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# Sex and Race/Ethnicity Differences in Following Dietary and Exercise Recommendations for U.S. Representative Sample of Adults With Type 2 Diabetes

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# Sex and Race/Ethnicity Differences in Following Dietary and Exercise Recommendations for U.S. Representative Sample of Adults With Type 2 Diabetes

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## Abstract

This study examined sex by race/ethnicity differences in medical advice received for diet and exercise with corresponding health behaviors of a U.S. representative sample of adults with type 2 diabetes ( $N = 1,269$ ). Data from the National Health and Nutrition Examination Surveys for 2011–2014 for 185 Mexican Americans, 123 Other Hispanics, 392 non-Hispanic Blacks, 140 non-Hispanic Asians, and 429 non-Hispanic Whites were analyzed using logistic regression analyses. Reporting being given dietary and exercise advice was positively associated with reporting following the behavior. There were differences in sex and sex by race/ethnicity for reporting receiving medical advice and performing the advised health behavior. These results suggest the importance of physicians having patient-centered communication skills and cultural competency when discussing diabetes management.

## Keywords

men of color, nutrition, health communication, preventive medicine, diabetes

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## Background

Not seeking help, poor diet, and physical inactivity are among the top five actual causes of death for men in the United States, along with tobacco and alcohol use (Garfield, Isacco, & Rogers, 2008). Reversing these lifestyle factors are of paramount importance for primary and secondary prevention of diabetes. Diabetes has become a worldwide epidemic and is of particular concern in the United States due to rising numbers in the general population with higher prevalence for certain racial/ethnic groups. The number of adults in the United States diagnosed with diabetes climbed from 5.5 million in 1980 to 21.5 million in 2014 (Centers for Disease Control and Prevention [CDC], 2015a) and it is estimated that there are 8.1 million undiagnosed cases in the United States (CDC, 2015a). Type 2 diabetes, the most common form (90% to 95% of all cases), has increased in the general population and disproportionately in Blacks, Hispanics, and Asians (CDC, 2015b). Diabetes leads to complications such as heart disease, stroke, high blood pressure,

blindness, kidney disease, and nervous system disease (CDC, 2015b). The age-adjusted death rate from all causes is 1.5 times higher and the death rate from cardiovascular complications is 1.7 times higher for persons with diabetes compared with those without diabetes (CDC, 2015b).

In order to prevent diabetic complications, health behavior change in diet and physical activity are paramount to diabetes care (Fowler, 2007); yet adults with diabetes are approximately 20% less physically active as compared with adults without diabetes (Morrato, Hill, Wyatt, Ghushchyan, & Sullivan, 2007). Diet quality was positively associated with decreased risk of type 2

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diabetes for a large cohort of male health professionals (de Koning et al., 2011).

Improvements in diet quality and body weight over 20 years resulted in a 10% lower risk of diabetes for three large cohorts of men and women from the Health Professional Follow-up Study and Nurses' Health Studies (NHS I and NHS II; Ley et al., 2016). Dietary patterns in Japanese adults with type 2 diabetes were associated with biomarkers for cardiovascular disease (Osonoi et al., 2015).

There are significant disparities in the prevalence, management, and complications of diabetes for ethnic minorities compared with non-Hispanic Whites (NHWs; Peek, Cargill, & Huang, 2007). The effectiveness of diabetes self-management depends primarily on following the recommended guidelines for diet and exercise. To follow guidelines, the individual must not only receive but must also understand the advice given by medical professionals. Inadequate dietary adherence and poor diet quality for a Black South African population with type 2 diabetes were due, in part, to miscommunication by the medical staff and to receiving conflicting advice from multiple sources (Nthangeni et al., 2002). Whether medical advice was received as it was intended has been associated with the degree of health care access, health care utilization, trust for the source of health information, and health literacy. The American Diabetes Association (2016) recommends that physicians apply patient-centered communication while taking into consideration preferences, literacy level, culture, health beliefs, and barriers to health care of each patient.

Disparities exist in both health care access and the quality of care received. According to the Agency for Healthcare Research and Quality (2015), Blacks, Hispanics, and Asians had less access to health care and a lower quality of care as compared with NHWs. Gavin, Fox, and Grandy (2011) reported differences by race/ethnicity in medical advice received for diet and exercise of adults with diabetes in the United States. Hispanics and Asians, particularly those born outside of the United States, were more likely to be uninsured as compared with NHWs (Agency for Healthcare Research and Quality, 2015). Underserved populations encounter multiple barriers for effective health behavior change. Support from health care professionals is an essential determinant of patients' success in following their prescription for diet and exercise (Bardia, Holtan, Slezak, & Thompson, 2007). Physicians working with underserved populations reported difficulties communicating diabetes self-management skills for several reasons including lack of knowledge of the patient's abilities and health beliefs, the patients' limited health literacy or English proficiency, not seeing patients frequently enough (poor continuity of care), and the lack of community health resources (Ratanawongsa et al., 2012).

Health literacy, the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions (Office of Disease Prevention and Health Promotion, 2014), differs by race and education (Kutner, Greenberg, Jin, & Paulsen, 2006). Only 12% of U.S. adults, ages 16 and older, have proficient health literacy and average health literacy scores, which are lower for Hispanics and Blacks as compared with Whites (Kutner et al., 2006). Underserved populations have difficulty interpreting medical advice, since it involves understanding the difference between evidenced-based recommendations and recommendations from noncredible sources (Escarce & Kapur, 2006). In general, individuals have more exposure to media and family and friends offering health advice than to health professionals (Cotten & Gupta, 2004). Social support from family was determined to be a critical component for African American men to accept medical advice and make behavioral changes (Griffith, Ellis, & Allen, 2012).

Health disparities are perpetuated by health professionals' limited understanding of culture and how it affects health communication (Freimuth & Quinn, 2004). Patient-provider communication may be confounded by differences in the use and type of nonverbal communication, which may be a factor of sex, race/ethnicity, and socioeconomic position (Cooper & Roter, 2003). White non-Hispanics reported receiving higher quality medical care, which included more information and encouragement, as compared with patients of other races, adjusting for medical facility (Cooper & Roter, 2003). Compared with women, men received less information and encouragement from their physician and the quality of care was the poorest for men with male physicians (Cooper & Roter, 2003).

In addition to differences in patient-provider communication, health access, and behaviors by sex, race/ethnicity, and literacy, there are sex differences in health utilization and diabetes self-management. Men younger than 64 years of age were less likely to have insurance than women in 2012 (81.5% vs. 84.6%; Agency for Healthcare Research and Quality, 2015). Health utilization and health behavior differences by sex which included dietary challenges, utilization of resources for diabetes, and source of social support were indicated by culturally diverse, urban-dwelling, Canadian focus groups (Mathew, Gucciardi, De Melo, & Barata, 2012). Self-management behaviors for changing diet and exercise were different for sex-race/ethnic groups in U.S. adults with diabetes (Gavin et al., 2011).

## Purpose and Justification

Men's poorer health outcomes and underutilization of health care as compared with women have been

attributed to socialization differences between the sexes (Garfield et al., 2008; Kaasalainen, Kasila, Komulainen, Malvela, & Poskiparta, 2015). Men have been socialized to be independent and not show emotions, which negatively affects their attitudes, beliefs, and behaviors concerning their health (Garfield et al., 2008). These disparities are more pronounced for men of color (Satcher, 2003). The need to present a strong image was a reason given by African American and Latino men from the Midwest for avoiding health care regardless of their health status (Hawkins, 2015). It is critical for men's health that attention be focused on patient-provider communication with an emphasis on the structure and processes of the delivery of health care to men (Garfield et al., 2008).

The purpose of this study was to examine sex and racial/ethnic differences in medical advice and health behaviors related to diet and exercise for the main five racial/ethnic categories of individuals with diabetes in a representative sample of the U.S. population (Mexican Americans [MAs], other Hispanics [OHs], non-Hispanic Blacks [NHBs], non-Hispanic Asians [NHAs], and NHWs). There have been two previous studies that examined similar factors (Gavin et al., 2011; Vaccaro et al., 2012); albeit the data were more than 5 years old, Asian Americans were not included, and Hispanic subgroups were not distinguished. The American Diabetes Association recommends lower body mass index (BMI) cutoff points for Asian Americans when defining risk for diabetes (Hsu, Araneta, Kanaya, Chiang, & Fujimoto, 2015). While many Asian Americans are not perceived as overweight, they tend to collect fat around the abdomen, placing them at metabolic risk for diabetes at BMI's lower than the general population (Hsu et al., 2015). The new recommendations from the American Diabetes Association are that all Asian American adults with a BMI of  $\geq 23$  kg/m<sup>2</sup> be tested for diabetes; whereas the cutoff for the general adult population is BMI  $\geq 25$  kg/m<sup>2</sup> (Hsu et al., 2015). Physicians who perceive Asian Americans with diabetes to be of normal BMI may not encourage them to reduce body weight, calories or fat consumption, and to increase exercise; yet these lifestyle behaviors are recommended for all persons with diabetes (American Diabetes Association, 2016). Health care and health issue have been reported to differ among men from separate Hispanic-American heritages (Ai, Noel, Appel, Huang, & Hefley, 2013). The subgroups of the Hispanic population differ in their health behaviors, beliefs, and practices (CDC, 2012). Based on a review of the literature, it was hypothesized that men of color will have lower odds of reporting an affirmative response to receiving medical advice and performing diabetes self-management health behaviors as compared with women and NHW men.

## Method

### Source of Data and Ethics

This article compares medical advice and health behaviors by sex and race/ethnicity of persons with type 2 diabetes based on updated, self-reported categories of the U.S. population: NHW, NHAs, NHB, MAs, and OHs. The authors extracted publically available data and appended two cycles from the National Health and Nutrition Examination Survey (NHANES), 2011-2012 and 2013-2014 (National Center for Health Statistics [NCHS], 2015). Each survey period applies a complex, stratified, multistage probability cluster sampling design to obtain a nationally representative sample of the civilian, noninstitutionalized population of the United States. These surveys contain data for approximately 20,000 individuals (5,000 per year) of all ages and are generated under the auspices of the NCHS, a division of the CDC, a part of the U.S. Department of Health and Human Services. All participants read, understood, and signed informed consent forms. Separate informed consent forms were signed for participants depending on whether they participated in the interview and health examination or just the interview. For this study, the sample weight chosen was for the health examination and was designed to account for unequal probabilities of selection, account for nonresponse, and to conform to a known population distribution. Weight and height were measured in a mobile examination center using standardized techniques and equipment. BMI was calculated as weight in kilograms divided by height in meters squared (kg/m<sup>2</sup>), rounding to the nearest tenth. Detailed information concerning the data collection procedure for these cross-sectional surveys is specified at the website (NCHS, 2015).

### Description of Sample

There were 19,151 persons for the 2011-2014 cycles. The sample for this study consisted of  $N = 1,269$  adults, 20 years and older with a diagnosis of diabetes after the age of 20 years, having anthropometric measurements, and distributed as follows: self-reported 185 (14.6%) MAs, 123 (9.7%) OHs, 392 (30.9%) NHBs, 140 (11.0%) NHAs, and 429 (33.8%) NHWs. The category "Other" was not included due to its small sample size. Having a diagnosis after the age of 20 years was used as a pseudoestimate of type 2 diabetes. Type 2 diabetes is generally acquired in adulthood where the body has difficulty using insulin and is primarily attributed to lifestyle factors as opposed to type 1 diabetes where there is no production of insulin from childhood through adulthood. A fit model was defined as having a  $p$  value of  $<.05$ . In addition,  $\geq 70\%$  correct overall classification of the cases for the outcome

variable was considered a reliable estimate of adults with type 2 diabetes.

### Major Variables

The committee for NHANES selected the following four questions to assess whether medical advice was given by a physician:

To lower [your/spouse's] risk for certain diseases, during the past 12 months [have you/has she or he] ever been told by a doctor or health professional to (a) control [your/his or her] weight or lose weight? (b) increase [your/his or her] physical activity or exercise? (c) reduce the amount of sodium or salt in [your/his or her] diet? (d) reduce the amount of fat or calories in [your/his or her] diet?

To determine if health behaviors for diet and exercise were being followed, NHANES used the following questions:

To lower [your/his or her] risk for certain diseases, [are you/ is she or he] now doing any of the following: (a) controlling [your/his or her] weight or losing weight? (b) increasing [your/his or her] physical activity or exercise? (c) reducing the amount of sodium or salt in [your/his or her] diet? (d) reducing the amount of fat or calories in [your/his or her] diet?

In constructing medical advice and health behavior variables only affirmative or negative responses were counted since the percentage of persons answering "not sure" was less than 1%. BMI categories corresponded to National Institutes of Health's classification; however, there were not enough people in the underweight category so underweight was combined with normal weight. The following categories were created: underweight or normal (12-24.9 = 1), overweight (25-29.9 = 2), mild obesity (30-34.9 = 3), moderate obesity (35-39.9 = 4), and morbid obesity ( $\geq 40$ ).

### Data Analysis

Sample weights used for all data analyzed were based on the data file with the smallest sample size, the Mobile Examination Survey, and were computed using the average of the 2-year sample weights for each cycle in accordance with instructions from NCHS (2013). All data were analyzed using IBM Statistical Package for Social Sciences (IBM SPSS, version 23) with the module for complex sample design analysis. Analyses were performed considering the differential probabilities of selection and the complex sample design, with SPSS, using the Taylor series linearization. A *p* value of less than .05 (two sided) was considered statistically significant. Descriptive characteristics, medical advice, and diet/

exercise behavior were compared by sex as in percentage and 95% confidence intervals. Logistic regression models were conducted considering whether medical advice was received (dependent variable) for sex by race and sociodemographics (independent variables). To determine the odds of diet/exercise health behavior (dependent variable), logistic regression models were conducted with medical advice, sex by race, and sociodemographics as the independent variables.

### Results

Characteristics of the study population by sex are presented in Table 1. Approximately three quarters of men as compared with half of women were married or living with a partner. More men ( $n = 137$ ; 25.8%) as compared with women ( $n = 74$ ; 14.3%) completed college. There were no significant differences between the sexes in BMI, receiving diabetes education, having health care coverage, or smoking. Less than 12% of men and women had a normal BMI. Over 40% of men and women reported having diabetes education over 5 years ago or not at all. Table 2 presents medical advice and health behaviors by sex. There was no significant difference in medical advice reported for men versus women. Health behavior differed by sex only for reporting reducing fat or calories. Fewer men ( $n = 456$ ; 68.1%) as compared with women ( $n = 480$ ; 77.4%) reported changing their behavior by reducing fat or calories. Logistic regression models for medical advice received for sex by race/ethnicity are reported in Table 3. NHB women had greater odds of being told to control or lose weight as compared with NHW females, even when adjusting for BMI, diabetes education, health insurance, age, marital status, and education. There were no sex by race/ethnicity differences in told to increase physical activity or exercise; however, younger persons and persons with health insurance had higher odds of being advised. MAs and NHB had higher odds of being told to reduce sodium or salt in their diets as compared with NHW. A model for dietary advice concerning salt could not be fit with the interaction of sex by race/ethnicity. MAs had higher odds of reporting being advised to reduce fat or calories as compared with NHW. There were no significant differences in being told to reduce fat or calories for sex by race/ethnicity. The odds of performing health behaviors with the corresponding medical advice are presented in Table 4. Persons who reported receiving advice for body weight, fat/calories, and salt had higher odds of reporting following the advice as compared with those who reported not receiving the advice. A model for physical activity could not be fit. Sex or sex by race/ethnicity were not associated with following behaviors; however, NHB told to control or lose weight and reduce sodium/salt intake had higher odds of reporting engaging

**Table 1.** General Characteristics, Medical Advice, and Diet/Exercise Behavior by Sex.

Variable	Male		Female		p
	n (%)	95% CI	n (%)	95% CI	
Body mass index (kg/m <sup>2</sup> )	n = 638		n = 631		.060
<25	107 (11.9)	[9.1, 15.4]	84 (11.4)	[8.2, 15.6]	
25-29	218 (29.3)	[24.5, 34.5]	143 (22.0)	[18.6, 25.9]	
30-34.9	181 (30.6)	[24.6, 37.4]	174 (27.0)	[22.4, 32.3]	
35-39.9	63 (13.8)	[10.5, 17.9]	115 (19.0)	[14.9, 24.0]	
≥40	69 (14.5)	[10.1, 20.5]	115 (20.5)	[16.6, 25.1]	
Diabetes education	n = 635		n = 630		.732
≤2 Years	297 (42.5)	[36.9, 48.3]	289 (45.1)	[40.1, 50.1]	
2-5 Years	62 (11.5)	[7.6, 17.0]	65 (11.4)	[7.6, 16.7]	
>5 Years or never	276 (46.0)	[39.2, 53.0]	276 (43.5)	[39.4, 47.8]	
Covered by health insurance	n = 638		n = 631		.976
Yes	551 (88.3)	[85.2, 90.9]	545 (88.3)	[84.4, 91.3]	
Current smoker	n = 638		n = 631		.698
Yes	109 (14.2)	[10.6, 18.8]	90 (15.6)	[11.4, 20.9]	
Education	n = 635		n = 631		.003
<High school (no diploma)	200 (22.4)	[17.5, 28.1]	236 (27.1)	[21.8, 33.1]	
High school graduate or GED	135 (22.7)	[17.4, 29.1]	151 (26.1)	[21.2, 31.8]	
Some college	163 (29.1)	[23.8, 35.1]	170 (32.5)	[28.0, 37.3]	
College graduate or above	137 (25.8)	[20.4, 32.0]	74 (14.3)	[10.3, 19.6]	
Married or partnered <sup>a</sup>	n = 637		n = 630		<.001
Yes	436 (73.5)	[67.8, 78.6]	276 (50.1)	[46.2, 54.0]	

Note. CI = confidence interval. The test of independence was analyzed by complex sample analysis. Results are the percentage of the population and the 95% CIs using the inclusion criteria for adults having diabetes and anthropometrics. Sample numbers are for the unweighted sample; however, sample weights were applied using complex sample analyses:  $\chi^2$  for categorical variables with the adjusted Wald *F* statistic to test significance and univariate statistics for age (mean age in years: males, 60.9 [59.5, 62.2] and females, 60.4 [59.4, 61.5]).

<sup>a</sup>Married or partnered was created by combining the two categories for "yes" and other marital status (widowed, divorced, single) was considered as "currently single."

in the behavior. Between one quarter and one third of persons who were not given medical advice currently followed the corresponding health behavior (Table 5).

## Discussion

Diabetes is a metabolic disease and its management requires changes in dietary and physical activity behaviors (American Diabetes Association, 2016). Medical advice is a critical component of diabetes self-management (Norris, Engelgau, & Venkat-Narayan, 2001). Despite this fact, over 30% of men and women with diabetes reported not receiving medical advice for following these essential diet and physical activity recommendations. This study observed the relationship among sex by race/ethnicity, medical advice, and medical behavior for persons with diabetes. After adjusting for sociodemographics, there were differences by sex race/ethnicity in reporting having received medical advice to follow key dietary guidelines. These findings indicate a disadvantage for men with diabetes who were not given key recommendations for diabetes self-management. This issue may be due, in part, to differences by sex in access to health care.

Men were reported to delay seeking medical attention for symptoms based on a review of sex differences in health utilization (Galdas, Cheater, & Marshall, 2005). The likelihood of receiving dietary medical advice might increase with frequency of physician visits.

NHB women had higher odds of being given medical advice to control or lose weight compared with NHW females and MAs had higher odds of being told to reduce fat or calories as compared with NHWs in the current study. Differences in race/ethnicity in reporting being given dietary medical advice for a representative sample of the United States population with diabetes was reported, previously (Vaccaro & Huffman, 2012); however, sex by race/gender was not reported and data for two racial/ethnic groups: OHs and Asian Americans were not available. The earlier study's results were in contrast to the current study; in that, Black non-Hispanics and MAs had higher odds of being told to reduce fat or calories and to increase physical activity or exercise as compared with NHWs and there were no significant differences by race/ethnicity in being told to control or reduce weight (Vaccaro & Huffman, 2012).

**Table 2.** General Responses of Receiving Medical Advice and Current Health Behavior by Sex.

Variable	Male		Female		p
	n (%)	95% CI	n (%)	95% CI	
Told to control or lose weight	n = 638		n = 631		.785
Yes	352 (63.2)	[57.0, 68.9]	393 (62.1)	[56.2, 67.7]	
Told to increase physical activity or exercise	n = 638		n = 631		.489
Yes	417 (68.1)	[61.9, 73.7]	445 (70.7)	[66.2, 74.9]	
Told to reduce amount of sodium or salt in diet	n = 636		n = 631		.611
Yes	361 (55.2)	[48.5, 61.6]	370 (53.0)	[48.1, 57.9]	
Told to reduce amount of fat or calories in diet	n = 638		n = 631		.281
Yes	361 (59.6)	[53.3, 65.5]	411 (64.1)	[58.0, 69.9]	
Now controlling or losing weight	n = 638		n = 631		.886
Yes	486 (75.2)	[69.4, 80.2]	476 (75.7)	[72.3, 78.7]	
Now increasing physical activity or exercise	n = 638		n = 631		.155
Yes	446 (67.2)	[2.1, 71.9]	398 (62.3)	[57.3, 66.9]	
Now reducing amount of sodium or salt in diet	n = 638		n = 631		.519
Yes	464 (68.4)	[63.3, 73.1]	444 (65.4)	[58.6, 71.6]	
Now reducing amount of fat or calories in diet	n = 638		n = 630		.004
Yes	456 (68.1)	[62.3, 73.4]	480 (77.4)	[71.6, 82.2]	

Note. CI = confidence interval.

Being told by a physician to control or lose weight, reduce fat or calories, or reduce salt/sodium in the diet was associated with the corresponding behavior, adjusting for sociodemographics; however, BNH had greater odds of reporting currently controlling or losing weight and reducing salt/sodium as compared with NHW. These results are in agreement with an earlier study where being given medical advice was associated with engaging in the behavior for a U.S. representative sample of persons with diabetes (Vaccaro et al., 2012) with several caveats: There were no differences in reporting currently engaging in the health behavior by race/ethnicity, data were not available for OHs and Asian Americans; models with sex by race/ethnicity were presented, data for salt/sodium intake were not available, and those who reported not receiving medical advice and were currently following dietary and physical activity recommendations were subtracted from the analysis. In the current study, although being told by a health professional increased the odds of following the recommendation, there were over 20% of those reporting not receiving the medical advice that were presently doing the health behaviors. There are several environmental influences of health information for persons with diabetes other than medical advice received from health professionals (physicians and/or diabetes educators) such as family, friends, government and organizational websites, and other nonevidence-based media. A total of 59% of adults refer to the Internet for medical advice (Fox, 2011).

Over 30% of men in this study reported that they were not told to control or lose weight or to increase physical

activity, yet both of these lifestyle modifications are necessary to manage diabetes for all levels of BMI. Individuals with type 2 diabetes with an excess of body fat, which interferes in their metabolic processes, are likely to be misclassified as normal weight by BMI (Cetin, Lessig, & Nasr, 2016). In particular, Asian Americans are likely to be misclassified (Hsu et al., 2015). There were sex differences in diabetes complications at increased BMI; men with obesity were at greater risk of developing renal, cardiovascular, ocular, and lower extremity complications than women at the same BMI (Gray, Picone, Sloan, & Yashkin, 2015).

Another reason why physicians are an important source of guidance for persons with diabetes is that not all people receive formal diabetes education training. Nearly half (44.7%) of the sample population in this study reported receiving diabetes education more than 5 years ago or never (55.3% received recent diabetes education). These results parallel a large cohort of adults with diabetes from 17 countries, where only 48.8% of respondents had participated in diabetes education (Nicolucci et al., 2013). The goal of the Office of Disease Prevention and Health Promotion (2016) is to raise the rate of adults with diabetes receiving diabetes education to 62.5%.

### Limitations

This study was limited by cross-sectional data and causality cannot be assumed. Medical advice was self-reported and may be limited by recall bias. Participants' recall of receiving advice could be due to the physician's ability to communicate

**Table 3.** Logistic Regression Models Assessing Sex by Race/Ethnicity With Dietary and Exercise Medical Advice.

Variables	OR [95% CI]	p
<i>Model 1: Told to control or lose weight</i>		
Male	—	.763
Race/ethnicity	—	.267
Sex by race/ethnicity	—	.020
Mexican American males	0.90 [0.48, 1.70]	.743
Other Hispanic males	1.55 [0.61, 3.96]	.349
Non-Hispanic Black males	1.28 [0.64, 2.55]	.468
Non-Hispanic Asian males	1.20 [0.60, 2.40]	.602
Non-Hispanic White males	1.81 [0.98, 3.36]	.056
Mexican American females	1.92 [0.83, 4.47]	.125
Other Hispanic females	1.40 [0.62, 3.20]	.407
Non-Hispanic Black females	2.51 [1.45, 4.34]	.002
Non-Hispanic Asian females	0.72 [0.32, 1.64]	.426
Non-Hispanic White females (reference)	1.00	—
Body mass index, kg/m <sup>2</sup>		<.001
<25	0.04 [0.02, 0.12]	<.001
25-29.9	0.18 [0.08, 0.39]	<.001
30-34.9	0.91 [0.46, 1.79]	.769
35-39.9	1.23 [0.48, 3.12]	.657
≥40 (reference)	1.00	—
Diabetes education, years	—	.018
≤2	1.76 [1.21, 2.57]	.005
>2-5	1.01 [0.52, 1.97]	.965
>5 or never	1.00	—
Health insurance (yes)	1.31 [0.85, 2.02]	.213
Current smoker (yes)	0.73 [0.41, 1.30]	.277
Age (years)	0.97 [0.95, 0.98]	<.001
Married/partnered	1.25 [0.86, 1.80]	.228
Education	—	.012
<High school (no diploma)	0.81 [0.41, 1.60]	.541
High school graduate or GED	0.42 [0.23, 0.78]	.007
Some college	0.75 [0.42, 1.36]	.334
College graduate or above (reference)	1.00	—
Model fit: Wald $F(22, 11) = 21.2$ , $p < .001$ . Pseudo $R^2$ , Nagelkerke = 0.379; overall classification = 75.9%		
<i>Model 2: Told to increase physical activity or exercise</i>		
Male	—	.861
Race/ethnicity	—	.173
Sex by race/ethnicity	—	.114
Body mass index, kg/m <sup>2</sup>	—	<.001
<25	0.13 [0.06, 0.25]	<.001
25-29.9	0.22 [0.10, 0.47]	<.001
30-34.9	0.57 [0.27, 1.21]	.137
35-39.9	0.76 [0.34, 1.69]	.489
≥40 (reference)	1.00	—
Diabetes education	—	.401
Health insurance (yes)	1.97 [1.25, 3.11]	.005
Current smoker (yes)	0.70 [0.46, 1.06]	.092
Age (years)	0.98 [0.96, 0.99]	.002
Married/partnered	1.23 [0.90, 1.70]	.190
Education	—	.810
Model fit: Wald $F(22, 11) = 9.68$ , $p < .001$ . Pseudo $R^2$ , Nagelkerke = 0.186; overall classification = 72.4%		

(continued)



**Table 3. (continued)**

Variables	OR [95% CI]	p
<i>Model 3: Told to reduce sodium or salt in diet</i>		
Male	1.30 [0.96, 1.76]	.089
Race/ethnicity	—	.001
Mexican American	1.77 [1.16, 2.69]	.009
Other Hispanic	1.56 [0.88, 2.78]	.124
Non-Hispanic Black	2.01 [1.42, 2.84]	<.001
Non-Hispanic Asian	1.23 [0.77, 1.96]	.379
Non-Hispanic White (reference)	1.0	—
Body mass index, kg/m <sup>2</sup>	—	.003
<25	0.24 [0.12, 0.45]	<.001
25-29.9	0.31 [0.16, 0.58]	.001
30-34.9	0.57 [0.38, 0.87]	.010
35-39.9	0.67 [0.36, 1.25]	.199
≥40 (reference)	1.00	—
Diabetes education	—	.146
Health insurance (yes)	1.07 [0.70, 1.64]	.758
Current smoker (yes)	1.19 [0.77, 1.83]	.423
Age (years)	1.02 [1.01, 1.03]	.003
Married/partnered	0.82 [0.55, 1.21]	.297
Education	—	.082
Model fit: Wald $F(22, 11) = 3.10$ , $p = .016$ . Pseudo $R^2$ , Nagelkerke = 0.107; overall classification = 63.3%		
<i>Model 4: Told to reduce fat or calories in diet</i>		
Male	0.99 [0.52, 1.87]	.968
Race/ethnicity	—	.036
Mexican American	2.50 [1.05, 5.96]	.039
Other Hispanic	2.29 [0.98, 5.39]	.056
Non-Hispanic Black	1.82 [0.96, 3.44]	.066
Non-Hispanic Asian	1.23 [0.62, 2.45]	.546
Non-Hispanic White (reference)	1.00	—
Sex by race/ethnicity	—	.377
Body mass index, kg/m <sup>2</sup>	—	<.001
<25	0.08 [0.04, 0.20]	<.001
25-29.9	0.21 [0.11, 0.41]	<.001
30-34.9	0.44 [0.24, 0.80]	.009
35-39.9	0.73 [0.34, 1.56]	.403
≥40 (reference)	1.00	—
Diabetes education	—	.376
Health insurance (yes)	1.21 [0.79, 1.85]	.360
Current smoker (yes)	0.72 [0.34, 1.56]	.136
Age (years)	0.98 [0.97, 1.00]	.070
Married/partnered	1.24 [0.84, 1.83]	.273
Education	—	.037
<High school (no diploma)	0.70 [0.47, 1.03]	.069
High school graduate or GED	0.56 [0.35, 0.91]	.020
Some college	0.56 [0.37, 0.85]	.008
College graduate or above (reference)	1.00	—
Model fit: Wald $F(22, 11) = 5.44$ , $p = .003$ . Pseudo $R^2$ , Nagelkerke = 0.208; overall classification = 70.1%		

Note. OR = odds ratio; CI = confidence interval. Model 3 could not be fit with the interaction of sex by race/ethnicity. Classification of overall cases is less than 70% (63.3%) and the model may not have adequate power. In Model 4, race/ethnicity was significant with or without the interaction.

(cultural competency) and the patient's attributes and socio-cultural barriers (patient-provider relationship) which were

not measured in this study. Cultural competency has been defined as an evolving process of awareness and skills that

**Table 4.** Logistic Regression Models Assessing Medical Advice With Behaviors.

Variable	OR [95% CI]	p
<i>Model 1: Told to control or lose weight with currently controlling or losing weight</i>		
Told to control or lose weight	2.92 [1.88, 4.53]	<.001
Male	0.80 [0.56, 1.15]	.229
Race/ethnicity	—	.049
Mexican American	1.32 [0.82, 2.14]	.245
Other Hispanic	1.12 [0.60, 2.11]	.709
Non-Hispanic Black	1.80 [1.25, 2.59]	.002
Non-Hispanic Asian	1.29 [0.68, 2.46]	.427
Non-Hispanic White (reference)	1.00	—
Body mass index, kg/m <sup>2</sup>	—	.273
Diabetes education	—	.461
Health insurance (yes)	0.64 [0.34, 1.20]	.160
Current smoker (yes)	0.87 [0.55, 1.38]	.546
Age (years)	0.99 [0.97, 1.00]	.162
Married/partnered	1.28 [0.85, 1.93]	.234
Education	—	.105
Model fit: Wald $F(19, 14) = 4.72$ , $p = .002$ . Pseudo $R^2$ , Nagelkerke = 0.121; classification = 76.2%		
<i>Model 2: Told to reduce fat or calories and currently reducing fat or calories</i>		
Told to reduce fat or calories	5.75 [3.75, 8.31]	<.001
Male	0.49 [0.32, 0.74]	.001
Race/ethnicity	—	.610
Body mass index, kg/m <sup>2</sup>	—	.001
<25	1.22 [0.58, 2.59]	.588
25-29.9	2.22 [1.42, 3.48]	.001
30-34.9	1.88 [1.07, 3.29]	.029
35-39.9	2.89 [1.22, 6.83]	.017
≥40 (reference)	1.00	—
Diabetes education	—	.341
Health insurance (yes)	0.98 [0.49, 1.94]	.950
Current smoker (yes)	0.95 [0.57, 1.59]	.884
Age (years)	1.00 [0.98, 1.01]	.530
Married/partnered	1.46 [1.00, 2.14]	.050
Education	—	<.001
<High school (no diploma)	0.26 [0.16, 0.44]	<.001
High school graduate or GED	0.23 [0.13, 0.43]	<.001
Some college	0.43 [0.28, 0.66]	<.001
College graduate or above (reference)	1.00	—
Model fit: Wald $F(19, 14) = 19.2$ , $p < .001$ . Pseudo $R^2$ , Nagelkerke = 0.273; classification = 76.5%		
<i>Model 3: Told to reduce sodium or salt and currently reducing sodium or salt</i>		
Told to reduce sodium or salt	6.48 [4.76, 8.83]	<.001
Male	1.04 [0.65, 1.65]	.882
Race/ethnicity	—	.006
Mexican American	1.32 [0.74, 2.35]	.328
Other Hispanic	2.14 [1.40, 3.28]	.810
Non-Hispanic Black	2.14 [1.40, 3.28]	.001
Non-Hispanic Asian	1.69 [1.09, 2.64]	.020
Non-Hispanic White (reference)	1.00	—
Body mass index, kg/m <sup>2</sup>	—	.530
Diabetes education	—	.861
Health insurance (yes)	0.70 [0.44, 1.14]	.149
Current smoker (yes)	0.94 [0.58, 1.50]	.776
Age (years)	1.04 [0.65, 1.65]	.351
Married/partnered	1.32 [0.91, 1.089]	.136
Education	—	.779
Model fit: Wald $F(19, 14) = 11.9$ , $p < .001$ . Pseudo $R^2$ , Nagelkerke = 0.249; classification = 71.3%		

Note. OR = odds ratio; CI = confidence interval. Model 4: Told to increase physical activity or exercise could not be fit.

**Table 5.** Reported Not Given Medical Advice and Currently Following Health Behaviors.

Medical advice not received	Currently doing health behavior		
	Sample population; percentage [95% CI]	Males	Females
	<i>N</i> = 1,268	<i>N</i> = 637	<i>N</i> = 631
Controlling or losing weight	<i>n</i> = 328; 30.9 [26.7, 35.5]	<i>n</i> = 180; 29.1 [22.9, 36.2]	<i>n</i> = 148; 32.6 [26.3, 39.7]
	<i>N</i> = 1,267	<i>N</i> = 637	<i>N</i> = 630
Reducing fat or calories	<i>n</i> = 265; 26.9 [23.0, 31.3]	<i>n</i> = 141; 26.3 [19.5, 34.5]	<i>n</i> = 124; 27.5 [22.3, 33.3]
	<i>N</i> = 1,267	<i>N</i> = 636	<i>N</i> = 631
Reducing sodium or salt	<i>n</i> = 269; 31.5 [27.2, 36.0]	<i>n</i> = 138; 29.4 [23.2, 36.4]	<i>n</i> = 131; 33.6 [28.5, 39.0]
	<i>N</i> = 1,269	<i>N</i> = 638	<i>N</i> = 631
Increasing physical activity or exercise	<i>n</i> = 218; 24.3 [20.1, 29.0]	<i>n</i> = 134; 26.1 [20.9, 32.1]	<i>n</i> = 84; 22.4 [16.2, 30.0]

Note. CI = confidence interval. Percentage for the cross-tabulation of advice by behavior is based on the adjusted *F* with its degrees of freedom (variant of the second-order Rao–Scott adjusted chi-square statistic). Advice by behavior is statistically significant for the sample population ( $p < .001$ ); differences by sex are not determined for subpopulations by this method; however, the CIs suggest no significant differences by sex.

incorporate values, principles, behaviors, attitudes, and policies of effective cross-cultural relationships (Cross, Bazron, Dennis, & Isaacs, 1989). Patient–provider relationship is related to the physician's cultural competence and the health beliefs of the patient. Adherence to medical recommendations has been associated with the patient's experiences and perception of medical care (Griffith, Allen, & Gunter, 2011). The degree to which the participants were motivated to follow the recommendation may have to do with perceived credibility of the source and trust that the advice is doable. A confounding factor in following medical advice may be self-efficacy. Psychosocial factors such as self-efficacy and degree of perceived control over the environment were determinants of high fitness level for Finnish men (Kaasalainen et al., 2015). The health information received from the media, family, and friend may have contradicted the advice of the physician. For example, the Mediterranean Diet encourages the consumption of healthy fat, while the advice for persons with diabetes is to lower fat intake. Level of trust of the health information received was not measured. Griffith et al. (2012) indicated that African American men were more inclined to engage in health behavior if they believe the credibility of the source. Another factor that can alter how medical advice is received is social support. Although being partnered/married versus living alone was measured, this is a proxy measure of social support at best. Social support was a critical factor in health and motivation to follow medical guidance for African American men (Griffith et al., 2012).

### Implications for Clinical Practice

Preventative care for persons with diabetes requires that the physician is culturally competent and able to demonstrate

good communication with patients regardless of their sex or race/ethnicity. Physician's normative health beliefs concerning sex and race/ethnicity may influence their management plan for adults with diabetes (van Ryan & Fu, 2003). Despite the recommendation by the American Diabetes Association (2016) that all persons with diabetes be given key dietary and physical activity advice, over 30% reported not receiving this advice. In fact, men and women whose BMI's were in the normal or overweight category were less likely to report being make changes in their weight, fat intake, salt/sodium intake, or physical activity as compared with those with BMI's in the obese category (Table 4). Patient–physician communication was a confounder in this study when considering receiving medical advice by men and women and by race/ethnicity. Reporting having received medical advice could be a factor of whether the message was delivered as intended. The degree of cultural competency of the physician would affect effective delivery of the recommendation (Goode & Jones, 2009; Griffith et al., 2011).

### Conclusion

For this study, NHB women were more likely to report being given advice for an essential diabetes management skill: to control or lose weight than other sex by race/ethnicity group. Men and women with diabetes, who reported that they were given medical advice for specific dietary changes, were more likely to perform the behavior as compared with those reporting not receiving the advice, adjusting for sociodemographics. Since the advice and behaviors were by self-report, it was not possible to determine if the message was not given or if it

was ineffectively delivered. These results suggest that effective dietary diabetes self-management given by physicians was associated with men and women's engagement in the corresponding health behaviors. Furthermore, since over 40% of adults with diabetes are not receiving current diabetes education, physician-delivered dietary medical advice for diabetes self-management has the potential to become an essential component in reducing diabetes complications.

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