

# The Influence of Treatment Modality and Ethnicity on Attitudes in Type 2 Diabetes

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**OBJECTIVE** — The study examines diabetes attitude differences by treatment modality (insulin vs. no insulin), race/ethnicity, and the interaction of these two variables for people with type 2 diabetes.

**RESEARCH DESIGN AND METHODS** — Data were collected with the Diabetes Care Profile (DCP), an instrument that assesses psychosocial factors related to diabetes. Participants ( $n = 672$ ) were recruited in the metropolitan Detroit, Michigan, area from 1993 to 1996. A total of 68% of these participants were African-Americans with type 2 diabetes, and 32% were Caucasians with type 2 diabetes. Analyses of covariance were performed to examine the effects of race/ethnicity, treatment, and their interaction for each DCP scale.

**RESULTS** — The four patient categories (two ethnicities by two treatment modalities) differed by age, years with diabetes, education, and sex distribution. Treatment modality had a significant effect on 6 of the 16 DCP scales (Control, Social and Personal Factors, Positive Attitude, Negative Attitude, Self-Care Ability, and Exercise Barriers). Ethnicity was a significant effect for three scales (Control, Support, and Support Attitudes). The interaction of race/ethnicity and treatment modality was a significant effect for two related attitude scales (Positive Attitude and Negative Attitude).

**CONCLUSIONS** — The results suggest that attitudes toward diabetes are similar for African-American and Caucasian patients with type 2 diabetes. The results also suggest that treatment modality has a greater effect on attitudes than either race/ethnicity or the interaction effect. However, Caucasian patients using insulin differed from the other patient groups by having the least positive and the most negative attitudes regarding diabetes.

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Diabetes is a serious disease in the U.S. population and is more prevalent in older adults and in minorities. Fortunately, many complications from diabetes can be avoided or delayed with proper management. Diabetes is foremost a self-managed disease; treatment and prevention of acute and long-term complications are largely a function of the patient's decisions on a daily basis. Because patients deliver

most of their own diabetes care, understanding the factors that affect self-management behavior is important, including health attitudes and treatment modality. The relationship of patient attitudes and patient behavior has been central in both the health belief model (1) and in the theory of reasoned action (2). Several studies have also demonstrated the importance of patients' attitudes and beliefs on health behavior.

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Abbreviations: DCP, Diabetes Care Profile.

A table elsewhere in this issue shows conventional and Système International (SI) units and conversion factors for many substances.

McCord and Brandenburg (1) found that type 2 patients described as “noncompliant” were more likely to believe that diabetes would not affect their life outcomes. The patient's confidence in modern medicine has been found to be a factor in patient response to treatment recommendations (2,3). Several studies have investigated factors that influence patient attitudes. Dietrich (4) interviewed seven type 2 diabetic patients and suggested that physician attitude at the time of diagnosis was critical in patients' attitudes about the seriousness of diabetes and patients' subsequent self-management behavior. Similarly, Hunt et al. (5) found that patient attitudes toward insulin therapy were influenced by a patient's interaction with health professionals as well as personal experience and observation.

Patient beliefs, attitudes, and behaviors are influenced by cultural and socioeconomic factors (6). The relationship of culture to health beliefs, attitudes, and behavior is especially important in the treatment of diabetes, which usually involves changing patterns of eating, physical activity, and other culturally embedded behaviors. If diabetes treatment recommendations are to be effective, then they must be sensitive and relevant to the culture of the people who are expected to carry them out (7). This study examines attitude differences among treatment modalities and ethnic groups. In two previous studies assessing the psychosocial factors related to diabetes for people with type 2 diabetes, we found that attitudes differed between patients using insulin and patients not using insulin (8) but not between African-American and Caucasian patients (9). In both studies, the Diabetes Care Profile (DCP) was used to measure diabetes attitudes. The DCP is a valid and reliable instrument that assesses social and psychological factors related to diabetes and its treatment (10). In a study focusing on the appropriateness of the DCP for the African-American population with diabetes, a two-way analysis of variance for each scale suggested that the use of insulin in the treatment of diabetes had a greater effect on patient attitudes than ethnic background did (9). Furthermore, the results of several scales indicated a signifi-

Table 1—Scoring and sample items for the Diabetes Care Profile scales

Diabetes Care Profile scale	Scoring		Items (n)	Sample item
	Good	Poor		
Control	1	5	19	During the past year, how often have you had changes in your blood sugar (too high) because you were sick or had an infection?
Social and Personal Factors	1	5	13	How often has your diabetes kept you from doing your normal daily activities during the past year?
Positive Attitude	5	1	5	I feel satisfied with my life.
Negative Attitude	1	5	6	I am afraid of my diabetes.
Self-Care Ability	5	1	4	I am able to keep my blood sugar in good control.
Importance of Care	5	1	4	I think it is important for me to keep my blood sugar in good control.
Self-Care Adherence	5	1	4	I keep my blood sugar in good control.
Diet Adherence	5	1	4	(If told to diet) How often do you follow a meal plan or diet?
Medical Barriers	1	5	8	How often do you change the timing and/or dose of your insulin or diabetes pills because you missed an earlier dose?
Exercise Barriers	1	5	5	How often do you have trouble getting enough exercise because you are too busy?
Monitoring Barriers	1	5	11	When you don't test for sugar as often as you have been told, how often is it because you forgot?
Understanding Management Practice	5	1	10	How do you rate your understanding of diet and blood sugar control?
Long-Term Care Benefits	5	1	5	Taking the best possible care of diabetes will delay or prevent eye problems.
Support Needs	5	1*	6	I want a lot of help and support from my family and friends in following my meal plan.
Support	5	1	6	My family and friends help and support me a lot to follow my meal plan.
Support Attitudes	5	1	6	My family and friends accept me and my diabetes.

\*No preferred score exists for the Support Needs scale because the scale is an assessment (5 = needing more support and 1 = needing less support).

cant interaction effect between insulin use and race/ethnicity (i.e., the joint effect of insulin use and race/ethnicity had a significant influence on several scales). However, that study did not control for demographic differences between the different ethnic groups. In another study, we compared quality-of-life measures for patients with diabetes. In that study, insulin use was also found to have a significant negative influence on several scales of the DCP (8). Unfortunately, this study included few non-Caucasians, which prevented comparisons by race/ethnicity.

The present study addresses a question that arose from the two preceding studies: What is the influence of race/ethnicity, treatment modality, and their interaction (i.e., the joint effect of race/ethnicity and treatment modality) on the attitudes of patients with type 2 diabetes? Our previous studies did not specifically examine the influence of race/ethnicity and treatment modality on diabetes attitudes and certainly not did control for possible intervening factors. This study focuses on these likely attitudinal influences by asking the following research question: Do attitudes toward diabetes as measured by the 16 scales of the DCP differ by diabetes treatment modality and race/ethnicity?

## RESEARCH DESIGN AND METHODS

### The DCP

Data were collected using the DCP, which is an instrument that assesses social and psychological factors related to diabetes and its treatment (10). The DCP is a self-administered questionnaire specific to diabetes. The instrument has 234 items in seven sections and includes questions concerning demographic information and self-care practices. The questionnaire can be completed in ~30–40 min. A total of 16 DCP scales assess an individual's diabetes attitudes (e.g., the Positive Attitude and the Support Attitudes scales), diabetes beliefs (e.g., the Importance of Care and the Long-Term Care Benefits scales), reported diabetes self-management barriers (e.g., the Self-Care Adherence and the Diet Adherence scales), and the difficulties of diabetes self-management (e.g., the Medical Barriers and the Exercise Barriers scales). A sample item from each scale, the scoring ranges, the interpretation of the end points, and the number of items for 16 DCP scales are provided in Table 1.

### Sample

Participants were recruited from six locations in the metropolitan Detroit, Michigan,

area: a suburban endocrinology clinic, two urban endocrinology clinics, an urban diabetes clinic, a suburban private practice, and an urban diabetes educational program (n = 771). Data were collected from June 1993 to January 1996. While waiting for scheduled appointments, adult clinic patients were asked whether they had diabetes. Those patients with diabetes were asked to complete the DCP. The overall response rate was 66%; among the six sites, the rates ranged from 56 to 79%. For this study, the sample was limited to patients who indicated that they were either African-American or Caucasian and had type 2 diabetes (n = 672).

### Statistical methods

Pearson's  $\chi^2$  was used to determine differences in sex distribution and education level among the four patient groups: African-Americans using insulin, African-Americans not using insulin, Caucasians using insulin, and Caucasians not using insulin. Differences in age and years with diabetes were determined between treatment modality and ethnic group by analysis of variance.

To determine whether scale scores differed among the six recruitment sites, an analysis of variance was performed for each scale with a Bonferroni adjustment for mul-

Table 2—Demographics of participants with type 2 diabetes by race/ethnicity and treatment modality

	African-Americans		Caucasians		P
	Using insulin	Not using insulin	Using insulin	Not using insulin	
n	246	211	103	112	—
Women	138 (60)	119 (59)	65 (66)	49 (47)	0.04
Age (years)	61.9 ± 12.3 (20–84)	61.4 ± 11.8 (16–84)	63.2 ± 14.7 (18–87)	66.1 ± 10.2 (37–88)	<0.01*
Years since diagnosis	14.3 ± 9.5	9.1 ± 7.5	15.8 ± 8.5	10.6 ± 8.8	<0.01†
Years of formal education					
≤8	21	22	21	13	0.04
9–11	21	25	13	21	
12	28	28	33	41	
13–15	23	14	21	15	
≥16	7	11	12	10	

Data are n, n (%), means ± SD (ranges), or %. \*Caucasians not using insulin differed from both African-American groups; †participants not using insulin differed from participants using insulin.

multiple statistical tests ( $P = 0.003$ ). Site scale scores were examined within race/ethnicity (African-American and Caucasian) and treatment modality (using insulin and not using insulin).

Analyses of covariance were performed to examine the effects of race/ethnicity (African-American and Caucasian), treatment modality (using insulin and not using insulin), and the interaction of race/ethnicity and treatment modality for each DCP scale. In this study, the analysis of covariance controlled for the covariates of age, years with diabetes, years of formal education, and sex distribution. The subgroups differed substantially regarding these characteristics. Thus, the DCP scale scores required adjustment to make unbiased comparisons between treatment modalities and ethnic groups. When a significant interaction effect was indicated, a post hoc F test was performed with the adjusted means ( $P \leq 0.05$ ).

## RESULTS

### Demographics

The study population had an average age of  $63 \pm 12$  years, and most participants were women (58%). A total of 68% of the participants were African-American, and 32% were Caucasian. Of the participants, 52% were treating their diabetes with insulin.

The four patient groups differed demographically (Table 2). In three of the four patient categories, most of the participants were women. Caucasians not using insulin were significantly older than patients in the other patient categories. Patients using insulin had diabetes of a longer duration.

Finally, the years of formal education were different among the patient categories. Insulin users were more likely to have a higher level of education ( $\geq 13$  years) than patients not using insulin. Caucasians also had more years of formal education than African-Americans.

Although participants were recruited from six sites, no statistically significant difference was indicated for any of the 16 DCP scales by site within treatment modality and race/ethnicity.

### Effects of race/ethnicity, diabetes treatment modality, and their interaction

Table 3 presents a summary of the analysis of covariance for each DCP scale. These analyses focused on the main effects of race/ethnicity, treatment modality, and their interaction while controlling for sex, age, years with diabetes, and education. The Adjusted Means column in Table 3 provides the scale means for each patient group after controlling for sex, age, years with diabetes, and education. The  $R^2$  column provides a measure of the amount of variance explained by the analysis of covariance model (i.e., the amount of variance by race/ethnicity, treatment modality, and their interaction). The Source of Variation column indicates the three sources of variation within the model (race/ethnicity, treatment modality, and their interaction) and whether each source had a significant effect on the scale (as determined by the P value). Ethnicity and treatment modality are referred to as the "main effects" of the model, and the "interaction effect" refers to the interaction of race/ethnicity and treatment modality.

To better explain Table 3, we describe the results for the Control scale in more detail. The Control adjusted means show that African-Americans not using insulin had the fewest control problems (1.81) followed by Caucasians not using insulin (1.89) and African-Americans using insulin (1.92). Caucasians using insulin had the most control problems (2.14). The  $R^2$  column indicates that race/ethnicity, treatment modality, and their interaction can explain 15% of the variance in the Control scale. Both race/ethnicity ( $P = 0.032$ ) and treatment modality ( $P = 0.014$ ) were significant in explaining the variance in the Control scale. The interaction effect did not have a significant influence.

Treatment modality was a significant main effect for the Social and Personal Factors scale, the Self-Care Ability scale, and the Exercise Barriers scale. Ethnicity was the only significant main effect for the Support scale and the Support Attitudes scale. For both the Positive Attitude scale and the Negative Attitude scale, treatment modality and the interaction of race/ethnicity and treatment were significant effects. For the remaining scales, no significant main or interaction effects were evident.

### Post hoc tests for the Positive Attitude and Negative Attitude scales

The interaction of race/ethnicity and treatment was a significant effect for both the Positive Attitude and the Negative Attitude scales. For the Positive Attitude scale, post hoc tests indicated that Caucasians using insulin had lower scores than African-Americans using insulin and Caucasians not using

Table 3—Analysis of covariance of the Diabetes Care Profile scales

Scale	Treatment (adjusted means)		Significance of source of variation (P)			R <sup>2</sup> (P)
	Insulin using	No insulin	Ethnicity	Treatment	Ethnicity and treatment	
Control						
African-Americans	1.92	1.81	0.032	0.014	0.324	0.15 (<0.001)
Caucasians	2.14	1.89				
Social and Personal Factors						
African-Americans	2.60	2.41	0.871	<0.001	0.267	0.12 (<0.001)
Caucasians	2.67	2.32				
Positive Attitude						
African-Americans	3.15	3.11	0.940	0.035	0.006	0.03 (0.008)
Caucasians	2.95	3.30				
Negative Attitude						
African-Americans	2.49	2.39	0.308	0.001	0.033	0.08 (<0.001)
Caucasians	2.72	2.31				
Self-Care Ability						
African-Americans	3.03	3.22	0.445	0.001	0.391	0.05 (0.001)
Caucasians	2.91	3.22				
Importance of Care						
African-Americans	4.35	4.41	0.501	0.048	0.241	0.01 (0.400)
Caucasians	4.24	4.44				
Self-Care Adherence						
African-Americans	3.24	3.28	0.420	0.135	0.297	0.03 (0.013)
Caucasians	3.11	3.30				
Diet Adherence						
African-Americans	2.93	2.85	0.858	0.311	0.857	0.02 (0.350)
Caucasians	2.93	2.82				
Medical Barriers						
African-Americans	1.34	1.36	0.986	0.749	0.471	0.05 (0.004)
Caucasians	1.38	1.32				
Exercise Barriers						
African-Americans	2.11	1.93	0.164	0.007	0.442	0.07 (<0.001)
Caucasians	2.29	1.98				
Monitoring Barriers						
African-Americans	1.53	1.48	0.219	0.614	0.831	0.04 (0.113)
Caucasians	1.44	1.42				
Understanding Management Practice						
African-Americans	3.37	3.53	0.975	0.508	0.267	0.08 (<0.001)
Caucasians	3.47	3.43				
Long-Term Care Benefits						
African-Americans	4.40	4.30	0.588	0.916	0.113	0.03 (0.028)
Caucasians	4.25	4.37				
Support Needs						
African-Americans	3.54	3.37	0.391	0.079	0.711	0.04 (0.025)
Caucasians	3.49	3.23				
Support						
African-Americans	3.79	3.65	0.003	0.187	0.937	0.03 (0.048)
Caucasians	3.49	3.36				
Support Attitudes						
African-Americans	3.90	4.02	0.043	0.080	0.874	0.03 (0.015)
Caucasians	3.79	3.89				

Data are adjusted means, P, or R<sup>2</sup> (P). Scale means were adjusted for the covariates.

insulin (i.e., Caucasians using insulin were less positive about their diabetes than the other two patient groups). The post hoc tests for the Negative Attitude scale were

similar. Caucasians using insulin were more negative about their diabetes than both of the African-American patient groups and the Caucasians not using insulin.

**CONCLUSIONS** — Several study limitations must be considered when interpreting these results. First, this is a cross-sectional study; the data cannot

address attitudinal changes within patients over time. A second limitation is the fact that the study recruited from six sites. Although we did not find differences in the DCP scales among the sites, differences may exist that were not identified in our analysis. Finally, the African-Americans and Caucasians with type 2 diabetes differed demographically, which makes comparisons difficult. To address this difficulty, we chose to control for the differences statistically.

The analysis of covariance indicates that race/ethnicity, treatment modality, and their interaction did not have a significant influence on half of the DCP scales (8 out of 16). The scales where these factors were not influential were the Importance of Care, Self-Care Adherence, Diet Adherence, Medical Barriers, Monitoring Barriers, Understanding Management Practice, Long-Term Care Benefits, and Support Needs. In other words, for these scales, African-Americans and Caucasians with diabetes do not score differently; furthermore, patients using insulin did not score differently from patients not using insulin.

For the other eight scales, one or more of the variables (race/ethnicity, treatment modality, and their interaction) had a significant influence. Of the three variables, treatment modality influenced the most scales; treatment modality was a significant influence for 6 of the 16 DCP scales (Control, Social and Personal Factors, Positive Attitude, Negative Attitude, Self-Care Ability, and Exercise Barriers). This suggests that patients using insulin have different attitudes and problems in these areas of their diabetes care from those of patients not using insulin.

Ethnicity had a significant influence on only three scales (Control, Support, and Support Attitude). However, two of these scales dealt with social support. In comparison with Caucasians, African-Americans reported receiving more support from family and friends. Furthermore, the support they received was interpreted more positively. Differences between African-Americans and Caucasians in the area of social support have been noted elsewhere (11–15).

The focus of this study centered on the joint effect of race/ethnicity and treatment modality on diabetes attitudes. The results of the analyses indicated that the interaction of race/ethnicity and treatment modality was a significant effect for only two scales, Positive Attitude and Negative Attitude; however, these scales are related. The Positive Attitude and Negative Attitude scales provide two

measures of patients' overall attitudes toward their disease. Interestingly, the biggest disparity occurred between the two Caucasian patient groups. The Caucasians not using insulin reported the most positive attitude and the least negative attitude (adjusted means of 3.30 and 2.31, respectively). The reverse was true for the Caucasians using insulin: this group reported the least positive attitude and the most negative attitude (adjusted means of 2.95 and 2.72, respectively). On the other hand, African-Americans were less distinct in the scores for these attitude scales: the adjusted means for Positive Attitude were 3.15 for patients using insulin and 3.11 for those not using insulin, and for Negative Attitude, the adjusted means were 2.49 for patients using insulin and 2.39 for those not using insulin.

These results suggest that insulin use has a significant effect on Caucasian patients' overall positive and negative attitudes toward diabetes. This effect was not as apparent in African-American patients, but this does not mean that treatment type is not important to African-Americans. The type of diabetes treatment has a significant effect on the DCP scales concerning the social and personal life of the patient, the ability of the patient to provide self-management, and the perceived barriers to exercise for all patients in this study.

The differences in the positive and negative attitudes of Caucasians using insulin suggest that diabetes and/or its treatment is perceived differently by this patient group. For these Caucasian patients, the use of insulin injections and the accompanying greater emphasis on glucose testing may strengthen the perception of diabetes as a serious disease. African-Americans appear to have a more stable overall attitude toward diabetes that is not altered significantly with a change in treatment. However, the data presented in the study are cross-sectional, and, as such, the study cannot directly address the attitudinal changes that may or may not have occurred among patients with the introduction of insulin. Differences among the patient groups may reflect an initial reaction to insulin, or the attitudes may have evolved gradually in response to any of several factors related to insulin use.

The reason for the differences in positive and negative attitude is unclear. Further investigation is needed in the area of patient perception of diabetes. Is the switch to insulin a pivotal moment in the diabetes care and education of Caucasians? What factors and conditions stimulate adjust-

ments or shifts in perceptions and attitudes? How do these perceptions affect the willingness to take insulin and subsequent self-management behavior? Should different strategies be used for patients from different ethnic groups? These are important questions to answer to better understand and work with patients.

For care providers and diabetes educators, these results suggest that attitudes toward diabetes are similar for African-American and Caucasian patients with type 2 diabetes. However, for Caucasian patients using insulin, overall attitudes about diabetes need to be evaluated and addressed. For the health researcher, this study emphasizes the necessity of controlling for differing demographics when comparing two samples. The use of an analysis of covariance was essential in controlling for variations in other demographic characteristics to better understand the relationship of race/ethnicity and treatment modality to diabetes-related attitudes.

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