover the best fitting and most

parsimonious model that described the relationship between LTPA and a set of explanatory variables, and 2) to discover model differences between men and women. The variables that were included in the data analysis are those that measure individual characteristics and experiences (age, self-motivation [SM], body mass index [BMI], marital status, education, income, number of dependents and perceived health status) and behavior specific cognition and affect variables (physical self-efficacy [PSE] and perceived benefits and barriers to exercise). The following research questions were examined for this study:

1. To what extent are the variables of age, BMI, SM, PSE, benefits and barriers to exercise, marital status, number of dependents, education, income, and health status associated with LTPA in a NA population?
2. In what ways do models for exercising and nonexercising men and women differ?

## Literature Review

*Theoretical framework.* The Revised Health Promotion Model [8](#) articulates the

nursing perspective of holism while using constructs from expectancy value and social cognitive theories.

Expectancy value theory supports the notion that a person will persist in a given action if the outcome of the action is of positive personal value.<sup>9</sup> Social cognitive theorists claim that behavior, personal factors, and the environment interact in a way that emphasizes self-direction, self-regulation, and self-efficacy.<sup>9</sup> Choice of study constructs were based on factors that were shown to influence LTPA in published studies.

*Leisure-Time Physical Activity (LTPA).* In general, ethnic minority women, including NA women, tend to exercise less than women of the dominant population.<sup>10-13</sup> However, Native American women reported the highest proportion of occupational activity and the highest proportion of no leisure activity.<sup>14</sup> These findings suggest that NA women may acquire their exercise primarily through occupational activities even if they engage in less leisure physical activity. Among various NA populations, women exercise less than their male counterparts across all age groups.<sup>15-17</sup>

*LTPA and Age.* In the general population, participation in LTPA by

adult men and women is inversely associated with age; this same pattern tends to be present among various groups of NA adults and children.<sup>18-21</sup> However, the association between LTPA and age may not be linear. One study demonstrated that NA adults under the age of 35 were more likely to exercise if they had no children than if they were parents.<sup>21</sup> These findings suggest that time for exercise resulting from occupational retirement or freedom from parental responsibilities may make exercise easier. Nonetheless, studies suggest that older women of all ethnic groups may exercise less than their younger counterparts because they feel less efficacious regarding their ability to exercise.<sup>19</sup>

*LTPA and Obesity.* There is evidence that physical inactivity increases the risk for childhood obesity, which may continue into adulthood.<sup>22</sup> Overweight NA children and adolescents tend to exercise less than their peers of the same age.<sup>15,23,24</sup> Two studies of Native Americans demonstrated that habitual exercise resulted in decreases in BMI and was inversely associated with obesity and fat distribution in NA females.<sup>17,25</sup> By contrast, another study found that spontaneous physical activity

(SPA) correlated positively with body weight in Pima Indian adults.<sup>26</sup>

*LTPA and Self-efficacy.* To date, perception of self-efficacy has been found to be a moderately strong predictor of adherence to habitual exercise in non-Native American individuals, including Mexican American women and Latino adults.<sup>19,27-29</sup> Generally, it is thought that self-efficacy is partly responsible for the successful engagement in exercise. Continued positive mastery experiences in this activity are likely to facilitate an individual's feelings of personal capabilities to continue LTPA.<sup>9</sup> However, while exercise efficacy predicted exercise intensity,<sup>30</sup> it did not predict exercise frequency.<sup>31</sup> None of the cited studies included sufficient numbers of NA adults to draw meaningful conclusions as to what effect self-efficacy may have on LTPA in the NA population.

*LTPA and Self-motivation.* Self-motivation appears to be a significant predictor of exercise for the athletically-inclined adults in the general population who exercise vigorously and often.<sup>30,32,33</sup> However, among sedentary adults, self-motivation does not predict participation in physical activity.<sup>34-36</sup>

Unfortunately, no studies were found that examined the effects of self-motivation on exercise behavior in the adult NA population.

*LTPA, Perceived Barriers and Benefits.* Perceived barrier and benefit factors appear to be associated with exercise behavior in various groups, including middle-aged Latino adults and older African American women.<sup>19,28,30,34,37,38</sup>

Contrary to the expected, while Mexican-American women reported less LTPA than European-American women, at the same time, they indicated fewer barriers and more benefits to exercise than their counterparts.<sup>20</sup> No studies were found that examined the association of barriers, benefits, and exercise behavior in NA adults.

## Methods

*Design, sample, and setting.* For this descriptive, cross-sectional survey study, a convenience sample from a large urban Native American health clinic in the southwest portion of the United States was asked to complete anonymous surveys. The clinic serves only those who are members of a federally recognized tribe or Alaska

Native group and who are able to provide documentation of status. Tribes represented in the sample were Choctaw (22.2%), mixed or affiliated with more than one NA tribe/nation (16.4%), Cherokee (12.5%), Creek (9.0%), and Chickasaw (6.6%). Twenty-eight percent of the representations came from the Kiowa, Cheyenne, Caddo, Pottowatomi, Seminole and miscellaneous tribes. The remaining 6% of the sample did not indicate tribal affiliation.

Protection of volunteers for this study was facilitated through the Institutional Review Board of the University of Oklahoma Health Sciences Center, the Human Subjects Review Committee of Texas Woman's University, and the approval of the medical director of the Oklahoma City Indian Clinic.

*Instruments.* Five survey measures were used for this study. In addition to a self-report demographic questionnaire, the survey packet consisted of the Self-Motivation Inventory (SMI),<sup>32</sup> the Physical Self-Efficacy Questionnaire (PSE),<sup>39</sup> the Exercise Benefits and Barriers Scale (EBBS),<sup>40</sup> and a Physical Exercise Questionnaire (PEQ) which was developed by the investigator for

this study. While it would have been preferable to choose instruments that have already been tested in this population, no studies to date have measured the primary study variables using Native Americans as the target group. BMI was measured by self-report of body weight and height and calculated by using the following mathematical formula:  $BMI = \text{weight in kilograms} \div (\text{height in meters})^2$ .<sup>41</sup>

The SMI is a forty-item, five-point Likert scale developed to predict perseverant habitual physical activity behavior. Cronbach alpha and test-retest analyses of the SMI has been reported to be 0.91-0.92 for college-aged students.<sup>32</sup> Reliability coefficients were not reported for other studies that tested adult nonathletic women and female body builders.<sup>33,42</sup> A Cronbach alpha coefficient for this study demonstrated a reliability of 0.89. The SMI has been demonstrated to hold validity in terms of discriminating between two groups of adult females of various ages.<sup>33,42,43</sup>

The PSE scale is a 22-item, six-point Likert scale that measures self-perceptions of physical abilities for exercise and self-confidence as exercise

is being performed in front of others. Reliability coefficients range from 0.69-0.85 in a variety of populations including adolescents, adult African Americans, and college-aged Japanese students.<sup>44-46</sup> The PSE Cronbach alpha coefficient for the entire sample for this study demonstrated a reliability of 0.78. Construct validity against the Tennessee Physical Self-Concept and the Health Locus of Control scales was demonstrated for the PSE in college-aged students.<sup>39</sup> Predictive validity was established in a study that examined exercising and nonexercising elderly males and females.<sup>47</sup>

The EBBS is a 43-item, four-point Likert scale with two subscales. The Barriers (BARR) subscale consists of 14 items and assesses a person's belief about negative aspects of routine exercise. The Benefits (BENE) scale comprises 29 items and measures an individual's perception about positive aspects of exercise. In a Cronbach alpha analysis, the EBBS was found to be reliable, with values of 0.95 and 0.77, respectively, in adult men and women.<sup>40</sup> For this study, a Cronbach alpha yielded values of 0.92 for the benefits scale and 0.82 for the barriers scales. Content validity was established during the

initial stages of the development of the instrument.<sup>40</sup> However, convergent validity could not be established in a study of elderly, community-dwelling adults.<sup>48</sup>

The PEQ was developed by the investigator for the purposes of this study. Qualitative data from 30 NA adult women from a pilot study served as a basis for the development of the questionnaire. The PEQ requires that the individual choose Likert-type responses, which are scaled from one to five, with a possible scoring range of 5-25. Not all items are equally weighted. Individuals who indicated that they did not currently exercise or who only participated in isometric exercise were automatically scored as nonexercisers. Those who exercised in a dynamic or a combination of isometric and dynamic manner were assessed for frequency, duration and intensity of exercise. Individuals who scored within the range of five to 15 were classified as nonexercisers and those who scored 16-25 were categorized as exercisers. Cut-off points in determining classification of exercisers and nonexercisers were established prior to data collection and based on evidence documenting that certain levels in frequency, intensity,

and duration and mode of exercise are necessary for cardiorespiratory fitness.<sup>5,49,50</sup> In this investigation, exercisers were defined as those currently exercising at least 4 weeks on a regular basis, at least 3-4 days per week, 4-6 months out of the year for 16-30 minutes for each session, and with an intensity that was considered to be light-to-very hard. Reliability for items that measured frequency, duration, and intensity yielded a value of .94. Other items of the PEQ consist of close-ended questions about environment, support, past exercise, occupational and lifestyle activity and effect of past stressful events on exercise habits.

*Procedures.* Data were collected over a period of three months in 1999, with participants recruited daily during the busiest days of the week at the clinic. The anonymous surveys were completed on site and returned to the data collector. Data were collected until the predetermined number of completed surveys was obtained. Of the 645 surveys distributed, 162 were either not returned or discarded as incomplete. If more than 10% of the responses to items in any one survey were missing, the associated subject was not used in the sample. A final sample of 483 surveys

was accrued yielding a response rate of 75%. Data analysis was performed by initial univariate examination followed by a multivariate logistic procedure within each gender. Missing responses for continuous variables were imputed with corresponding mean values from same gender/exercise group. For each of the continuous response variables, differences among the four means of the gender by exercise group partition were examined using an ANOVA appropriate for two gender levels and two exercise levels with SAS® General Linear Model procedure used as adjustment for unequal group sizes. For the logistic regression analyses, each of the continuous variables was dichotomized to High (median or above) coded as 1 and Low (less than median) coded as 0 categories. In order to have sufficient sample size for stable estimates of proportions, each categorical variable was also reduced to two categories. For each variable, a comparison of the proportion of subjects in each category who exercised was made within each gender using the Chi-Square test for two proportions. Within each gender, a stepwise logistic regression was used to

generate a model to predict exercise group classification. An alpha of 0.05 was used as criterion for significance for all hypothesis tests.

## Results

Summary statistics for continuous variables are displayed in Table 1. The ANOVA comparisons of means resulted in no significant effects for the Age variable. For all other variables, except BARR, the main effect for exercise was significant with p-values of 0.0001 or less. The exercise group had higher means than the nonexercise group for the variables of SMI, PSE, and BENE. The female exercisers had a lower mean for BARR compared to nonexercisers, but male exercisers had a higher BARR mean than the male nonexercisers. BMI means were lower for each gender exercise group than the nonexercise group. For both BARR and BMI, there was a significant interaction affect ( $p < .001$  for BARR and  $p = .0349$  for BMI). No significant interactions were observed for any other variable. The gender main effect was significant only for the variables SMI ( $p = .0002$ ), PSE ( $p < .0001$ ), and BARR ( $p < .001$ ).

**Table 1. Summary Statistics for Continuous Variables by Gender and Exercise Groups**

Variables	Female Exercisers N = 167		Female Nonexercisers N = 73		Female
	Mean	SD	Mean	SD	Difference Of Means
SMI	156.03	20.64	140.22	23.79	15.81
PSE	96.79	14.62	86.65	15.90	10.13
BARR	26.39	5.18	30.64	5.94	4.25
BENE	94.61	13.24	84.02	19.00	10.59
AGE	42.82	14.36	40.17	13.03	2.66
BMI	29.27	5.46	30.33	6.91	-1.06

  

Variables	Male Exercisers N=142		Male Nonexercisers N = 101		Male
	Mean	SD	Mean	SD	Difference Of Means
SMI	149.26	20.17	131.74	23.33	17.51
PSE	84.31	11.15	77.15	12.40	7.16
BARR	37.72	5.34	33.20	6.04	4.52
BENE	94.33	11.70	85.01	11.09	9.32
AGE	39.65	13.22	40.07	12.89	-0.42
BMI	27.98	5.85	31.66	8.24	-3.67

Summary statistics for categorical variables and p-values for Chi-Square comparisons are displayed in Table 2. For the males, only the health status variable was significant ( $p=.0215$ ). For the females,

significant differences were observed for number of dependents ( $p=.0216$ ) and Income ( $p=.0092$ ) with health status approaching significance ( $p=.0589$ ).

**Table 2. Summary Statistics for Categorical Variables by Gender**

<b>Females</b>				<b>Males</b>			
<b>Marital Status</b>	<b>N</b>	<b>Percent Exercise</b>	<b>p-value</b>	<b>Marital Status</b>	<b>N</b>	<b>Percent Exercise</b>	<b>p-value</b>
Married	136	57.35	0.745	Married	124	66.13	0.221
Not Married	106	59.43		Not Married	113	73.45	
<b>Number of Dependents</b>				<b>Number of Dependents</b>			
2 or Less	156	62.18	0.022*	2 or Less	195	70.77	0.304
More than 2	64	45.31		More than 2	43	62.79	
<b>Education</b>				<b>Education</b>			
Completed College	19	73.68	0.151	Completed College	34	79.41	0.227
Not Completed College	222	56.76		Not Completed College	198	69.19	
<b>Annual Income</b>				<b>Annual Income</b>			
Greater than \$25,000	80	70.00	0.009*	Greater than \$25,000	97	75.26	0.102
\$25,000 or Less	153	52.29		\$25,000 or Less	126	65.08	
<b>Health Status</b>				<b>Health Status</b>			
Good to Excellent	153	62.75	0.059	Good to Excellent	149	74.50	0.022*
Fair to Poor	82	50.00		Fair to Poor	88	60.23	

\*p-value  $\leq$  0.05

The six continuous variables listed in Table 1 and the five categorical variables listed in Table 2 comprised the set of independent variables considered for the logistic model selection for prediction that the subject is an exerciser. A separate model was generated for each gender. For both genders, the same variables were

selected by the forward as for the backward stepwise logistic procedure. Five variables were selected for females and six variables selected for males. Only three variables (BARR, SMI, and PSE) were common to selected models for both genders. The model for females correctly identified 32.3% of the nonexercisers and 92.2% of the

exercisers with an overall correct identification rate of 74.3%. For the male model corresponding values were 63.7%, 83.3%, and 74.8%. Percents of correctly classified subjects are likely to be smaller if the prediction model was applied to another data set. Coefficients and associated p-values for each model are presented in Table 3. Variables are listed in order of entry into model by

forward selection method. The model is for log odds for being an exerciser.

Note that for model selection purpose, all dichotomized continuous variables were coded as 1 for higher and 0 for lower. Categorical variables were coded as 1 for category listed first in Table 2 and 0 for second. Classification midpoint was set as 0.5 and inclusion alpha as 0.10.

**Table 3. Summary of Results for Model Selection from Variables in Tables 1 and 2 by Stepwise Linear Logistic Procedure to Predict Log Odds of Being an Exerciser by Gender**

<u>Female</u>			<u>Male</u>		
Variable	Regression Coefficient	p-value	Variable	Regression Coefficient	p-value
Intercept	-0.679	0.073	Intercept	-1.912	<0.001
BARR	-1.486	<0.001	SMI	1.003	0.004
SMI	0.954	0.006	BENE	1.158	0.001
AGE	0.884	0.012	PSE	0.916	0.008
PSE	0.762	0.029	DEPEN+	0.751	0.039
MAR*	-0.721	0.036	BMI	-0.654	0.050
			BARR	-0.671	0.055
<b>Model:</b> Exercise = -0.679 - 1.486(BARR) + 0.954(SMI) + 0.884(AGE) + 0.762(PSE) - 0.721(MAR)			<b>Model:</b> Exercise = -1.912 + 1.003(SMI) + 1.158(BENE) + 0.916(PSE) + 0.751(DEPEN) - 0.654(BMI) - 0.671(BARR)		

\*MAR – Marital Status

+DEPEN – Number of Dependents

## Discussion

Findings from this study suggest that self-motivation, physical self-efficacy,

and perceived barriers play key roles in exercising behavior in an adult Native American population. All three of these

variables were common to both gender models. Although no other studies have examined relationships between these particular variables and exercise behavior in this ethnic group, it is interesting to note that self-motivation was entered first for men and second for women in the exercising behavior model. As in other studies, these findings indicate that self-motivation correlates positively with exercise behavior only in those persons who have a general disposition to exercise.<sup>32,33,43</sup> In one investigation involving Caucasian adults, a model using self-motivation, body weight, and percent body fat, predicted female exercisers at a 91% rate and male exercisers at a 83% rate.<sup>51</sup> Although the gender models were not developed for nonexercisers, some studies indicate that motivation does not predict exercising behavior in usually sedentary women.<sup>34,35,42</sup> The adherent pattern reported by the exercising subjects of the present study lends support to the premise by Dishman and Ickes<sup>43</sup> that self-motivation is a general disposition to persevere at habitual physical activity.

It is not surprising that physical self-efficacy was included in both gender models. There are several studies that

show that physical self-efficacy plays a key role in exercise.<sup>19,28,52,53</sup> In this investigation, exercisers included individuals who exercised routinely for at least 4 weeks, which gave them time to make their judgments and improve their exercise self-efficacy. This lends support to Bandura's claim that self-efficacy is an indicator of one's judgment about the ability to accomplish a certain level of performance.<sup>9</sup>

It is evident from this study that those who perceived fewer barriers to exercise were the ones who exercised. However, evidence from other investigations regarding barriers and LTPA are mixed. While some investigations found that perceived barriers were negatively associated with LTPA,<sup>19,37</sup> other studies found that this variable was not explanatory of habitual exercise behavior.<sup>20,28</sup> Nonetheless, what may be more meaningful for future research is the examination of particular items on the barriers scale in this study. "Exercise is hard work" and "Exercise is tiring" were rated as the top two barriers to exercise in this population of Native Americans. This could be expected, given the assumption that a person's reason for persisting in a given action is influenced, in part, by the extent to

which there is a belief of a positive reward that is associated with a particular behavior.<sup>9</sup> Discomfort characterized by “hard work” and “tiring” can be viewed by some as negative and nonrewarding. For those who are starting an exercise routine, supervision by an appropriate health care professional might help the individual learn how to perform moderate-intensity activity without undue discomfort.

Many studies have examined other groups, including Native Americans, and have generally found that BMI and other measures of body fat to be negatively correlated with exercise.<sup>14,20,28,54</sup> Therefore, it was anticipated that BMI would enter into models generated for both males and females. An unexpected finding in the present study is that BMI did not appear in the model for women. One explanation could be that self-report of height and weight are subjective and perhaps less accurate than they would be if measured by an examiner. Another explanation might be the possibility that some of the higher BMI measurements came from athletically-prone women. The numerator of the BMI equation is affected by factors other than body fat,

such as bone and lean muscle mass. In relatively lean people with excessive muscle mass in relation to stature, a high BMI could result in an incorrect conclusion about excess body fat and lead one to make an incorrect interpretation about exercise and BMI.<sup>41</sup>

It was also unexpected that the benefits variable did not enter into the women’s model. Benefits has clearly been implicated in studies of exercise behavior in mostly Caucasian adults.<sup>19,20,34,37,38</sup> However, other investigations found that benefits did not enter into a multiple regression model for individuals who either walked for exercise or vigorously exercised <sup>28</sup> and that positive reasons for exercising had little to do with predicting a person’s adherence to exercise.<sup>36</sup> In this study, it is possible that the women are well-aware of the benefits of exercise but find that the actual barriers are the ones that keep them from engaging in habitual LTPA.

It is generally thought that the younger person tends to be the exerciser and the older person is not <sup>18-21,28</sup>; this appears to be true of the woman’s model in this study. However, a closer look at the literature reveals that there are many confounding factors involved in

the relationship between age and LTPA. While young adulthood and the final period in life indicated a continuing decrease in activity patterns over time, those who were considered middle adults and retirement age either demonstrated a pattern of relative exercise stability or showed an improved tendency in activity patterns over time.<sup>14,34</sup> Factors such as declining health and disability and family or work responsibilities may be reasons for the findings in the men's model in the present study.

There were several limitations to this investigation. A major one relates to the question of cross-cultural applicability of the measuring instruments and the Health Promotion Model, upon which this study was based. A foundational inquiry regarding this group's ways of knowing about healthy living and health promotion is needed to investigate whether models and instruments based on Western biomedical perspectives have applicability across cultures. Findings from this study cannot be generalized to Native American adults in other regions. The process of enculturation and acculturation has its roots in the times that the U.S. federal

government attempted to force all Native American to conform to European customs and habits, and these processes, either knowingly or unknowingly, continue to this day. Research related to the health care needs of all Native Americans need to be carried out with the notion that rural, urban, suburban, and reservation settings contain a varied mix of people from different tribes and nations, each with their own unique sets of problems, needs, and values.<sup>55</sup>

Although many of the variables in this study that explain exercise behavior in a sample of Native Americans are similar to those influencing the dominant population, it is important for future research to center on Native Americans who do not habitually engage in LTPA. A prospective, longitudinal study involving known predictor variables, exercise behavior, and the physiological and psychological outcomes of routine exercise behavior could give a more complete picture of the phenomenon. Obviously, other predictor variables, such as those in the Revised Health Promotion Model <sup>8</sup> will need to be studied to more clearly predict the model for each gender.

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**Acknowledgement:** This research was funded by the American Nurses Foundation, Grant #99-169. Biostatistical assistance was provided by the General Clinical Research Center, University of Oklahoma Health Science Center.

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