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Predictors of Wellness and American Indians

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Abstract

Wellness is an important American Indian (AI) concept, understood as being in balance with one's body, mind, and environment. Wellness predictors are reported in this paper within the context of health. A cross-sectional randomized household survey of 457 AI adults at 13 rural health care sites in California was conducted. Measures included wellness perceptions, barriers, health status/health conditions, spirituality, cultural connectivity, high-risk behaviors and abuse history. Statistical analysis obtained the best predictive model for wellness. Predictors of wellness were general health status perception, participation in AI cultural practices and suicide ideation. Significant differences in wellness status were observed depending on experience of adverse events in childhood and adulthood (neglect, physical abuse, and sexual abuse). Cultural connectivity (speaking tribal language, participating in AI practices, and feeling connected to community) was also associated with perceptions of wellness. Recommendations are for culturally-appropriate education and interventions emphasizing community and cultural connectivity for improving wellness status.

Keywords

Wellness; cultural connectivity; American Indians; risk factors; barriers

Wellness is an important facet of health and general welfare among American Indians.¹ In many tribes, the concept of wellness signifies more than the absence of disease; it is the balance of environmental traits that together maintain good health status.^{2,3} Central to many American Indian cultures is belief in the interconnectedness of all aspects of one's life and everything in the world.⁴ To live in harmony one must balance all parts of life, including physical, mental, emotional and spiritual well-being, with the environment.⁴ The failure of any or all of these parts of wellness can yield poor outcomes in other aspects of life.

Examining predictors of wellness enables researchers to identify health conditions and environmental factors such as culture, spirituality, behaviors, and adverse events that are associated with wellness; addressing them may improve overall life conditions of American Indians. It also helps to identify threats to health disparities by examining domains that together create balance and harmony in life.^{2,3} Such information is important as it can illuminate barriers to wellness and can aid in the development of interventions to maintain

healthy communities and to respond to adverse life events that may play a significant role in the health status of individuals.

There are many measurable barriers to wellness, ranging from systems barriers to physical, cultural, and environmental barriers. Perceptions of wellness can be measured through reported activity limitations, poor physical and mental health, and cultural factors (such as language, perceptions of health and wellness). Data on physical barriers (disabilities, limitations, and mental health problems), and cultural factors (satisfaction with spiritual/religious life, language, practices, and feelings of connectedness) may be used to assess any influence on perceived wellness. A better understanding of the factors associated with the perception of wellness is needed for effective intervention development and implementation to reduce health disparities between the American Indian population and other U.S. populations.

The health status of American Indians is below that of the general U.S. population and has been for many years,⁵ affected in part by high-risk behaviors such as smoking, poor nutrition, risky sexual practices, and sedentary lifestyles.⁶ Serious health conditions, such as obesity, pose a major problem to American Indians, contributing to disability, poor health status, and early death and disease.^{7,8,9} Other diseases that disproportionately affect American Indians include hypertension, cardiovascular disease, stroke, some cancers (endometrial, breast, and colon), osteoarthritis, and other joint and limb problems.⁹ Type 2 diabetes has reached epidemic levels in American Indian communities and is thought to be associated with obesity and low physical activity.⁸ Many of the health problems facing American Indians are related to individual behaviors and would be amenable to changes in lifestyles. Instead of addressing each of these problems separately, if one were to address American Indian wellness and ways in which to improve one's overall wellness, then there is the possibility that many of the above problems can be addressed simultaneously.

Knowing what constitutes a healthy individual and/or a healthy community may depend on understanding that wellness involves environmental interconnectivity as well as a simple freedom from disease. A better understanding of culturally-specific concepts of wellness plays an important role in understanding the health disparities between American Indians and others in the U.S. Identifying barriers and threats to wellness will serve as a guide for living a balanced life in harmony with one's environment.

Background

According to the U.S. Bureau of the Census, there are over 4.5 million American Indians in the United States,¹⁰ with the largest concentration (333,300 self-identifying as only American Indian and 696,600 reporting a combination of races/ethnicities including American Indian) residing in the state of California,^{10,11,12} reporting 30% non-urban (rural) residence.¹¹ There are over 100 federally recognized tribes and an additional 50 unrecognized tribes in California.¹² The majority of American Indians who reside in rural counties live on or near the 85 reservation/*rancherías* and obtain their medical care at one of over 40 Indian health clinics in the state.¹² Clinic services include outpatient services, such as immunizations; women, infant, and children checkups; management of chronic health conditions; and other primary care services.

For the purpose of this study, wellness was defined as being in balance and taking care of oneself physically, emotionally, mentally, and spiritually.² The Wellness Circles Project was a two-pronged research study designed to implement and evaluate a culturally-appropriate, community-based health care model to improve the wellness of American Indian families. The first stage of the study included the implementation and analysis of a modified Centers for Disease Control and Prevention (CDC) Behavioral Risk Factor Surveillance System

(BRFSS)¹³ survey in select rural sites in California. Survey data guided the second stage of the study, which included the development and evaluation of an intervention to capture the social and cultural capital of the community in order to improve overall wellness status among American Indians residing in rural California. The project consisted of four data-gathering and analysis phases: (1) focus groups, (2) a needs assessment survey, (3) a randomized intervention trial, and (4) an evaluation of the project. This paper reports on the needs assessment survey administered during the first phase of the study.

Methods

Sample

Four-hundred and fifty seven adult American Indians residing at rural reservation/*rancheria* sites participated in the study. Inclusion criteria included (1) aged 18 years and older, (2) self-identified American Indian, (3) active client of the local Indian health care clinic, and (4) member of the selected study household.

Design

A cross-sectional randomized household study was implemented at 13 rural reservation sites in California. Thirteen of the 15 clinic sites approached agreed to participate in the study. Sites were chosen because of ease of respondent access and because of the large number of clinic clientele. All American Indian clients who visited the local Indian clinic within the previous five years were identified by family groups. Households were then randomly selected and a questionnaire was given out to all adult members of the selected household.

Data collection method

A modified BRFSS survey was used in a structured approach. A trained American Indian interviewer contacted each selected household by telephone, U.S. mail, and personal contact to recruit respondents, specifically the heads of each household, as well as all adults (age 18 years and older) in the household. The interviewer explained the process, obtained informed consent and answered any questions that arose. The survey was self-administered under the supervision of the study interviewer and took place in respondents' homes or clinic meeting rooms (in person), depending upon which site was more comfortable for the respondent. The survey instrument was pilot-tested for literacy level and readability.

Five hundred individuals were invited and 457 agreed to participate in the study. Site approvals were obtained through letters of agreements from each site (tribe and/or clinic). Institutional Review Board approvals were obtained from the University of California at Berkeley, University of California at San Francisco, University of Minnesota, and the Indian Health Service. (Tribes did not have their own IRBs.) Respondents were provided oral and written information about the study and consent was given either in their households or at the clinic. The voluntary nature of the study was explained, as was the fact that services at local tribal, clinic, or community centers were not contingent upon participation in the study.

Measures

This paper concentrates on several parts of the survey: socio-demographic characteristics, general health status, wellness, high-risk behaviors, psycho-social characteristics, such as history of neglect and abuse, and cultural factors. The survey instrument was a 60-minute, written, self-administered questionnaire and included the following measures:

Socio-demographic characteristics—Respondents' age, gender, degree of Indian blood, employment, income, marital status and educational attainment were collected by the survey.

Wellness status—Respondents were asked, "Wellness includes feeling good and taking care of yourself physically, emotionally, mentally, and spiritually. How would you rate your own wellness?" This measure was dichotomized into two categories (good = excellent/very good, and poor = fair/poor).

General health status—A single question, "How would you rate your health, nowadays? Would you say that it is excellent, very good, fair, or poor?" was used to measure health status. This measure was categorized into two groups (very good = excellent/very good, good and poor = fair/poor).

Obesity status—The measure of obesity was based on body mass index (BMI), which is calculated from the self-reported height and weight of the respondent. Underweight is defined by a BMI score of less than 18.5; healthy weight is a BMI between 18.5 to 24.9; overweight is defined as a BMI between 25 to 29.9; obese is defined as a BMI score of 30 to 39.9;⁹ morbidly obese is a BMI over 40.¹⁴

Health conditions—Respondents were asked if a physician had diagnosed them as having any listed health problems (e.g., type 2 diabetes, arthritis, osteoporosis, and hypertension). Additionally, data were collected on self-reported number of days of poor mental/physical health in the last month.

High risk behaviors—Smoking status, intention to quit smoking (among current smokers), sexual practices, suicide ideation, and attempted suicide were measured.

Limitations in activities—Respondents were asked to report any major impairment limiting their activities.

History of neglect and abuse—Psycho-social questions were asked about self-reported history of physical, mental, or sexual abuse and neglect as a child, adolescent, or adult.

Data analysis

The outcome variable of interest was respondents' perception of their own wellness (excellent/very good *versus* fair/poor). Differences in characteristics between individuals with good *versus* poor wellness were studied under the broad classes of demography, health conditions, high risk behaviors, cultural connectivity and psychosocial characteristics. Chi-squared tests and Fisher's exact tests were used to assess associations between wellness categories and other categorical/binary variables, whereas ANOVA methods were used to assess association for normally distributed continuous variables. Backward multiple logistic regression analysis was used to obtain the best predictive model for wellness, after incorporating all potential predictors into the model. Covariates were entered in an initial full model and a final model was obtained through backward elimination, a process of eliminating redundant variables from an overly complex model. Covariates included variables that were associated with good wellness at the 0.15 level in preliminary analyses; they were retained if they were significant at the 0.10 level. Model fit was assessed by the Hosmer and Lemeshow Goodness-of-Fit statistics,¹⁵ as well as the area under the curve (AUC) of the associated receiver operating characteristics (ROC) curve for the final model. All model assumptions were checked and met. All statistical analyses were performed with Statistical Analysis Program (SAS/STAT).¹⁶

Results

Socio-demographic characteristics reported by wellness categories are shown in Table 1. The average age of American Indians in the overall sample was 44.5 years (range of 19–83), 52.5% (n=227) were married, and the average annual household income was around \$25,000. Twenty-six percent (n=102) spoke their tribal language, 87% (n=376) were enrolled in a tribe, and 46% (n=137) reported that they had 50% or more Indian blood. Of the 442 American Indian respondents in the overall sample who responded to the wellness question, 72.6% (n=321) reported good wellness compared to the remaining 27.3% (n=121) who reported poor wellness. As seen in Table 1, persons with poor wellness were older (48 years *vs.* 43 years, *p*-value = .01) and a lower proportion of them were employed (53% *vs.* 67%, *p*-value = .01).

A significantly higher proportion of study participants (reporting poor wellness) also reported negatively on conditions such as general health, weight, and number of days of poor mental and physical health. Almost half of the poor wellness group (n=62) reported fair to poor general health status compared with only 9% (n=28) of the good wellness group (*p*-value <.0001). A significantly higher proportion of the poor wellness group was obese or morbidly obese (60% *vs.* 42%, *p*-value = .005), and 28% (32) suffered from type 2 diabetes compared with 14% (n=46) in the other group (*p*-value = .002). Almost half of respondents in the poor wellness group (n=56) reported limitations in activity due to poor health compared with only 21% (n=66) in the good wellness group (*p*-value <.0001).

With respect to high-risk behaviors, the poor wellness group differed significantly from its counter-group with respect to suicide ideation. Twenty-nine percent (n=33) of people with poor wellness reported suicide ideation compared with the 17% (n=54) in the good wellness group (*p*-value = .007). The groups behaved similarly with respect to smoking, intentions to quit smoking, monogamous relationships and actual suicide attempts. There was marginal difference in reported safer sexual practices (26% in the poor wellness group *vs.* 38% in the good wellness group, *p*-value = .07).

With regard to cultural connectivity, the poor wellness group differed from the good wellness group in their ability to speak their tribal language (17% *vs.* 29%, *p*-value = .02), participating in American Indian practices (45% *vs.* 62%, *p*-value = .001) and feeling connected to community (76% *vs.* 86%, *p*-value = .022). The groups were similar in terms of being active in the community, having at least 50% Indian blood quantum and being enrolled in an Indian tribe. There was marginal difference in their satisfaction with their religious/spiritual lives (84% in the poor wellness group *vs.* 91% in the good wellness group, *p*-value = .07).

There were significant differences between the groups on almost all counts of psycho-social characteristics, such as history of neglect and abuse. Significantly higher proportions of the poor wellness group reported having history of neglect in their childhood (25% *vs.* 14%, *p*-value = .007), adolescence (30% *vs.* 16%, *p*-value = 0.002) and adulthood (22% *vs.* 10%, *p*-value = .002). Significantly higher proportions of the poor wellness group reported physical abuse during their childhood (23% *vs.* 14%, *p*-value = .04) and adulthood (29% *vs.* 16%, *p*-value = .004), as well as sexual abuse during the same phases of their lives (childhood: 21% *vs.* 12%, *p*-value = .02; adulthood: 16% *vs.* 7%, *p*-value = .004).

The logistic regression model reported in Table 2 shows the significant predictors of poor wellness in this sample of American Indian individuals. Significant predictors were fair-poor perception of general health status, participating in American Indian practices and reporting of suicide ideation. Compared with those who had excellent to very good general health, people with fair to poor general health had 29 times the odds of having poor wellness (*p*-

value $<.0001$), while those with good general health had almost four times the odds of having poor wellness (p-value = $.0001$). Individuals who never or rarely participated in American Indian practices had 2.5 times the odds of having poor wellness compared to those who practiced often or always (p-value = $.01$). Additionally, people who reported suicide ideation had twice the odds of poor wellness compared to those who did not report ideation (p-value = $.01$).

Discussion

This study yielded important insights into the concept of wellness among American Indians and the role wellness plays in defining the general well-being of American Indians. Among many tribes, the concept of wellness is defined as the physical, mental/emotional, spiritual, and environmental traits that together form balance and harmony in life.^{2,3,4} The failure of any or all of these parts of balance in life (wellness) appears to be closely tied to general health status and was shown in this study to be associated with health conditions, psychosocial factors, adverse events in childhood, adolescence and in adulthood, and cultural connectivity.

Although one can assume that poor health conditions may lead to poor perceptions of wellness, it is important to note the health conditions of concern that are of critical significance for American Indian communities. Obesity, type 2 diabetes and limited activity due to poor health have been shown to be at epidemic levels in American Indian communities^{17,18} with far-reaching consequences. High risk behaviors, such as smoking and sexual practices were found to be similar in both the good and poor wellness groups, however, suicide ideation proved to be significantly higher in the poor wellness group. This is troubling, as it is an indication of a population in need of immediate and long-term health care assistance.

Experiencing adverse events in childhood, adolescence and adulthood, such as neglect, physical and sexual abuse, was shown to be significantly related to poor wellness. Those experiencing adverse events in childhood carry lifelong problems associated with psychosocial behaviors.¹⁹ Reports of physical and sexual abuse as an adult and child clearly affected the lives of American Indians in this study, perhaps contributing to lower self esteem, poor eating habits, and suicide ideation. Our study found that those who reported neglect, physical abuse, and sexual abuse in childhood also reported such abuse in adulthood; these respondents also reported poor wellness, suggesting that adverse events during childhood may have serious consequences and poor outcomes later in life. Considering the long-term effects of adverse events in childhood, and the trajectory leading up to poor health perceptions in adulthood, studies that can identify the best point of intervention and programs that can provide the support to halt the abuse and neglect can have an enormous impact on the health and wellness of a community. Further investigation is needed to examine abuse and poor health perceptions in detail.

Cultural connectivity, measured in this study as the ability to speak tribal language, participating in American Indian practices, and feeling connected to community were associated with poorer perceptions of wellness. This finding implies that maintaining culturally connectivity is healthy for individuals and communities and needs to be reaffirmed. For American Indians, cultural practices, beliefs, and daily rituals are important to maintain as they may strengthen spirituality and self-identity. Often, these practices serve to establish identity and feelings of connectedness in individuals and groups.²⁰ Cultural identity and connectivity are strongly valued in American Indian communities²⁰ and their loss can be measured and studied in association with other risky behaviors, such as alcohol and drug abuse, obesity, and psycho-social problems, as well as poor health conditions.

Studies have shown the importance of identity and support in the maintenance of mental health.^{4,21} Having a stable and balanced environment could be an important part of good mental and physical health.

The survey findings helped our research team to craft the second phase of the study, a culturally-sensitive intervention that encompassed education and behavioral modification to reduce obesity, improve good health habits, and improve perceptions of wellness. The use of the Talking Circle,²² a culturally-appropriate group support method and educational forum, was incorporated into the intervention to facilitate behavior change and knowledge acquisition. The Talking Circles were structured so that all participants were provided weekly educational sessions and given the opportunity to discuss depression, substance abuse, and healthy living. Talking Circles are an important tool and may be used to guide American Indians to improve the balance and harmony in their lives, thereby improving knowledge, attitude and health outcomes.

Culturally-appropriate education and interventions, such as the Talking Circle, emphasizing the importance of community and cultural connectivity are recommended for improving wellness status among American Indians. Recommendations for developing culturally-appropriate education and interventions much emphasize the importance of community and cultural connectivity for improving wellness status among American Indians.

Limitations

There are some limitations of the study that must be acknowledged. The self-selection of the clinics that agreed to participate in the study, the limitations of the composition of the sample, and the over-representation of female respondents in the study are limitations. The small sample of male respondents may be due to increased single family households headed by women or that males were not at home or chose not to identify as a household member when our staff distributed the surveys. There is possible bias in interpretation of terms, such as abuse and neglect, as these are subjective measures. Additionally, there is potential for bias in population-based surveys arising from possible absence of study subjects from the household when the surveys are being administered. Furthermore, the household may not adequately represent the high-risk non-household population groups and mobile or transient populations. Because California has a very large population of American Indians (over 690,000)²³ and because time and financial constraints limited access to all residents, the author chose to sample randomly a small portion of households of adult clinic users residing at participating sites.

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Notes

1. Weaver HN. Perspectives on wellness: journeys on the red road. *J Sociol Soc Welf.* 2002 Mar; 29(1):5–15.
2. Ojibwa. Native American religions: balance and harmony. Daily Kos website. 2010. Available at: <http://www.dailykos.com/story/2010/10/08/908731/-Native-American-Religions:-Balance-and-Harmony->
3. Alvarado, D. The Native American Wellness Scale: a multidimensional quality of life measure for indigenous populations. Walden University; 2008. Available at: <http://nativeamericanwellness.com>
4. Lefter, LJ. Promoting wellness among Eastern Band Cherokees. In: Keefe, SE., editor. *Appalachian cultural competency: a guide for medical, mental health and social service professionals.* Knoxville, TN: University of Tennessee Press; 2005. p. 219-39.

5. Barnes PM, Adams PF, Powell-Griner E. Health characteristics of the American Indian and Alaska native adult population: United States, 1999–2003. *Advance Data*. 2005 Apr 27;356:1–24.
6. Office of Minority Health. American Indian/Alaskan native profile. Washington, DC: Office of Minority Health; 2009. Available at: <http://minorityhealth.hhs.gov/templates/browse.aspx?lvl=2&lvlID=52>
7. Slatterly ML, Ferucci ED, Murtaugh MA, et al. Associations among body mass index, waist circumference, and health indicators in American Indian and Alaska Native adults. *Am J Health Promot*. 2010 Mar–Apr; 24(4):246–54. [PubMed: 20232606]
8. Centers for Disease Control and Prevention. Obesity: halting the epidemic by making health easier: at a glance 2010. Atlanta, GA: Center for Disease Control and Prevention; 2010. Available at: <http://www.cdc.gov/chronicdisease/resources/publications/AAG/obesity.htm>
9. Halpern, P. Obesity and American Indian/Alaska natives. Washington, DC: U.S. Department of Health and Human Services; 2007. Available at: <http://aspe.hhs.gov/hsp/07/AI-AN-obesity>
10. U.S. Census Bureau. Census 2000 redistricting data (Public Law 94-171) summary file: 2000 Census of population and housing. Washington, DC: U.S. Census Bureau; 2001.
11. O'Brien, C. Southwest is home to largest American Indian population. Newark, NJ: DiversityInc; 2008. Available at: http://diversityinc.com/content/1757/article/4638/?Southwest_Is_Home_to_Largest_American_Indian_Population
12. California Rural Indian Health Board, California Tribal Epidemiology Center. California American Indian community health profile. Sacramento, CA: California Tribal Epidemiology Center; 2009. Available at: http://crihb.org/files/california_community_health_profile_september2009.pdf
13. Centers for Disease Control and Prevention. About the BRFSS (Behavioral Risk Factor Surveillance System). Atlanta, GA: Centers for Disease Control and Prevention; 2008. Available at: <http://www.cdc.gov/brfss/about.htm>
14. MedlinePlus. Body mass index. Bethesda, MD: U.S. National Library of Medicine; 2010. Available at: <http://www.nlm.nih.gov/medlineplus/ency/article/007196.htm>
15. Shah, BV.; Barnwell, BG. Hosmer-Lemeshow goodness of fit test for Survey data. *Proceedings of the Joint Statistical Meetings—Section on Survey Research Methods*; 2003. Available at: <http://www.amstat.org/sections/srms/Proceedings/y2003/Files/JSM2003-000744.pdf>
16. SAS Institute Inc. SAS 9.1.3 help and documentation. Cary, NC: SAS Institute Inc; 2000–2004.
17. Story M, Stevens J, Himes J, et al. Obesity in American-Indian children: prevalence, consequences, and prevention. *Prev Med*. 2003 Dec; 37(6 Pt 2):S3–12. [PubMed: 14636804]
18. Whitbeck LB, Adams GW, Hoyt DR, et al. Conceptualizing and measuring historical trauma among American Indian people. *Am J Community Psychol*. 2004 Jun; 33(3–4):119–30. [PubMed: 15212173]
19. American Psychological Association. Adversity in childhood can increase risk of cardiovascular disease in adulthood, research shows. Washington, DC: American Psychological Association; 2010.
20. Hill DL. Sense of belonging as connectedness, American Indian worldview, and mental health. *Arch Psychiatr Nurs*. 2006 Oct; 20(5):210–6. [PubMed: 17010824]
21. Fisher EB, Thorpe CT, DeVellis BM, et al. Healthy coping, negative emotions, and diabetes management: a systematic review and appraisal. *Diabetes Educ*. 2007 Nov–Dec; 33(6):1080–103. [PubMed: 18057276]
22. Hodge FS, Stubbs HA. Talking circles: increasing cancer knowledge among American Indian women. *Cancer Research and Therapy*. 1999; 8(1–2):103–11.
23. U.S. Census Bureau. Population estimates (table 3). Washington, DC: U.S. Census Bureau; 2007. Available at: <http://www.census.gov/popest/national/asrh/NC-EST2007/NC-EST2007-03.xls>

Table 1

CHARACTERISTICS OF AMERICAN INDIANS WITH REGARD TO WELLNESS (N=442)

Characteristics	Overall (n=442)	Good Wellness (n=321)	Poor Wellness (n=121)	p-value
Demographic	Mean (SE)	Mean (SE)	Mean (SE)	
Age	44.53 (0.77)	43.34 (0.86)	47.62 (1.63)	.01*
Annual household income	24618.94 (1682.95)	23312.34 (1682.86)	29213.10 (4744.88)	.15
	% (n, SE)	% (n, SE)	% (n, SE)	
Gender				
Male	26.08 (115, 2.0)	25.94 (83, 2.0)	26.45 (32, 4.0)	.91
Female	73.92 (326, 2.0)	74.06 (237, 2.0)	73.55 (89, 4.0)	
Marital Status				.45
Married or Living with someone	52.55 (227, 2.0)	53.67 (168, 3.0)	49.58 (59, 5.0)	
Divorced/Separated/Widowed/Single	47.45 (205, 2.0)	46.33 (145, 3.0)	50.42 (60, 5.0)	
Employed				
Yes	62.94 (270, 2.0)	66.56 (207, 3.0)	53.39 (63, 5.0)	.01*
No	37.06 (159, 2.0)	33.44 (104, 3.0)	46.61 (55, 5.0)	
Education				
< HS degree	23.08 (102, 2.0)	22.43 (72, 3.0)	24.79 (30, 5.0)	.60
≥ HS degree	76.92 (340, 2.0)	77.57 (249, 3.0)	75.21 (91, 5.0)	
Health				
Perception of General Health				<.0001*
Fair/poor	20.41 (90, 2.0)	8.75 (28, 2.0)	51.24 (62, 5.0)	
Good	38.32 (169, 2.0)	39.06 (125, 3.0)	36.36 (44, 4.0)	
Excellent/Very good	41.27 (182, 2.0)	52.19 (167, 3.0)	12.40 (15, 3.0)	
BMI				.005*
<25: Normal	29.09 (128, 2.0)	31.25 (100, 3.0)	23.33 (28, 4.0)	
25–29.9: Overweight	24.09 (106, 2.0)	26.88 (86, 2.0)	16.67 (20, 3.0)	
30–39.9: Obese	36.14 (159, 2.0)	33.13 (106, 3.0)	44.17 (53, 5.0)	
40+: Morbidly Obese	10.68 (47, 1.0)	8.75 (28, 2.0)	15.83 (19, 3.0)	
# of Days of Poor Mental Health in Last Month				
0	91.55 (271, 2.0)	93.22 (220, 2.0)	85 (51, 5.0)	.009*
1–7	3.72 (11, 1.0)	3.39 (8, 1.0)	5 (3, 3.0)	
8–14	1.35 (4, 1.0)	1.69 (4, 1.0)	0	
15–30	3.38 (10, 1.0)	1.69 (4, 1.0)	10 (6, 4.0)	
# of Days of Poor Physical Health in Last Month				
0	94.37 (218, 2.0)	95.96 (190, 1.0)	84.85 (28, 6.0)	.002*
1–7	3.90 (9, 1.0)	3.54 (7, 1.0)	6.06 (2, 4.0)	
8–14	0	0	0	
15–30	1.73 (4, 1.0)	0.51 (1, 1.0)	9.09 (3, 5.0)	
Type 2 Diabetes				
Yes	17.97 (78, 2.0)	14.47 (46, 2.0)	27.59 (32, 4.0)	.002*

Characteristics	Overall (n=442)	Good Wellness (n=321)	Poor Wellness (n=121)	p-value
No	82.03 (356, 2.0)	85.53 (272, 2.0)	72.41 (84, 4.0)	
General Limited Activity due to Poor Health				
Yes	28.44 (122, 2.0)	20.95 (66, 2.0)	49.12 (56, 5.0)	.0001*
No	71.56 (307, 2.0)	79.05 (249, 2.0)	50.88 (58, 5.0)	
High Risk Behaviors				
Smoking Status				
Current	38.04 (159, 2.0)	39.22 (120, 3.0)	34.82 (39, 5.0)	.28
Former	27.27 (144, 2.0)	25.16 (77, 2.0)	33.04 (37, 4.0)	
Never	34.69 (145, 2.0)	35.62 (109, 3.0)	32.14 (36, 4.0)	
Intent to Quit Smoking (Among Current Smokers)				
Yes	25.85 (38, 4.0)	25.86 (30, 4.0)	25.81 (8, 8.0)	1.00
No	74.15 (109, 4.0)	74.14 (86, 4.0)	74.19 (3, 8.0)	
Sex Practice				
Safe	34.78 (96, 3.0)	37.93 (77, 3.0)	26.03 (19, 5.0)	.07
Not Safe	65.22 (180, 3.0)	62.07 (126, 3.0)	73.97 (54, 5.0)	
Monogamous Relationships				
Yes	80.34 (233, 2.0)	82.86 (174, 3.0)	73.75 (59, 5.0)	.08
No	19.66 (57, 2.0)	17.14 (36, 3.0)	26.25 (21, 5.0)	
Suicide ideation				
Yes	20.42 (87, 2.0)	17.25 (54, 2.0)	29.20 (33, 4.0)	.007*
No	79.58 (339, 2.0)	82.75 (259, 2.0)	70.80 (80, 4.0)	
Attempted suicide				
Yes	7.80 (34, 1.0)	7.23 (23, 1.0)	9.32 (11, 3.0)	.47
No	92.20 (402, 1.0)	92.77 (295, 1.0)	90.68 (107, 3.0)	
Cultural Connectivity				
Satisfaction with religious/spiritual life				
Yes	88.84 (374, 2.0)	90.52 (277, 2.0)	84.35 (97, 3.0)	.07
No	11.16 (47, 2.0)	9.48 (29, 2.0)	15.65 (18, 3.0)	
Able to speak tribal language				
Yes	25.76(102, 2.0)	28.97 (84, 3.0)	16.98 (18, 4.0)	.02*
No	74.26(294, 2.0)	71.03 (206, 3.0)	83.02 (88, 4.0)	
Participate in AI practices				
Yes	57.69(255, 2.0)	62.31 (200, 3.0)	45.45 (55, 5.0)	.001*
No	42.31(187, 2.0)	37.69 (121, 3.0)	54.55 (66, 5.0)	
Ever participated in healing ceremony				
Yes	34.27(146, 2.0)	32.68 (100, 3.0)	38.33 (46, 4.0)	.27
No	65.73(280, 2.0)	67.32 (206, 3.0)	61.67 (74, 4.0)	
Active in AI community				
Yes	62.56(264, 2.0)	63.40 (194, 3.0)	60.34 (70, 5.0)	.56
No	37.44(158, 2.0)	36.60 (112, 3.0)	39.66 (46, 5.0)	
Feel connected to community				

Characteristics	Overall (n=442)	Good Wellness (n=321)	Poor Wellness (n=121)	p-value
Yes	83.64(322, 2.0)	86.22 (244, 2.0)	76.47 (78, 4.0)	.02*
No	16.36(63, 2.0)	13.78 (39, 2.0)	23.53 (24, 4.0)	
Indian Blood Quantum				
<25%	27.52 (82, 3.0)	24.89 (55, 3.0)	35.06 (27, 5.0)	
25–50%	26.51 (79, 3.0)	28.51 (63, 3.0)	20.78 (16, 5.0)	.24
50–75%	23.15 (69, 2.0)	24.43 (54, 3.0)	19.48 (15, 5.0)	
75–100%	22.82 (68, 2.0)	22.17 (49, 3.0)	24.68 (19, 5.0)	
Enrolled in an Indian Tribe				
Yes	87.24 (376, 2.0)	85.90 (262, 2.0)	89.74 (105, 3.0)	.29
No	12.76 (55, 2.0)	14.10 (43, 2.0)	10.26 (12, 3.0)	
Psycho-Social Characteristics				
Neglected—Childhood				
Yes	17.19(71, 2.0)	14.19 (43, 2.0)	25.45 (28, 4.0)	.007*
No	82.81(342, 2.0)	85.81 (260, 2.0)	74.55 (82, 4.0)	
Neglect—Adolescence				
Yes	19.35(71, 2.0)	15.56 (42, 2.0)	29.90 (29, 5.0)	.002*
No	80.65(296, 2.0)	84.44 (228, 2.0)	70.10 (68, 5.0)	
Neglect—Adult				
Yes	13.23(52, 2.0)	10.03 (29, 2.0)	22.12 (23, 4.0)	.002*
No	86.77(341, 2.0)	89.97 (260, 2.0)	77.88 (81, 4.0)	
Physical abuse—Childhood				
Yes	16.43(68, 2.0)	14.05 (42, 2.0)	22.61 (26, 4.0)	.04*
No	83.57(346, 2.0)	85.95 (257, 2.0)	77.39 (89, 4.0)	
Physical abuse—Adolescence				
Yes	12.37(47, 2.0)	10.58 (29, 2.0)	16.98 (18, 4.0)	.09
No	87.63(333, 2.0)	89.42 (245, 2.0)	83.02 (88, 4.0)	
Physical abuse—Adult				
Yes	19.46(80, 2.0)	16.05 (48, 2.0)	28.57 (32, 4.0)	.004*
No	80.54(331, 2.0)	83.95 (251, 2.0)	71.43 (80, 4.0)	
Sexual abuse—Childhood				
Yes	14.25(58, 2.0)	11.74 (35, 2.0)	21.10 (23, 4.0)	.02*
No	85.75 (349, 2.0)	88.26 (263, 2.0)	78.90 (86, 4.0)	
Sexual abuse—Adolescence				
Yes	10.55 (40, 2.0)	9.35 (26, 2.0)	13.86 (14, 3.0)	.21
No	89.45 (339, 2.0)	90.65 (252, 2.0)	86.14 (87, 3.0)	
Sexual abuse—Adult				
Yes	9.42 (39, 1.0)	6.93 (21, 1.0)	16.22 (18, 3.0)	.004*
No	90.58 (375, 1.0)	93.07 (282, 1.0)	83.78 (93, 3.0)	

* Significant difference between classifiers based on Chi-square test (categorical/binary variables) or two-sample independent t-test (continuous variables) at alpha = 0.05.

Table 2

LOGISTIC REGRESSION MODEL TO PREDICT POOR PERCEPTIONS OF WELLNESS AMONG AMERICAN INDIANS (N=419)

Predictors				
H-L Goodness of fit p-value = 0.67	Estimated OR	95 % CI (for OR)	p-value	
General Health				
	Fair/poor v. Excellent/very good	28.76	13.72–60.29	.0001*
	Good v. Excellent/very good	3.71	1.91–7.20	.0001*
Suicide Ideation				
	Yes v. No	2.21	1.20–4.08	.01*
Participate in AI Practices				
	Never/Rarely v. Often/Always	2.56	1.26–5.21	.01*
	Sometimes v. Often/Always	1.15	0.55–2.40	.71

* Significance based on Wald Chi-square tests from Logistic model fitting at alpha = 0.05.