

Psychosocial Characteristics and Cardiovascular Risk in African Americans with Diabetes

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This descriptive study examined the ability of anxiety, depressive symptoms, and perceived social support to predict cardiovascular disease (CVD) risk in African American adults ($N = 57$) with type 2 diabetes but no prior history of CVD events. All completed a questionnaire packet during structured interviews. Participants had CVD risk profiles that indicated a greater than 20% probability of experiencing a CVD event in the next 2 to 10 years based on diabetes status alone. The variance (10%) in CVD risk accounted for by the variables examined was not statistically significant, suggesting that other variables may be better predictors of CVD risk.

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DESPITE DOCUMENTED DECLINES in cardiovascular disease (CVD) mortality in the general U.S. population, similar progress has not been observed in individuals with type 2 diabetes (T2D). Recent research has shown that 98% of American adults with T2D have some evidence of CVD (Cook et al., 2000) and that diabetes is associated with increased risk of CVD mortality (Whiteley, Padmanabhan, Hole, & Isles, 2005). According to the new guidelines of the National Cholesterol Education Program Adult Treatment Panel III (NCEP ATP III, 2001), diabetes is now categorized as a coronary heart disease (CHD) equivalent (Linton & Fazio, 2003).

CVD and T2D—in terms of prevalence, quality of life, death, and disability—are greatly magnified in African American communities, and they also impose a particularly great burden on African Americans (Braithwaite & Taylor, 2001; Burt et al., 1995; Gavin, 2004; Nash et al., 2003). The prevalence of CVD is approximately 50% higher, and mortality rates for stroke are four to five times higher in African Americans than in Whites (Sowers, Ferdinand, Bakris, & Douglas, 2002). The prevalence of hypertension (HTN) in African Americans is among the highest in the world (Ferdinand, 2005). Reducing the burden of CVD for African Americans depends on reducing risk factors, especially among those with T2D (Summerson, Bell, & Konen, 1996).

Anxiety and depressive symptoms have been associated with both CVD and T2D in the general population (Gavard, Lustman, & Clouse, 1993; Grundy, Pasternak, Greenland, Smith, & Fuster, 1999; Iliæ & Apostoloviæ, 2002; Plach, 2002), and they are considered risk factors for CVD morbidity and mortality in individuals with T2D (Anderson, Freedland, Clouse, & Lustman, 2001; de Groot, Anderson, Freedland, Clouse, & Lustman, 2001; Lustman et al., 2000). Anxiety disorders are common psychiatric disorders in the general population of the United States (2001; Kessler, Chiu, Demler, Merikangas, & Walters, 2005; Office of the Surgeon General, 2001). Substantial epide-

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This study was funded by the American Nurses Association, Ethnic Minority Fellowship Program, and the Substance Abuse and Mental Health Services Administration Grant 1-T06-SM56572-01; the University of North Carolina Center for Innovation in Health Disparities Research, National Institutes of Health Research Grant 5P20NR8369; National Institute of Nursing Research; and the National Center for Minority Health and Health Disparities.

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0883-9417/1801-0005\$30.00/0

doi:10.1016/j.apnu.2006.04.005

miological evidence has implicated anxiety in the development of heart disease as well as the occurrence of sudden cardiac death (Hettema, Neale, & Kendler, 2001). Some authors have suggested that the prevalence of anxiety disorders may be higher in African Americans (Neal & Turner, 1991; Office of the Surgeon General, 2001).

Depressive symptoms have also been associated with increased risks of myocardial infarction (MI), stroke, and death (Barefoot & Schroll, 1996; Chapman, Perry, & Strine, 2005; Compton & Nemeroff, 2001; Januzzi, Stern, Pasternak, & DeSanctis, 2000; Miller, Freedland, & Carney, 2005; Penninx et al., 2001). Depression is twice as prevalent in individuals with diabetes as in those without diabetes, and glycemic control and diabetes complications have been significantly associated with depression in T2D patients (de Groot et al., 2001; Peyrot, 2003; Rubin & Peyrot, 2002; Valdovinos & Echeverry, 2005). However, few studies have examined anxiety and depressive symptoms among African Americans (Baker & Bell, 1999; Gary & Yarandi, 2004; Neal & Turner, 1991; Office of the Surgeon General, 2001; United States Department of Health and Human Services, Centers for Disease Control and Prevention [CDC], National Center for Chronic Disease Prevention and Health Promotion, Division of Adult and Community Health, 2002). Thus, little is known about their effects on CVD risk in African American adults with T2D.

Research has shown that social support plays a significant role in health outcomes (Berkman & Syme, 1979; ENRICH Investigators, 2001; Ford, Tilley, & McDonald 1998a, 1998b; Martin, 1996; Neal & Turner, 1991). Social support may have a significant role in health outcomes of African Americans, by directly affecting physical and mental health status and by serving as a buffer against the effects of psychological and physiological stress (Ford et al., 1998a, 1998b). Ford et al. (1998a, 1998b) reported that African Americans tend to rely more heavily than Whites on informal social networks to manage disease. Further, social support has been significantly associated with improved diabetes management among African Americans (Ford et al., 1998a, 1998b). Also, Frasure-Smith et al. (2000) have reported that high levels of social support predict improvements in depressive symptoms over the first post-MI year in depressed participants.

Perceived social support, thus, may have a role in the prevention and treatment of anxiety and depressive symptoms and in the reduction of CVD risk in African Americans with T2D. However, because relationships among anxiety and depressive symptoms, perceived social support, and CVD risk in African Americans with T2D have been minimally investigated, it is not known what interventions, if any, are needed to reduce CVD risk. Therefore, this study assessed levels of anxiety and depressive symptoms, social support, and CVD risk in a sample of middle-aged and older African American adults with T2D in the southeastern United States and explored the relationships among anxiety and depressive symptoms, social support, and CVD risk.

METHODS

Sample and Setting

This cross-sectional, descriptive–correlational study examined the relationships among anxiety, depressive symptoms, social support, and CVD risk in 57 middle-aged and older African Americans with T2D. Participants were enrolled in three community-based primary care clinics in the southeastern United States. The Institutional Review Board at the University of Tennessee approved the study. All participants had a diagnosis of T2D documented in a medical record. Participants were required to comprehend written or spoken English and should be willing and able to sign or make a witnessed mark indicating informed consent to participate. Individuals were excluded if they were outside the target age range (35–74 years), blind, profoundly deaf, or with cognitive impairments (confirmed by medical record) that would prevent comprehension of verbal instructions or ability to complete the interview. Individuals with previous medical diagnoses of CHD (defined as MI, angina pectoris, or risk of coronary disease death), cerebrovascular disease (stroke), or any physical conditions that rendered participants unable to complete the study questionnaire were also excluded. Study criteria were consistent with the NCEP ATP III guidelines, which use Framingham projections of 10-year absolute CHD risk to identify patients with multiple risk factors (Linton & Fazio, 2003).

A power analysis with the a priori alpha set at $P < .10$ and the power set at .95 was used to

quantify the power for examination of variables identified in this study. It was anticipated that a sample of approximately 51 participants was required for sufficient analytic power to detect relationships among the study variables based on the aforementioned power analysis. Setting a priori alpha at $P < .10$ and the power at .95 was selected due to the exploratory design of the study. Recruitment of subjects continued until 57 participants were enrolled.

Potential participants were approached by their health care providers about interest in participating in the study. After potential participants volunteered to the clinic or to their health care provider and signed a consent form, face-to-face interviews were conducted in a designated private area at each clinic. At the end of the interview, participants received a Wal-Mart gift card valued at US\$25 as a token of appreciation for their participation.

Measures

Five instruments were used to measure the study variables. The Personal, Health, and Sociodemographic Form was adapted by the author from the Behavioral Risk Factor Surveillance System developed by the CDC (United States Department of Health and Human Services, CDC, National Center for Chronic Disease Prevention and Health Promotion, Division of Adult and Community Health, 2002) to collect sociodemographic and health information.

Anxiety was measured by the State-Trait Anxiety Inventory, a widely used instrument on which 20 items measure state anxiety and 20 items measure trait anxiety. Higher scores indicate more anxiety. Correlations between this scale and other measures of trait anxiety have been .80, .75, and .52 (Spielberger, Gorsuch, & Lushene, 1970).

The 20-item Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977) was used to assess depressive symptoms. This measure was selected because it identifies more affective symptoms of mental health disorders and fewer somatic symptoms, making it appropriate for populations who present with somatic symptoms secondary to chronic illness (Fonda & Herzog, 2001; Gary & Yarandi, 2004; United States Department of Health and Human Services, CDC, 1994). Scores ranged from 0 to 60. For the purposes of this study, the clinical depression cutoff score of 16 reported by Jiang et al. (2003)

was utilized. The instrument has high reliability and discriminant validity. Alpha coefficients of .85 and .90 have been documented for general population samples and for client samples, respectively (Radloff, 1977).

The measure of perceived social support from the Medical Outcomes Survey Social Support Questionnaire (MOS-SSQ) was developed for use in the Rand Outcomes Survey (Sherbourne & Stewart, 1991); this is a widely used, brief measure of perceived social support that assesses the contributions of network size and four major categories of support (instrumental, emotional, informational, and companionship). The instrument's 20 items are arranged in a five-point Likert-type format; subscale scores and total scores range from 0 to 100, with higher scores representing higher levels of perceived social support. The MOS-SSQ has established criterion-related and factor-analyzed validity (Sherbourne & Stewart, 1991). Criterion-related validity was established through convergent correlations with loneliness ($r = -.53$ to $.69$), marital and family functioning ($r = .38$ to $.57$), and mental health ($r = .36$ to $.45$). The MOS-SSQ has documented internal consistency reliability (total $r = .97$, subscale alpha values ranging from $r = .91$ to $.96$) and 1-year test-retest reliability (total $r = .78$, subscale r ranging from $.72$ to $.76$).

The National Heart, Lung, and Blood Institute Framingham CHD Risk Prediction Score (Wilson et al., 1998) was used to estimate CVD risk over the course of 10 years. Gender-specific score sheets were used; the factors used to estimate CVD risk included age, blood cholesterol (low-density lipid cholesterol [LDL-C]) and high-density lipid cholesterol [HDL-C], blood pressure, cigarette smoking, and diabetes or glucose intolerance.

Medical records were reviewed to obtain and validate data on physiological variables required for CV risk estimation and sample description, including past medical history or family history of CHD or cerebrovascular disease, age, total cholesterol (TC; or LDL-C), HDL-C, hemoglobin A1c, blood pressure, smoking status, and diabetes diagnosis. Duration of diabetes disease, as well as height and weight data, was validated by medical record review. Data were recorded on the Personal, Health, and Sociodemographic Form and the Framingham CHD Risk Prediction Score sheets.

RESULTS

The mean age of the sample was 55 ± 11 years; 79% ($n = 45$) were female and 21% ($n = 12$) were male. Most (79%, $n = 45$) reported being high school graduates and 21% ($n = 12$) reported having graduated from college. Most participants were unmarried ($n = 41$, 72%) and reported annual household incomes of less than US\$20,000 ($n = 32$, 56%). The mean duration of T2D reported by participants was 8 ± 9 years; in general, hemoglobin A1c levels were elevated ($8.5 \pm 2.5\%$), indicating poor glycemic control. Study participants had TC levels at the upper limits of the normal range (190.0 ± 44.9 mg/dl), HDL-C levels within the recommended goal range (45.7 ± 11.3 mg/dl), and elevated LDL-C levels (115.2 ± 37.5 mg/dl) that exceeded the recommended range of <100 mg/dl. Forty-two percent ($n = 24$) of the participants reported a family history of heart disease, and 26% ($n = 15$) reported having first-line relatives who had experienced heart attacks. Most participants ($n = 47$, 82%) had a medical diagnosis of HTN, and several reported other comorbid conditions.

Thirty two percent ($n = 18$) reported having psychological problems for which they were receiving treatment; nearly all of these ($n = 16$) were receiving medications. The most common problem was depression ($n = 7$, 12%). Individuals who reported that they were receiving treatment for depression were treated with Paxil, Celexa, Zoloft, Tegretol, and Risperdal.

Thirty-two percent ($n = 18$) of participants reported that they were current smokers, and 26% ($n = 15$) reported current alcohol consumption. Participants reported engagement in physical activity (moving large muscle groups for at least 20 minutes a day) at an average of 2.7 ± 2.5 days each week. The majority ($n = 36$, 63%) reported consuming a low- or reduced-cholesterol diet, and 56% ($n = 30$) reported consuming a low- or reduced-sodium diet.

Anxiety, Depression, and Social Support

Seventy-seven percent ($n = 44$) of the participants reported low state anxiety scores (<40), and 23% ($n = 13$) reported high state anxiety scores (>40). The mean Spielberger State Anxiety score was 32.5 ± 11.2 , the median was 28, and the range was 39. The potential score ranges from 20 to 80. These participants generally reported low trait anxiety. Eighty-eight percent ($n = 46$) of the

participants reported low trait anxiety scores (<40), and 19% ($n = 11$) reported high trait anxiety scores (>40). The mean Spielberger Trait Anxiety score was 28.8 ± 11.4 , the median was 23, and the range was 47. The potential score range of this instrument was 20–80. Participants also reported relatively low and stable trait anxiety levels despite their self-reported psychological disorders.

Sixty-eight percent ($n = 39$) of the participants reported low CES-D scores (<16), and 32% ($n = 18$) reported high CES-D scores that were >16 . The mean CES-D score was 9.9 ± 10.4 ; the median was 6, and the range was 45 (instrument score range, 0 to 60). The low mean score indicates that depressive symptoms were not prevalent within the sample. A score of 16 is indicative of clinical distress.

Thirty-seven percent ($n = 37$) of participants reported high social support scores (>80), 18% ($n = 10$) reported moderately high social support scores (60–80), and 18% ($n = 10$) reported moderate social support scores (40–60). The mean social support score was 82.5 ± 18.5 ; the median social support score was 92, and the range was 60, with a potential score range from 1 to 95. These study participants thus perceived that they had high levels of social support.

The mean CVD score (risk estimate) was $15.8 \pm 11.9\%$; the median CVD risk score was 13%, and the range was 54%, with a score range from <-3 to $>56\%$. Thirty-seven percent ($n = 21$) of the participants reported CVD risk scores that were $<10\%$, 28% ($n = 16$) reported CVD scores $<20\%$, and 35% ($n = 20$) reported CVD scores $>20\%$. Higher risk estimates indicate higher risk for death associated with a cardiovascular event. Risk categories have been defined by the NCEP ATP III as (1) “high risk” (CHD or CHD risk equivalents [10-year risk for hard CHD, $>20\%$]), (2) “moderately high risk” (2+ risk factors [10-year risk, 10–20%]), (3) “moderate risk” (2 risk factors [10-year risk, $<10\%$]), and (4) “low risk” (0–1 risk factors; Grundy et al., 2004; Linton & Fazio, 2003). This sample’s mean score indicates that study participants were at moderately high risk for a CVD event (defined as MI, angina, coronary insufficiency, sudden and non-sudden coronary death, stroke, transient ischemic attack, peripheral vascular disease [claudication], and left ventricular failure [symptomatic]) over any period of 2 to 10 years. However, the NCEP ATP III has mandated that individuals with medical diagnoses

Table 1. Associations Among Anxiety, Depressive Symptoms, Social Support, CVD Risk, and Selected Sociodemographic Variables (*N* = 57)

Variable	Trait Anxiety	State Anxiety	Depressive Symptoms	Perceived Social Support	Age	Gender	Education
CVD Risk	.026	.040	.134	.110	.104	.079	-.142
Trait Anxiety		.68***	.713***	-.505***	.01	-.05	-.38***
State Anxiety			.725***	-.511***	-.02	-.03	-.34**
Depressive Symptoms				-.479***	.12	-.05	-.30**
Perceived Social Support					.03	.05	.12
Age						.06	.02
Gender							.03

*** $P < .01$ (two tailed).

** $P \leq .05$ (two tailed).

of diabetes be assigned to the “high risk” category (Grundy et al., 2004; Linton & Fazio, 2003). Thus, these participants had a greater than 20% risk for the occurrence of CVD event over any period of 2 to 10 years based on diabetes status alone.

Spearman’s correlations were used to examine the relationships among anxiety (state and trait), depressive symptoms, perceived social support, and CVD risk. There were no significant associations between these predictor variables and CVD risk (Table 1). However, depressive symptoms were significantly correlated with trait anxiety ($r = .713$, $P < .01$) and state anxiety ($r = .725$, $P < .01$), and state anxiety was correlated with trait anxiety ($r = .68$, $P < .01$). Perceived social support was significantly correlated with trait anxiety ($r = -.505$, $P < .01$), state anxiety ($r = -.511$, $P < .01$), and depressive symptoms ($r = -.479$, $P < .01$). Finally, education was correlated with trait anxiety ($r = -.38$, $P < .01$), state anxiety ($r = -.34$, $P < .01$), and depressive symptoms ($r = -.30$, $P < .02$). There were no significant relationships between age, gender, marital status, and any of the study variables.

Approximately 10% of the variance in cardiovascular risk was accounted for by a combination

of anxiety symptom scores, depressive symptom scores, and perceived social support scores ($R^2 = .095$; adjusted $R^2 = .025$; $F = 1.357$, $P = .2623$). The prediction equation for CVD risk was as follows: $CVR = 0.006$ (CES-D) $- 0.003$ (ANXTT) $- 0.001$ (ANXTS) $+ 0.001$ (MOSST) $+ 0.136$ (constant). These data are depicted in Table 2 and Figure 1.

DISCUSSION

This study was designed to quantify the influence of anxiety, depressive symptoms, and social support on the CVD risk scores of middle-aged and older African Americans with T2D. The variance in CVD risk accounted for by these variables was relatively small and not statistically significant. Low state and trait anxiety symptoms were prevalent among the middle-aged and older African Americans with T2D in this sample. However, anxiety symptoms may be culturally defined (Kleinknecht, Dinnel, Kleinknecht, Hiruma, & Harada, 1997) and, in some cases, may be indistinguishable from symptoms of physical illness. Lack of recognition of anxiety symptoms may have caused such symptoms to be under-reported in the sample.

Table 2. Parameter Estimates of the Relationship Between Predictor Variables and the CVD Risk Score From Regression Analyses for Study Participants (*N* = 57)

Variable	Unstandardized Coefficients		Standardized Coefficient β	<i>t</i> for H_0 : Parameter = 0	<i>P</i> > <i>t</i>	Collinearity Statistics	
	β	<i>SE</i>				Tolerance	VIF
1 (Constant)	.136	.126		1.079	.286		
CES-D	.006	.003	.527	2.111	.040	.279	3.579
ANXTT	-.003	.002	-.311	-1.406	.166	.356	2.806
ANXTS	-.001	.002	-.103	-.466	.643	.355	2.819
MOSST	.001	.001	.169	1.089	.281	.720	1.389

NOTE. Dependent variable: CVD risk.

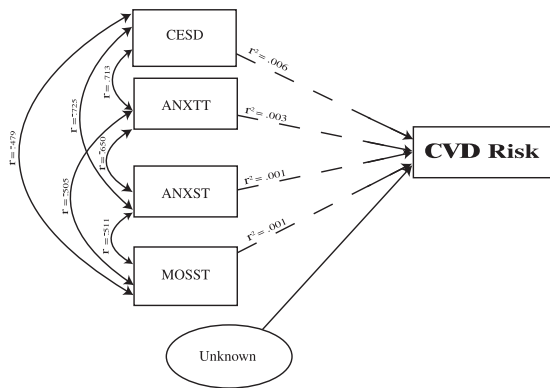


Fig 1. Path diagram of multiple regression.

The prevalence of depressive symptoms was also low in this sample. Because individuals with diabetes are reported to be twice as likely as their peers without diabetes to manifest depressive symptoms and other signs of psychological distress (Anderson, Freedland, Clouse, & Lustman, 2001), the low prevalence of depressive symptoms was an unexpected finding. However, approximately 25% of the participants reported receiving psychotherapeutic medications, and 5% reported current treatment by a mental health provider. Thus, depressive symptoms may have been controlled in this sample. Because antidepressants can block the symptoms of anxiety and panic (Bender, 1998), this may have led to underreporting of state anxiety and trait anxiety symptoms. Finally, mental illness carries a stigma in many African American communities (Gary & Yarandi, 2004), and this stigma may have contributed to lack of both recognition and reporting of depressive and anxiety symptoms.

The current study sample had high social support scores, but there were no significant relationships between perceived social support scores and CVD risk scores. These findings are consistent with the finding of Gorkin et al. (1993)—that level of perceived social support was not a significant predictor of CVD mortality. Results also support reports by Frasure-Smith et al. (2000)—that perceived social support scores and other measures of social support were not related to cardiac mortality.

The sample in this study was small; a larger sample might have provided more associations among the study variables. Additionally, the Framingham CVD risk scores do not take into account all risk factors for CHD, including

triglycerides, small LDL particles, Lp(a), coagulation factors, and homocysteine. Also, the scoring of the Framingham instrument does not include a quantitative index (risk value) for racial ethnicity, and it does not appear to be sufficiently sensitive to middle-aged and older African American adults who have low socioeconomic status. Finally, the instruments used to measure anxiety and depressive symptoms may not have adequately detected culturally defined differences in anxiety and depression recognition and reporting among middle-aged and older African Americans.

Conclusions and Implications

This study found relationships among state and trait anxiety symptom scores, depressive symptom scores, and perceived social support scores among middle-aged and older African Americans with T2D. However, there was no statistically significant correlation of state and trait anxiety symptom scores, depressive symptom scores, and perceived social support scores with CVD risk scores among these African Americans with T2D. The relationships among state and trait anxiety scores, depressive symptom scores, and perceived social support scores were also associated with low years of education in middle-aged and older African Americans with T2D in this study. The moderately high-risk CVD estimates observed in this sample indicates that CVD risk factors are more difficult to control clinically and could be impacted by other factors such as comorbid illness, neuroendocrine dysfunction, genetic profiles, mental health, and lifestyle behaviors.

Recommendations

Future studies need to examine relationships between anxiety and depressive symptoms and perceived social support in African Americans and other racial/ethnic minorities with T2D. Additionally, future education programs and interventions should target diabetes prevention and the significance of lifestyle changes in the day-to-day management of diabetes in African Americans. Further, studies with representative samples of African Americans with T2D need to be performed using the categorized levels of CVD risk (i.e., no risk, moderate risk, moderately high risk, and high risk) for a more accurate and refined estimate of CVD risk. Finally, studies need to be performed with large samples of African Americans to

develop ethnically and culturally specific measures of anxiety and depressive symptoms.

Multidisciplinary collaboration and referrals among primary care providers, mental health care providers, particularly advanced practice mental health nurses, and clergy may be needed in the treatment of anxiety and depressive symptoms in African Americans with T2D, as well as in the care of individuals with any mental illness and comorbidities such as T2D and CVD. Finally, participants in this study had CVD risk profiles indicating a high risk (>20%) of CVD event based on diabetes status alone, despite low anxiety and depressive symptoms and high social support scores. Thus, it is urgent to develop interventions to decrease mental health and health care disparities and improve health outcomes in middle-aged and older African Americans with T2D.

ACKNOWLEDGMENT

Acknowledgments are given to the members of my doctoral dissertation committee: Judy Carbage-Martin (Chair), Robert Algozzine, PhD, Muammer Cetingok, PhD, Diane Greenhill, PhD, RN, Corelia Porter, PhD, RN, Jane Neese, PhD, RN, and Mona Newsome Wicks, PhD, RN; to Catherine Gilliss, DNS, RN, and Faye Gary, EdD, RN, for their guidance and critiques of this work; and to Ms. Elizabeth Tornquist, MS, for her professional editing of the manuscript.

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