# CORRELATES OF ELEVATED DEPRESSIVE SYMPTOMS AMONG RURAL AFRICAN AMERICAN ADULTS WITH TYPE 2 DIABETES

**Objective:** The study objective was to examine the health-related and sociocontextual correlates of elevated depressive symptoms among rural African American adults with type 2 diabetes mellitus.

Design: Cross sectional, observational study.

**Setting:** Rural communities in central Georgia, United States.

**Participants:** African American patients with type 2 diabetes mellitus (N = 200) were recruited from eight rural counties in Georgia by using community-based procedures.

**Methods:** Participants were assessed on demographics (age, sex, and education), diabetes-related characteristics (health status, time since diagnosis, blood glucose control problems, and hemoglobin A1C level), and psychosocial variables (financial stress, community disadvantage, community support, social support, and patient-healthcare provider relationship quality). Elevated depressive symptoms, as assessed via the Center for Epidemiologic Studies–Depression scale, constituted the dependent variable.

**Results:** Elevated depressive symptoms were present in 30% of the sample. Multiple logistic analysis of the contributors to depression predicted 57% of the variability in depression. Sex, neighborhood disadvantage, health status, hyperglycemic symptoms, social support, and patient-healthcare provider relationship quality predicted depression in multivariate analyses.

**Conclusions:** Both health-related and psychosocial stressors contribute to depressive symptoms among rural African Americans. Problems in patient-healthcare provider relationships may impede identification of depressive symptoms among these patients. Providers require training and support to identify and treat depression among rural African Americans. (*Ethn Dis.* 2007;17:106–112)

**Key Words:** African Americans, Depression, Rural Population, Type 2 Diabetes Mellitus

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#### INTRODUCTION

African Americans are disproportionately affected by type 2 diabetes mellitus and its complications compared with European Americans.<sup>1-4</sup> African Americans are approximately twice as likely as European Americans to have diabetes, and African Americans experience a greater burden of diabetes-related morbidity and mortality. Data from the third National Health and Nutrition Examination Survey<sup>5</sup> indicated that African Americans who live in rural areas are particularly vulnerable to increased morbidity and mortality from poor control of their blood glucose. Among persons with diagnosed diabetes, rural African Americans were significantly more likely to have a hemoglobin A1C (HbA1C) level ≥8% (61%) than urban African Americans (45%), rural European Americans (33%), or urban European Americans (43%). Consistent with findings on chronic diseases that require extensive self-management regimens or lifestyle changes, diabetes-related morbidity and mortality have been linked with lower socioeconomic status and residence in communities characterized by poverty, crime, disorganization, and lack of access to health-related resources.<sup>6</sup> Although few studies have examined rural African Americans, this group faces considerable sociocontextual adversity, particularly in the rural South, where persistent poverty and a lack of health-

Address correspondence and reprint requests to Steven M. Kogan, PhD; 1095 College Station Rd.; Athens, GA 30602-4527; 706-425-2979; 706-425-2985 (fax); smkogan@uga.edu Meta-analysis indicates that persons with diabetes are approximately twice as likely as matched control subjects to exhibit depressive symptoms or meet clinical criteria for depression.<sup>8</sup>

related resources contribute to chronic illness.  $^{7}$ 

Depression is a common comorbidity of diabetes. Meta-analysis indicates that persons with diabetes are approximately twice as likely as matched control subjects to exhibit depressive symptoms or meet clinical criteria for depression.<sup>8</sup> This association was not affected by type of diabetes (type 1 or type 2), sex, or source of assessment, though prevalence rates were higher for women and in studies that used selfreport. The combination of diabetes and depression confers a poor prognosis on affected individuals, increasing morbidity and economic costs and decreasing quality of life.9 Depression in diabetes is linked with hyperglycemia and increased risk for macrovascular and microvascular complications.<sup>10</sup> Depression also affects patients' ability to adhere to lifestyle and self-care regimens crucial for maintaining tight control of blood glucose.<sup>11</sup>

Despite the disproportionate burden diabetes places on rural African Americans, few studies have addressed the prevalence and correlates of depression among minority patients. In one metaanalysis of the association between diabetes and depression, only 3% of studies considered race/ethnicity as a contributing factor.9 Two studies included rural African Americans. Blazer et al<sup>12</sup> found older African Americans to be at higher risk for depression than members of other ethnic groups. Bell et al,<sup>13</sup> however, found no race/ethnicity effect on depression among a multiethnic sample of elderly persons with diabetes. These studies did not examine the correlates of depression specific to rural African Americans. Geographic isolation, scarce medical and economic resources, and cultural characteristics combine to create unique and difficult living conditions for rural African Americans, potentially undermining their mental health. Previous research indicates that African Americans are less likely to report symptoms of depression to their health providers or to request assistance with managing emotional or mental duress.<sup>14</sup> The extent to which rural African Americans with diabetes may be suffering from depressive symptoms is unknown.

Research on the contributors to depression among persons with diabetes indicates that both disease-related and sociocontextual factors are associated with incident depression. Fisher et al<sup>15</sup> advocated using a biopsychosocial approach to investigating depression in diabetes, which considers the multiple cumulative stressors that affect patients' emotional well-being. According to this approach, diabetics' emotional health is a consequence of the cumulative impact of both sociocontextual and diseaserelated factors. The presence of complications and poor health as a result of diabetes is a consistent proximal predictor of depression.<sup>10,16</sup> Chronic contextual stressors, however, also lead to decrements in rural African Americans' well-being.<sup>17,18</sup> Sociocontextual features include the availability of supportive relationships with family and friends, 19-21 the quality of relationships with health care providers,<sup>22</sup> and socioeconomic factors such as economic distress and living in neighborhoods with high rates of poverty and crime.<sup>23,24</sup> Accordingly, we hypothesize that multiple stressors across social and health-related domains will contribute to the incidence of depression among rural African Americans.

## Methods

### Participants

From 8 rural counties in central Georgia, 200 African American persons with type 2 diabetes and a support person were recruited. The counties were selected on the basis of  $\geq 60\%$ rurality, adequate population of African Americans from which to sample  $(\geq 15\%)$ , and their proximity to our research center. Adults with type 2 diabetes were identified by using a multifaceted community outreach strategy that involved a public awareness campaign and referrals from community contacts. This strategy was informed by our prior research with the target population<sup>25,26</sup> and previous research on chronic disease management with minority populations.<sup>27–29</sup> Research staff identified physician offices, healthcare providers, churches, social service providers, and businesses that served the African American community in each county. Contacts at these sites described the project to potential participants and compiled contact information from them. Project staff then contacted potential participants by phone to screen for eligibility and interest in participating.

Eligibility requirements for participants included age 40–65 years, diagnosis of type 2 diabetes by a physician, duration of the disease 1–10 years, participation in ongoing care with a physician, and identification of an adult support person. A support person was defined as someone  $\geq 18$  years of age who was perceived by the adult with diabetes as a source of support for his or her diabetes management by providing either emotional or instrumental sup-

port. Data also were collected from support persons for a study of support processes ancillary to the present analysis. For their participation, each participant was compensated \$80 after data collection. The importance of monetary incentives to potential participants' willingness to involve themselves in studies has been noted by other researchers<sup>30</sup> and validated anecdotally by families who have participated in previous studies.<sup>26</sup>

### Procedures

To enhance rapport and cultural understanding, African American university students and community members served as home visitors to collect data. Before data collection, the visitors received 28 hours of training in administering the protocol. The instruments and procedures we used were developed and refined with the help of a focus group of 40 African American community members who were representative of the population from which the sample was drawn. These focus group members provided quantitative ratings of the cultural appropriateness of several instruments and qualitative feedback regarding data collection. Participants interacted in small groups with trained facilitators, and process results were brought to the larger group for summary. The focus group process has been described elsewhere in detail.<sup>31</sup> Survey data were collected at participants' homes; the interviews were conducted by using computer-assisted interviewing (CAI) technology with laptop computers. One item at a time was displayed on the computer screen; the interviewer read each item to the participant and entered the answer into the computer. The use of CAI created an easy interview pace; reduced missing data from skipped questions, out-of-range responses, and inconsistent answers; and increased administration consistency. When responses to a Likert-type scale were required, the participant was shown a card with a series of dots in graduated sizes that corresponded to the magnitude of the responses from which he or she was to choose, and was asked to indicate his or her feelings using the dots on the card. Each interview lasted approximately two hours, which included consent procedures. Field interviewers received ongoing quality control monitoring throughout the data-collection period.

Participants also received vouchers to have HbA1C tests at a local laboratory. Results of the HbA1C tests were forwarded to the researchers, who forwarded this information to the patients, with a letter encouraging participants to discuss their HbA1C with their physicians. The researchers also sent a copy of the HbA1C results directly to each participant's physician.

### Measures

The survey instrument included well-established, standardized scales as well as items developed and pilot-tested by the investigators. Demographic variables used in this report included sex, age, marital status, and highest level of formal education. Education was recoded into three categories (less than high school, high school diploma or general equivalency diploma, and at least some college). Marital status was recoded into two categories (married, not married). The survey included questions from the Behavioral Risk Factor Surveillance System<sup>32</sup> regarding the use of insulin (yes/no) or diabetes medications (yes/no). Duration of diabetes, a continuous variable, was calculated from the reported date of "first being told you had diabetes." Two items from the Diabetes CareProfile<sup>33</sup> assessed control problems. The first item indexed the number of days in the past month in which symptoms of hypoglycemia occurred: "How many times in the last month have you had a low blood sugar (glucose) reaction with symptoms such as sweating, weakness, anxiety, trembling, hunger, or headache?" The second item addressed

hyperglycemia: "How many days in the last month have you had high blood sugar with symptoms such as thirst, dry mouth and skin, increased sugar in the urine, less appetite, nausea, or fatigue?" The ordinal response scale for these two items (0, 1-3, 4-6, 7-12, or >12 days) was recoded to 0 days, 1-3 days, or >3 days. Current health status was assessed with the physical components subscales of the short form health survey from the Medical Outcomes Study (SF-36).<sup>34</sup> This widely used scale has demonstrated reliability and validity on diverse populations. The physical components subscales indexed perception of overall health, experience of physical limitations due to physical health, and experience of pain.

We developed indicators for three sociocontextual variables hypothesized to contribute to depression: economic distress, neighborhood disadvantage, and community support. Economic distress was assessed with the Adequate Necessities subscale of the Family Resources Scale.<sup>35</sup> Participants responded to 8 items rated on a scale ranging from 0 (not adequate) to 4 (almost always adequate) to indicate how well their resources met their needs. Example items included "food for 2 meals a day" and "clothes for your family." Cronbach  $\alpha$  with this sample was .84. Neighborhood disadvantage was indexed with three scales. The community disorganization scale consisted of 6 items ( $\alpha = .86$ ) assessing the extensiveness in participants' neighborhoods of graffiti, public drunkenness, abandoned buildings, and so forth. The community crime measure assessed the frequency of robbery, mugging, gang problems, and other violent crimes. The third indicator of neighborhood disadvantage was the Safety Risk subscale of the Community Resources and Problems measure.<sup>36</sup> This six-item scale indexed the extent to which participants believed that truancy, crime, vandalism, and other deviant behaviors were a problem in their communities ( $\alpha = .86$ ).

These three subscales were standardized and aggregated to form the neighborhood disadvantage measure. Community support was assessed with the community version of the Social Provisions Scales.<sup>37</sup> Example items included "You can depend on people in your community to help you if you really need it" and "You feel you could not turn to people in your community for guidance in times of stress" (reverse scored). Cronbach  $\alpha$  for this scale was .83.

We examined the contribution of social support from participants' primary support persons in managing their disease and the quality of their relationships with their primary healthcare providers. Social support from the participants' primary support persons was assessed with the negative and positive subscales of the Social Provisions Scales.<sup>37</sup> These five-item subscales indexed the extent to which individuals felt they could rely on their primary support persons for assistance, recognition of their competence, alliance, and belonging;  $\alpha$  was .64 for the positive subscale and .79 for the negative subscale. We also used an adapted version of the Family Intrusiveness Questionnaire, which was designed to distinguish between helpful support and intrusiveness.<sup>38</sup> We adapted the eight-item scale to focus specifically on diabetes-related communication. Example items included "shows respect for my viewpoints about how to manage my diabetes" and "shows understanding when I don't wish to share my feelings about managing my diabetes." The response scale ranged from 0 (never) to 3 (always);  $\alpha$  for this scale was .72. The three scales were standardized and aggregated to form an index of support from the primary support person. To assess patients' relationships with their primary healthcare providers, participants completed the Patient Reactions Assessment (PRA),<sup>39</sup> a 15-item measure of perceived quality of a patient-provider relationship. We used the total score, which included items regarding the

Table 1.	Demographic and	clinical	characteristics	of the	sample
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Characteristic ( $N = 200$ )	Means $\pm$ SD or %
Demographic characteristics	
Age (years)	$52.5 \pm 6.69$
Female (%)	70
Education (%)	
Less than high school	35
High school or GED	26
More than high school	39
Married (%)	48.5
Clinical characteristics	
Years since diagnosis	$5.85 \pm 2.91$
Taking insulin (%)	34
Taking diabetes medications (%)	80.5
Days in past month reported symptoms of hypoglycen	nia (%)
1–3	45
>3	19.5
Days in past month reported symptoms of hyperglycemi	a (%)
1–3	29.5
>3	19
Hemoglobin A1C	$7.83\% \pm 1.96\%$
$CES-D \ge 16 $ (%)	31

SD=standard deviation; GED=general equivalency diploma; CES-D=Center for Epidemiologic Studies Depression Scale.

provision of information ("told me what to expect from treatment"), affective relationship ("warm and caring toward me"), and ease of communication ("hard for me to ask my medical provider about my treatment"; reverse scored). Internal consistency for the PRA in the present study was .87.

Depressive symptoms were assessed by using the Center for Epidemiologic Studies Depression Scale (CES-D).<sup>40</sup> This measure has been widely used with community samples, including rural African Americans.<sup>41</sup> The CES-D consists of 20 items concerning the frequency with which symptoms were experienced during the week preceding the interview. Responses were scored on a four-point scale, with potential total scores ranging from 0 to 60. Scores  $\geq 16$ are considered elevated and suggestive of clinically significant depression. Cronbach  $\alpha$  for this scale was .78.

## Statistical Analysis

Bivariate associations between CES-D and independent variables were evaluated for statistical significance by using an independent samples *t* test for continuous variables,  $\chi^2$  analysis for binomial or multinomial discrete variables, and the Mantel-Haenszel trend test for discrete, ordinal variables. Significant bivariate correlates were included in a multiple logistic regression analysis.

## RESULTS

### Demographic and Clinical Characteristics and Prevalence of Depression

Participants' mean age was 52.46 (SD = 6.687) and 70% were female. Thirty-five percent attained less than a high school diploma; 26% were high school graduates, and 39% attended some college. Approximately half (48.5%) were married. Approximately one-third of the sample reported being on insulin and the majority (82%) reported taking medication to control their diabetes. Symptoms of hypoglycemia were common, with 45% reporting 1–3 days with symptoms in the past month and 19% reporting more than 3 days. One half the sample reported symptoms of hyperglycemia in the past month; 19% reported more than 3 days with symptoms. The mean HbA1c level was  $7.83 \pm 1.96$ . Thirty-one percent of the sample reported clinically significant symptoms of depression.

## Correlates of Depression

Bivariate associations between elevated CES-D scores and demographic, psychosocial, and health-related characteristics of participants are presented in Table 2. Participants with elevated CES-D scores compared to participants below the clinical cutoff were more likely to be female and to report living in disadvantaged neighborhoods. Elevated CES-D scores were negatively associated with adequate financial resources, social support, and positive relationships with healthcare providers. Participants with elevated CES-D scores also were more likely to be on insulin, take diabetes medications, experience symptoms of hypoglycemia or hyperglycemia, report greater disability, and have higher HbA1C levels.

Significant bivariate correlates of elevated CES-D scores were entered simultaneously into a multivariate logistic regression analysis. The resulting model explained 57% of the variability in depression (Nagelkerke  $R^2 = .57$ ) and correctly classified 70.7% of participants. Results presented in Table 3 indicate that sex, neighborhood disadvantage, social support, relationships with primary healthcare providers, hyperglycemia, disability status, and consistent foot care were significant predictors of elevated CES-D scores. Women were 4.4 times more likely than men to have elevated CES-D scores. Participants who had positive relationships with their primary support persons and their primary healthcare providers were 67% and 29%, respectively, less likely to have elevated CES-D scores. Participants with elevated CES-D scores were 6.9 times more likely to report symptoms of hyperglycemia. Elevated CES-D scores also were

	<b>CES-D</b> < 16	$\text{CES-D} \geq 16$	P value
Demographic characteristics			
Sex			.019
Female		50 (35.7)	
Male		12 (20)	
Marital status			.063
Married	73	24 (24.7)	
Not married	65	38 (36.9)	
Education			.74
Less than high school		22 (31.4)	
High school or GED		18 (34.6)	
More than high school		22 (28.2)	
Current age	$52.9 \pm 6.59$	$51.47 \pm 6.85$	.162
Psychosocial factors			
Adequate necessities	$28.16 \pm 4.79$	$25.09 \pm 6.25$	.001
Neighborhood disadvantage	$20 \pm .74$	.44 ± .92	<.001
Community support	$10.03 \pm 3.08$	$8.51 \pm 2.95$	.001
Supportive relationship index	.20 ± .92	$45 \pm 1.03$	<.001
Relationship with provider	$11.90 \pm 1.99$	$10.55 \pm 1.95$	<.001
Health-related factors			
Taking insulin			.009
Yes		29 (42.6)	
No		33 (25)	
Taking diabetes medications			.02
Yes		44 (27.3)	
No		18 (46.2)	
Days reported symptoms of hypoglycemia			.042 <sup>†</sup>
0		16 (22.9)	
1–3		30 (33)	
>3		16 (41)	
Days reported symptoms of hyperglycemia			$< .001^{\dagger}$
0		18 (17.5)	
1–3		20 (33.9)	
>3		26 (62.2)	
Years since diagnosis	$6.12 \pm 3.04$	$5.26 \pm .32$	.053
Hemoglobin A1C	$7.62 \pm 1.78$	$8.31 \pm 2.25$	.042
Health status	$86 \pm 3.16$	$1.92 \pm 2.70$	<.001

 Table 2. Bivariate associations between CES-D-defined depressive symptoms and demographic and psychosocial characteristics

† Mantel-Haenszel trend test.

CES-D=Center for Epidemiologic Studies Depression Scale; GED=general equivalency diploma.

significantly associated with reports of disability and health limitations.

#### DISCUSSION

In this study we found that depression as measured by elevated CES-D scores is common among rural African Americans with type 2 diabetes. Nearly one third of the sample had clinically significant symptoms of depression, as indicated by CES-D scores  $\geq 16$ . This rate approximates that obtained by Anderson et al<sup>8</sup> for uncontrolled studies that used self-report instruments with a predominantly European American sample. Our data are also comparable to the rates that Black et al<sup>10</sup> found for Mexican American diabetics (30%) and Fisher et al<sup>15</sup> found for Latino patients in California (31.6%) by using similar assessment protocols.

Nearly one third of the sample had clinically significant symptoms of depression, as indicated by CES-D scores  $\geq 16$ .

Consistent with our hypotheses, multiple sociocontextual processes were independent contributors to depression, net of the strong contributions made by health limitations and disease-related factors such as hypoglycemia. Participants with elevated CES-D scores reported less supportive relationships with the primary persons in their social networks who assisted them with managing their diabetes and poor relationships with their primary healthcare providers. The direction of effects is unclear; past research indicates that depressive symptoms may be both a result of poor social relationships<sup>18,42</sup> and a personal characteristic that undermines a person's ability to receive and use support.43 The finding of poor relationship quality with providers is particularly troubling, as persons with depressive symptoms may be less likely to report their symptoms to their providers or engage in the communication necessary to understand and implement treatment regimens.44

Participants who live in communities characterized by disorganization and crime were at high risk for elevated depressive symptoms. Other studies among rural African Americans have linked neighborhood disadvantage to adults' depressive symptoms. In contrast to previous research that linked financial distress to depressive symptoms among persons with diabetes, this link was not significant in our multivariate analysis. These studies, however, did not include assessment of community crime and disorganization. In our analysis, the bivariate effect of economic distress 
 Table 3. Multivariate associations between CES-D-defined depressive symptoms and demographic, psychosocial, and health characteristics

	Odds Ratio (95% Confidence Interval)	P value
Sex (female vs male)	3.82 (1.25–11.69)	.019
Adequate necessities	.95 (.88–1.03)	.202
Neighborhood disadvantage	1.93 (1.12-3.33)	.019
Community support	.98 (.84–1.15)	.789
Supportive relationship	.48 (.30–.76)	.002
Relationship with health provider	.71 (.56–.92)	.009
Insulin (yes vs no)	2.11 (.68-6.56)	.196
Diabetes medications (yes vs no)	3.14 (.94–10.57)	.064
Days reported symptoms of hypoglycemia		
1–3 vs 0	2.25 (.85-7.42)	.097
> 3 vs 0	1.77 (.48–6.50)	.392
Days reported symptoms of hyperglycemia		
1–3 vs 0	3.15 (1.13-8.80)	.029
> 3 vs 0	8.60 (2.32-31.79)	
Hemoglobin A1C	1.12 (.87–1.44)	.396
Health status	1.34 (1.14–1.58)	<.001
CES-D=Center for Epidemiologic Studies Depression Sca	le.	

was suppressed in the multiple regression, potentially as a result of collinearity. Economic distress and disadvantaged community environments covary extensively and are linked to medically under-served communities with few resources for managing diabetes.23,45 Unfortunately, the contextual conditions that contribute to depressive symptoms also serve as barriers to care. In these isolated and under-served areas, screening and intervention protocols must be developed to facilitate the identification and treatment of depression. Ciechanowski et al<sup>44</sup> recommended the inclusion of health educators or nurse practitioners with additional training in the treatment of depression and the influence of social relationships on diabetes management as part of a team approach to diabetes care.

Overall, the results are consistent with Berkowitz's<sup>46</sup> reformulated frustration-aggression hypothesis. Berkowitz demonstrated that a pileup of stressful and painful events or conditions is related to increases in emotional arousal or negative affect. For African American adults with type 2 diabetes who live in the rural South, the burden of disease management, disease-related problems, and a lack of social and economic resources to support disease management combine to undermine psychological well-being. Consistent with Berkowitz's position, we found that depressive symptoms among adults with diabetes were associated independently with health-related and environmental stressors.

Several limitations to our findings must be noted. First, this study was cross-sectional, and the results do not necessarily support inferences about temporal precedence. Second, we initially intended to recruit adults with type 2 diabetes from physicians' offices. This strategy would have allowed us to evaluate non-response. We opted to use conventional community recruitment strategies, however, when we saw that physicians were not referring their patients to the study. Accordingly, we have no data on non-response. Our findings suggest, however, that due to poor provider-patient relationship quality, obtaining a sample from physicians' offices may have caused persons with depressive symptoms to select out of the study and bias the results toward lower incidence of depressive symptoms. These cautions notwithstanding, the results of the present study provide valuable information by describing the ways in which sociocontextual and health-related variables contribute to depressive symptoms among rural African American adults with type 2 diabetes.

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Design concept of study: Kogan, Brody

- Acquisition of data: Brody, Murry
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- Manuscript draft: Kogan, Brody, Crawley, Logan, Murry

Statistical expertise: Kogan

- Acquisition of funding: Brody, Murry
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Supervision: Brody, Murry