

# Family and Disease Management in African-American Patients With Type 2 Diabetes

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**OBJECTIVE** — The aim of this project is to specify features of family life that are associated with disease management in African Americans with type 2 diabetes.

**RESEARCH DESIGN AND METHODS** — A total of 159 African-American patients with type 2 diabetes were assessed on three domains of family life (structure/organization, world view, and emotion management) and three key dimensions of disease management (morale, management behaviors, and glucose regulation). Analyses assessed the associations of family factors with disease management.

**RESULTS** — Multivariate tests for the main effects of three family variables were significantly related to the block of disease management variables for morale ( $F = 3.82$ ;  $df = 12,363$ ;  $P < 0.0001$ ) and behavior (2.12; 9,329;  $P < 0.03$ ). Structural togetherness in families was positively related to diabetes quality of life (DQOL)–Satisfaction ( $P < 0.01$ ). High family coherence, a world view that life is meaningful and manageable, was positively associated with general health ( $P < 0.05$ ) and DQOL-Impact ( $P < 0.05$ ) and negatively associated with depressive symptoms ( $P < 0.001$ ). Emotion management, marked by unresolved family conflict about diabetes, was related to more depressive symptoms ( $P < 0.001$ ), lower DQOL-Satisfaction ( $P < 0.01$ ), and lower DQOL-Impact ( $P < 0.001$ ). No family measures were related to HbA<sub>1c</sub> levels.

**CONCLUSIONS** — The family domain of emotion management demonstrates the strongest associations with diabetes management in African-American patients, followed by family beliefs. Patient morale is the aspect of disease management that seems most related to family context.

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Type 2 diabetes is 1.2–2.3 times more prevalent in African Americans than European Americans and is associated with higher rates of complications and greater levels of disability related to those complications (1). Higher rates of coronary heart disease, stroke, and end-

stage renal disease contribute substantially to African Americans with diabetes living shorter and less healthy lives. There is an urgent need to develop culturally appropriate treatment approaches that will affect improvements in diabetes control in this population (2).

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**Abbreviations:** DQOL, diabetes quality of life.

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

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Although there has been progress in identifying specific approaches to caring for diabetes in African Americans, much work remains. Focus group research (3–6) has identified illness concerns of African Americans to include the following: managing diabetes in a way that includes ethnic foods and participation in social gatherings involving food; accessing proper instruction about disease management; and dealing with concerns about the trustworthiness of health care providers and about the financial consequences of the disease. The few operational diabetes treatment programs specifically designed for African Americans have demonstrated some effectiveness. Most programs focus on culturally specific approaches to food management (7) or exercise (8,9), and some have attempted to address African-American values in structuring programs at the individual and community level (10,11).

One valued dimension of African-American life that has been overlooked in diabetes research and treatment is the family. The valuing of interdependence, cooperation, collectivism, and synergism (12,13) in African-American life suggests the importance of the family to disease management. However, there have been no systematic investigations of the family context of disease management in African-American adults with type 2 diabetes. In exploratory investigations, African-American patients repeatedly identified family members as important to diabetes management. Tangible and emotional support of diabetes care by family members, particularly daughters, was noted (14). At the same time, patients identified family members as barriers to diabetes care because of nonsupport for dietary changes, because they create role demands in caregiving, and because they contribute to patients' emotional distress (4,6,15).

The central aim of this study is to examine how family factors influence health and health practices in African-American patients with type 2 diabetes, using a multidimensional model of family life and a

Table 1—Characteristics of the sample\*

Characteristic	Value
Men/women	63/96 (40/60)
Age (years)	54.2 ± 9.04
Education (years)	14.35 ± 2.58
Income (in thousands)	40.01 ± 30.46
Years since diagnosis	7.68 ± 5.65
Treatment regimen (diet or exercise/pills/insulin)	9/110/39 (5/70/25)
Married	89 (56)
Lives with health partner	114 (72)
Family Togetherness	33.55 ± 5.39 (8–48)
Family Coherence	58.48 ± 8.59 (13–78)
Unresolved Conflict	11.11 ± 6.03 (5–35)
SF-36—General Health	15.62 ± 4.11 (5–25)
DQOL—Satisfaction	52.20 ± 9.50 (15–75)
DQOL—Impact	62.00 ± 6.57 (19–76)
Center for Epidemiological Studies—Depression	12.17 ± 9.50 (0–56)
Average daily fat	35.66 ± 6.71 (13–50%)
Average daily calories	1,723 ± 524 (678–3,778)
Physical activity	36.77 ± 8.40 (25–75)
HbA <sub>1c</sub>	8.67 ± 2.09 (5.2–16.3)

Data are n (%), means ± SD, or means ± SD (range). \*n = 159.

biopsychosocial conceptualization of health. Specifically, we wished to explore two central questions: 1) Is the family context associated with disease management in African-Americans patients with type 2 diabetes? And, if so, 2) Which aspects of family life demonstrate the most significant relationships with disease management in this population?

## RESEARCH DESIGN AND METHODS

Patients who met the following criteria were identified from billing and clinical databases from health care facilities: diagnosis of type 2 diabetes; time since diagnosis at least 1 year; patient age between 25 and 70 years; no evidence of major diabetes complications (e.g., proliferative retinopathy, cerebrovascular accident, or myocardial infarction within the past 12 months, renal insufficiency, amputations); an identifiable family health partner who was either a spouse, primary relative (parent, sibling, child), or someone the patient considered family; self-identification as African American; and born in the U.S. Recruitment was also conducted in predominantly African-American churches. Data were collected from patients and health partners; only patient data are reported here.

After receiving an introductory letter, patients were screened for inclusion criteria by telephone interview, and a home

visit was scheduled. The initial 1.5-h home visit was used to introduce the project, review informed consent, establish personal rapport, and allow participants to complete questionnaires. Additional data collection comprised completion of a mail-back questionnaire (45 min), and a second home visit was conducted to complete a semistructured interview about illness understandings (60 min). All screening and data collection were conducted by female African-American research assistants. Screening identified 300 eligible African Americans; of these, 205 agreed to participate (68% acceptance rate). Key reasons for nonparticipation were work or family commitments and lack of interest in the study. A total of 46 participants withdrew from the study after consent primarily because of time constraints. Complete data for the present analyses are available on 159 patients (Table 1).

## Family measures

Family is defined broadly to include a group of intimates living together or in geographic proximity, with strong emotional bonds, and with a history and a future. Because unique variations in family form prevail in the African-American community, we included patients who identified as their health partner a family member who was related by marriage or

blood (parent, sibling, or child) or who was substantially involved in the patient's life and considered to be family. This sampling approach allowed us to include African-American families who match those who reside in the community (16).

As conceptualized, family life is composed of three domains: family structure and organization, family world view, and family emotion management (17). Each domain is viewed as a resource for patients to manage the disease (18). Patients were asked to appraise their current family, including the health partner.

Family structure comprises interpersonal proximity and the roles and rules for completing tasks within the family and the larger community (19). Family structure was measured by Togetherness, an eight-item scale assessing the degree of interpersonal closeness in family work and activities ( $\alpha = 0.70$ ) (20). Items include "Family members spend much of their free time together" and "In our family, everyone knows what is expected of them." We hypothesized that greater togetherness would be associated with better disease management. Positive associations between family structure and disease management in type 2 diabetes have been observed in other ethnic groups (20).

Family world view comprises the family's basic assumptions and beliefs about life that guide action and orient the family to its social context. Family world view was measured by Family Coherence, a 13-item scale assessing the degree to which the family believes the world is understandable, meaningful, and manageable ( $\alpha = 0.81$ ) (21). Items include "Our family believes that most things usually work out well" and "Our family believes that people do not get what they want in life" (reverse scored). In European Americans, family coherence was related to better diabetes management, including less depression, better diabetes quality of life (DQOL)—Satisfaction, better self-assessed health, and better HbA<sub>1c</sub> levels (20).

Family emotion management includes the family's expression and management of emotions, including conflict, intimacy, anger, and loss (22). It was assessed using the Unresolved Conflict scale, a five-item scale that measures diabetes-specific conflict ( $\alpha = 0.90$ ) (23); high scores reflect high unresolved conflict. Items include "After an argument about diabetes or diabetes care with your

spouse/partner, how often do you 'still feel angry with your spouse/partner' or 'still feel bothered by the problem?'" Family emotion management has demonstrated extensive linkages with disease management in diverse ethnicities. In European-American families, unresolved conflicts were associated with lower levels of physical activity, worse depression, and worse general health, whereas in Chinese-American families, it was associated with greater depressive symptoms and decreased quality of life (24). Our measures of family structure and beliefs comprised general measures of family life, whereas the indicator of emotion management was diabetes specific.

### Measures of disease management

Disease management is also conceptualized as multidimensional and includes patient morale (DQOL, general health, and depressive symptoms), diabetes care behaviors (diet and exercise), and biologic outcomes (HbA<sub>1c</sub>) (25). Patient morale was indicated by four different measures. The General Health subscale of the Quality of Life Assessment (SF-36) is a five-item appraisal of general health ( $\alpha = 0.75$ ) that measures the patient's global sense of physical well-being (26). High scores indicate better health. DQOL-Satisfaction is a 15-item scale that assesses patient satisfaction with different aspects of living with diabetes ( $\alpha = 0.90$ ) (27), including leisure time, current treatment, sleep, and social relationships. DQOL-Impact measures the patient's assessment of how much diabetes does or does not interrupt other life activities ( $\alpha = 0.81$ ), such as feeling ill and being embarrassed about diabetes. High scores on DQOL scales reflect better quality of life. Depressive symptoms were assessed by the Center for Epidemiological Studies-Depression (CES-D) scale ( $\alpha = 0.91$ ) (28). Behavioral disease management variables included indicators of diet and exercise. Diet measures were summarized from an analysis of a 3-day food record and included a measure of diet quality, average fat intake (computed as a percent of total calories from fat per day), and a measure of diet quantity (the average number of total calories consumed per day). Physical activity is an index of activity over a 24-h period. Patients indicate how many hours are spent at five levels of energy expenditure from rest to heavy activity during a typical day. Each level is

weighted by relative oxygen consumption and is then summed for the entire 24-h period (29). The natural logarithm of the activity score was used to normalize the distribution. HbA<sub>1c</sub>, a measure of the adequacy of glycemic control over the past 3 months, was used as a biologic indicator. All blood samples were tested at a single laboratory.

### Contextual variables

Contextual variables considered were disease indicators, including duration of disease, and treatment regimen (diet/exercise, oral medications, or insulin), patient age, education, sex, marital status, and cohabitation with the study health partner.

### Data analysis

The goal of the analysis was to examine the concurrent relationship between three domains of family life and three conceptually distinct domains of disease management. The general multivariate likelihood criterion (Wilks  $\lambda$ ) and its associated  $F$  statistic were used to assess the effects of the three family variables on the two disease management domains with multiple outcome variables, morale, and disease management behaviors. When the multivariate  $F$  value was statistically significant ( $P < 0.05$ ), the regression weights for each of the family domain variables were examined for patterns of effects. In all analyses, we controlled for the seven contextual variables (disease duration, treatment regimen, patient age, sex, educational level, marital status, and living arrangement). There was no evidence of problems with multicollinearity: correlations among the family variables were modest (0.11–0.16) and tolerances for these variables were  $\geq 0.86$ .

**RESULTS** — On average, patients were middle-aged (mean 54 years, SD 9.0), had at least some post-high school education (mean 14 years, SD 2.6), and had family incomes  $< \$50,000$  per year (Table 1). Patients were more likely to be women (60%), to be married (56%), and to live with the family member who participated in the project (72%). The relationship between the health partner and patient was predominantly spousal (84 patients, 53%; some married patients named a different family member as their health partner) but also included children (39 patients, 24.5%), siblings (16 pa-

tients, 10%), and other relations (20 patients; 12.5%). Considering disease features, time since diagnosis was 7.7 years (SD 5.6) and most patients were treated with oral medications (70%) versus insulin (25%) or diet and exercise only (5%).

The set of three family variables (togetherness, coherence, and unresolved conflict) were statistically significantly related to the blocks of disease management variables in the morale and behavior management domains. For the block of four variables in the morale domain, Wilks  $\lambda = 0.729$ ,  $F = 3.82$ ,  $df = 12,363$ , and  $P < 0.0001$ . For the block of three variables in the behavioral domain, Wilks  $\lambda = 0.872$ ,  $F = 2.12$ ,  $df = 9,329$ , and  $P < 0.03$ . Thus, detailed analysis of the regressions in these domains was warranted. Standardized  $\beta$  values for the regression equations for all domains of disease management are presented in Table 2. No family measures were significantly related to HbA<sub>1c</sub> levels.

Family measures had the strongest associations with patient morale. Unresolved family conflict about diabetes was statistically significantly related to more depressive symptoms and lower DQOL (lower satisfaction and greater impact of the disease). High family coherence, a belief that the social world is meaningful and manageable, was significantly positively associated with general health and DQOL-Impact and negatively associated with depressive symptoms. Finally, structural togetherness in families was positively related to DQOL-Satisfaction. One statistically significant association was found between the family variables and self-management behaviors. Coherence was positively associated with levels of physical activity.

**CONCLUSIONS** — In this study, as in our prior work with other racial/ethnic groups, unresolved family conflict demonstrates the broadest set of relationships with disease management (18,20,24) primarily with regard to patient morale. Unresolved family conflict about diabetes is associated with more depressive symptoms and lower DQOL. There were no associations apparent between unresolved family conflict and diabetes management behaviors. Family conflict that is unresolved may create a negative emotional context that distracts or discourages the patient, thereby increasing

Table 2—Standardized regression coefficients for multivariate analyses of the effects of family on disease management

Dependent variable	Structure-organization: togetherness	World view: coherence	Emotion management: unresolved conflict	R <sup>2</sup> of family variables
Morale				
General health	0.05	0.19*	−0.16	0.07†
Depression	−0.09	−0.24‡	0.28‡	0.16‡
DQOL-Satisfaction	0.25†	0.11	−0.22†	0.13‡
DQOL-Impact	0.10	0.17*	−0.28‡	0.13‡
Behavior				
Physical activity	−0.02	0.23†	−0.05	0.06*
Diet: quality (% fat)	0.16	−0.11	−0.16	0.05*
Diet: amount (calories)	−0.03	−0.16	−0.04	0.03
HbA <sub>1c</sub>	−0.03	0.04	0.01	0.001

Analyses control for duration of disease, treatment regimen, patient age, education, sex, marital status, and cohabitation with the family health partner. \* $P < 0.05$ ; † $P < 0.01$ ; ‡ $P < 0.001$ .

symptoms of depression and feelings that diabetes is more onerous or intrusive. Additionally, unresolved family conflict may produce emotional arousal, resulting in deleterious emotional and endocrine responses for patients with long-term risk for diabetes regulation (30,31).

Our findings parallel a body of research that links family emotion management and disease management in other chronic illnesses (32,33). Family conflict and negative family emotional tone have proven to be powerful predictors of disease course or mortality in multiple disease processes, including cancer (34), cardiovascular disease (35), and end-stage renal disease (36). The pathways through which family conflict resolution impacts patient morale are not well understood and deserve continued investigation.

As hypothesized, disease management is better in African-American patients from families believing optimistically that life has order, meaning, and manageability. Coherence beliefs are associated with better patient morale, including fewer depressive symptoms, better self-assessed general health, and better DQOL-Impact. Greater physical activity is also associated with family coherence. Managing diabetes within a family context that espouses life's orderliness and manageability may reinforce the patient's personal sense of health, emotional well-being, and ability to maintain diabetes care. Diabetes requires patients' persistent attention to daily regimens as well as attention to possible negative sequelae of the disease. These practical and emotional strains may be more readily absorbed in a context of family optimism and beliefs in order.

Family structure demonstrates only limited relationships with disease management in African-American patients. Family togetherness is associated with DQOL-Satisfaction, suggesting that ease or satisfaction with diabetes care is associated with a sense of family closeness and social sharing. It is unclear why hypothesized relationships between family structure and disease management were not observed in this sample; perhaps our measures inadequately tapped this domain of family life given the complex relationship configurations included in the African-American sample.

A recent Institute of Medicine report on health and behavior (37) identifies family relationships as prime targets for interventions that might produce more enduring changes in health behavior than those achieved in individual behavioral interventions. Although there is good evidence that interventions aimed at developing positive family interaction skills, including conflict resolution, can improve chronic disease outcomes (31,32), family interventions in diabetes have been exclusively focused on younger families with type 1 diabetes. Clinical trials of family interventions with children with type 1 diabetes demonstrate efficacy for improving family relationships (38,39) and metabolic control (38). These present-focused, family-focused, office-based interventions may be adaptable for care of adult families who are coping with type 2 diabetes. Coaching family members to stay involved in care, to interact supportively rather than critically, and to be realistic about diet, exercise, and glucose control may positively affect morale as

well as disease management behaviors in patients with type 2 diabetes.

Although there are good clinical guidelines for working with family beliefs (40), limited information is available about the efficacy of these approaches. However, just as personal self-efficacy beliefs are alterable (41), the family's world view may be influenced by direct discussion of the family's potential role in affecting diabetes outcomes. Family coherence or optimistic beliefs may be strengthened by straightforward explanations of the evidence that family context makes a difference in disease outcomes in a host of chronic illnesses (32,37), including diabetes (42). The limited relationships observed between family structure and disease management suggest this is an area for further study.

Family health partners in this study included spouse/partners, children, siblings, and other family relationships. Despite the increased variation in the types of family relationships included in this sample, similar family features proved important to disease management, regardless of the relation of the health partner. Thus, family emotion management and, to a lesser extent, beliefs and structures, are significantly associated with disease management in relationships beyond the marital couple. This finding has heightened significance in an African-American patient population in which key family members involved with disease management may well be children, siblings, or extended family, rather than a spouse/partner. These findings should also be a signal to researchers that conducting investigations into the role of the family in the African-American community should

not be narrowly constructed to fit definitions and models of a nuclear family arrangement common to other racial/ethnic groups.

Several cautions should be taken into account when considering these findings. First, respondents represent a clinical sample of patients who have ties to a medical practice and are in treatment for their diabetes. Second, relationships between domains of family life and disease management are examined at one point in time; longitudinal designs are required to establish the causation between family context and disease outcomes. Third, this study of the social context of disease management focused directly on family features. Many other contextual features that influence how African Americans manage diabetes deserve further study, for example, neighborhood, degree of segregation, availability of medical care, and so on. Fourth, examining multiple forms of family relationships and living arrangements strengthens external validity but prevents some analyses because of small numbers in particular cells (e.g., those married but not living together).

In summary, attention to the family context of disease is warranted in African-American patients with type 2 diabetes. African-American families have previously been identified as both a support and barrier to adequate care of type 2 diabetes. This work suggests that greater consideration should be given to interventions that enable family members to become involved in diabetes management in positive ways and to change patterns that may serve to make diabetes management more difficult.

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