

## THE RELATIONSHIPS AMONG HEALTH FUNCTIONING INDICATORS AND DEPRESSION IN OLDER ADULTS WITH DIABETES

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### **Abstract:**

A common health problem among the elderly with diabetes is the onset of depressive symptoms that can adversely affect self-care and control of diabetes. The study examined the relationships of gender, race, comorbid conditions, symptom distress, and functional status with depression in a sample (N = 55) of older adults with diabetes. Most participants were female and black; mean age was 73 years. Gender and symptom distress were the strongest predictors of depression, accounting for 53% of the variance in depression. Although the sample was reasonably high functioning with only moderate levels of symptom distress, these findings serve as an important reminder for nurses that even moderate levels of symptom distress may be an indicator of depressive symptomatology among older diabetic adults.

### **Article:**

More than 20 million people in the United States and 171 million people worldwide have diabetes ([American Diabetes Association [ADA], 2005a]; [World Health Organization [WHO], 2006]). Moreover, by the year 2025 the World Health Organization projects that there will be more than 300 million cases of diabetes worldwide ([WHO, 2006]). Between 1980 and 2002, the prevalence of diabetes more than doubled from 5.8 million to 13.3 million ([Centers for Disease Control and Prevention [CDC], 2005a]). It is well known that ethnic minority status and advancing age increase the risk of developing diabetes ([ADA, 2005a]). Nearly one-fifth of U.S. adults age 60 and older have diabetes and it is the sixth most common cause of death among older adults ([CDC, 2005b]).

A major co-occurring condition among older diabetics is depression or the incidence of depressive symptoms ([Black, Jakobi, Rush, DiNuzzo, & Garcia, 1999]; [Blazer, Moody-Ayers, Craft-Morgan, & Burchett, 2002]; [Engum, Mykletun, Midthjell, Holen, & Dahl, 2005]; [Meneilly & Tessier, 2001]; [Palinkas, Lee, & Barrett-Connor, 2004]). Approximately 32% of individuals with diabetes have experienced depression ([Anderson, Freedland, Clouse, & Lustman, 2001]). In women with type 2 diabetes, the prevalence of depressed mood has been reported to be as high as 44% and the prevalence of depression as high as 34% ([Whittemore, Melkus, & Grey, 2004]). Depressive symptoms have potential negative effects on individuals ([Judd, Schettler, & Akiskal, 2002]; [Keller, 2002]) and have been associated with exacerbations of health problems relating to diabetes (e.g., retinopathy and cardiovascular disease) and an individual's ability to control and self-manage symptoms ([Ciechanowksi, Katon, & Russo, 2000]; [Whittemore, Melkus, & Grey, 2004]; [Ziegelstein, Fauerbach, Stevens, Romanelli, Richter, & Bush, 2000]). Low motivation for self-care, poor response to treatment, and difficulty maintaining self-care activities have been reported among diabetic individuals with depression ([de Groot, Anderson, Freedland, Clouse, & Lustman, 2001]; [Lin et al., 2004]; [McKellar, Humphreys, & Plette, 2004]). Depression also may play a significant role in the progression of the disease contributing to poor metabolic control, decreased quality of life, and increased medical morbidity and mortality ([Anderson,

Freedland, Clouse, & Lustman, 2001]; [Blaum, Ofstedal, Langa, & Wray, 2003]). Individuals with diabetes and depression have a higher risk of cardiovascular disease, cerebrovascular and peripheral vascular diseases, and vascular dementia ([Meneilly & Tessier, 2001]; [Pouwer et al., 2003]; [Tariot, Ogden, Cox, & Williams, 1999]).

While neither the mechanism for the co-occurrence of diabetes and depression nor the directional pattern of causality between the two conditions is well understood, the implications of this relationship are clear. When occurring together there appears to be a synergistic interaction, resulting in more adverse outcomes ([Black, Markides, & Ray, 2003]; [Lustman, Anderson, Freedland, de Groot, Carney, & Clouse, 2000]; [Palinkas, Lee, & Barrett-Connor, 2004]).

Another dimension to the incidence of diabetes and depression is the rate of occurrence of depression among older men and women and among white and black seniors. Women are more likely to manifest diabetes, have more difficulties with the disease, and experience more depression than men ([Anderson, Freedland, Clouse, & Lustman, 2001]; [Bell, Smith, Arcury, Snively, Stafford, & Quandt, 2005]; [Whittemore, Melkus, & Grey, 2004]). A recent study reporting longitudinal results on a sample of over 70,000 female nurses found that women who experienced symptoms of depression had an increased risk of type 2 diabetes ([Arroyo et al., 2004]). Although some studies have found differences between white and black older adults ([Blazer, Moody-Ayers, Craft-Morgan, & Burchett, 2002]; [Katon et al., 2004]), at least one recent study ([Bell et al., 2005]) found the prevalence of depression was similar between older Whites and Blacks with diabetes.

#### COMORBID CONDITIONS AND DEPRESSION

Among the elderly, diabetes rarely exists in isolation; it often occurs with comorbid conditions that affect both the individuals' experience of symptoms and functional status ([Bell et al., 2005]; [Fisher, Chesla, Mullan, Skaff, & Kanter, 2001]). Individuals with diabetes are more likely to be clinically depressed, experience subsequent episodes of depressive symptoms ([McKellar, Humphrey, & Plette, 2004]), and have a higher risk of cardiovascular disease, cerebrovascular and peripheral vascular diseases, and vascular dementia ([Meneilly & Tessier, 2001]; [Pouwer et al., 2003]; [Tariot, Ogden, Cox, & Williams, 1999]). For example, the co-occurrence of many medical conditions, including hypertension, heart disease, cancer, stroke, angina, and chronic obstructive pulmonary disease (COPD), often are associated with manifestations of depressive and affective illness ([Black, Markides, & Ray, 2003]; [Jonas & Lando, 2000]). Moreover, higher numbers of comorbid conditions have been reported among older adults with diabetes with depressive symptoms ([Bell et al., 2005]).

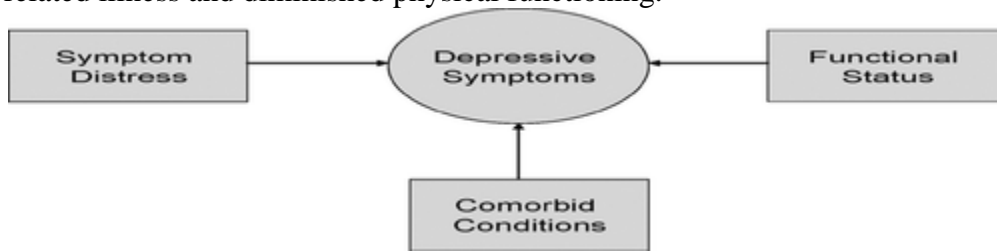
#### SYMPTOMS AND DEPRESSION

Research has shown that depressive symptoms and comorbid conditions heighten the experience of symptoms in diabetes ([Katon & Ciechanowski, 2002]). Patients with diabetes who have major depression are two to five times more likely to report symptoms than diabetics without depression ([Lustman et al., 2000]). In addition, individuals with depression often experience adverse effects on memory, energy, and interpersonal interactions, which affect disease management and self-care ([Boudreau et al., 2002]; [Katon & Ciechanowski, 2002]; [Williams et al., 2004]).

#### FUNCTIONAL STATUS AND DEPRESSION

Past research has explored the relationships among functional impairment, depressive symptoms, and diabetes in adults ([Caruso, Silliman, Demissie, Greenfield, & Wagner, 2000]). Functional impairment has been found to be significantly associated with diabetes ([Blaum, Ofstedal, Langa, & Wray, 2003]) and depression ([Egede, 2004]). Diabetics with depression are more likely to report a high level of limited physical functioning ([Ciechanowski, Katon, & Russo, 2000]; [Ciechanowski, Katon, Russo, & Hirsch, 2003]). Older individuals with depression also have a higher incidence of functional disability ([Caruso, Silliman, Demissie, Greenfield, & Wagner, 2000]).

Figure 1 presents a model based on the findings of the literature that links comorbid conditions, symptom distress, and functional status with depression among older adults with diabetes. Because of the possible synergistic impact of these variables, this study was conducted to investigate comorbidity condition, symptom distress, and daily functioning as predictors of depressive symptomatology among older adults with diabetes. By studying the impact of these three factors, the purpose of this study was to identify important combinations of factors relating to depression that could be used to better characterize the association of depression with age related illness and diminished physical functioning.



**FIGURE 1** Conceptual framework depicting health-influencing factors on level of depressive symptoms among older diabetic adults.

## METHOD

### *Sample*

A convenience sample of older adults with diabetes ( $N = 55$ ) was recruited from residents living in three subsidized housing complexes for seniors. These housing units were located in a moderate size city in the southeastern United States. Recruitment was coordinated through the nursing centers operated by the University of North Carolina at Greensboro (UNCG) School of Nursing at each residence. Individuals aged 60 or older were recruited through flyers that described the study and were posted in the nursing centers and in the public access areas of the apartment/housing complexes. Criteria for inclusion were a documented diagnosis of diabetes, ability to speak English, and functional orientation to time, place, and person. Approval for the study was obtained from the University's Institutional Review Board, and local Housing Authority. Data were collected in a face-to-face interview between a participant and an investigator or a trained research assistant. Participants received a \$10 grocery gift card as compensation for their time.

### *Measures*

#### **Demographic Information**

Participants were asked to provide their age, gender, educational level, household income, and current medication profile.

#### **Comorbid Conditions (Excluding Diabetes)**

Participants were asked about the presence or absence of four chronic diseases: cardiac disease, hypertension, chronic obstructive lung disease, and arthritis. A comorbidity score was calculated based on the number of chronic conditions each participant reported. The score ranged from 0 to 4 with 0 indicating no comorbid condition and 4 indicating that participants had all four chronic conditions.

#### **Symptom Distress**

Symptom distress was measured by the Symptom Distress Scale (SDS). The SDS is a self-report instrument that measures the level of distress for a set of 13 symptoms representing nausea, appetite, insomnia, pain, fatigue, bowel, concentration, appearance, breathing, outlook, and cough ([McCorkle & Young, 1978]). Items are rated from 1 (no distress, no symptom) to 5 (severe distress). A total score (range 13–65) is calculated by adding the severity ratings across all symptoms. Higher scores indicate greater symptom distress. A total score between 13 to 24 indicates mild symptom distress, a score between 25 and 32 indicates moderate symptom distress, and 33 or greater indicates severe symptom distress. Internal consistency reliabilities in previous studies of patients

with chronic diseases have ranged from 0.70 to 0.92 ([McCorkle, 2000]). Validity has been well established ([McCorkle, 2000]). In the current study, Cronbach's alpha for the SDS was 0.79.

### Functional Status

Functional status was measured by the Instrumental Activities of Daily Living (IADL) scale ([Lawton & Brody, 1969]), which measures level of functioning in elderly community populations. The IADL has been used extensively in establishing functioning levels in elderly ([Cummings, Neff, & Husaini, 2003]; [Edwards, 1990]). The IADL includes assessment of performance of tasks that require a combination of physical and cognitive functioning that is necessary to complete daily living tasks, such as using the telephone, shopping, preparing meals, keeping house, doing laundry, arranging transportation, taking responsibility for one's own medications, and managing finances ([Angel & Frisco, 2002]). The eight items are rated 0 (unable to function) or 1 (normal function). Scores range from 0–8. The lower the score, the less an older adult can function. A total score between 5 to 8 indicates better functioning and scores below 5 indicate poor functioning. Reliability of this measure has been reported to be .80 ([Lawton & Brody, 1969]). Validity of the IADL has been established ([Lawton & Brody, 1969]). Cronbach's alpha for the IADL was 0.74 in this study.

### Depression

Depression was measured using the 15-item Geriatric Depression Scale-Short Form (GDS). Items are scored 0 (no depression) or 1 (depressed). A total score between 0 to 4 indicates no or mild depression, 5 to 9 indicates moderate depression, and 8 or greater indicates depression. Reliability and convergent validity have been well established with elderly population samples ([Sheikh & Yesavage, 1986]). Reliability and validity of the GDS short form have been established in previous studies (i.e., [Friedman, Heisel, & Delavan, 2005]). Cronbach's alpha for the GDS was 0.81 in the current study.

### Data Analysis

A correlational design was used in the current study. Descriptive statistics of the measures were computed to profile participants in the study. Bivariate relationships among the measurement variables were examined using Pearson correlations. Race and gender differences for the number of comorbid conditions, severity of symptom distress, level of functional status, and level of depression were calculated using the Chi-square statistic. Predictive analysis investigating the relationship of these variables with depression was conducted using multiple linear regression. The SPSS (version 11.5) computer package was used for all analyses. Statistical significance level was set at  $\alpha < .05$ . Because of their potential exploratory value, gender and race were used to group the data for comparisons and as the first block of predictive variables in the regression analysis.

## RESULTS

### Demographic Characteristics

The mean age of study participants was 73 years ( $SD = 8.04$ ). Most were female (74%) and black (56%), and nearly all participants (96%) reported a religious affiliation. Most had less than 12 years of education (62%) and a household income less than \$10,000 a year. Approximately one fourth (26%) of participants had diabetes only. Overall, more than half of the participants (62%) had at least one chronic condition in addition to their diabetes (13% heart disease, 29% arthritis, 24% hypertension and 8% COPD in addition to diabetes). Blacks were more likely (80% vs. 68%) to report additional (to diabetes) chronic conditions than Whites.

Means and standard deviations for the measures of comorbid conditions, symptom distress (SDS scale), functional status (IADL scale), and depression (GDS) by gender and race are presented in Table 1.

**TABLE 1** Mean Scores and Standard Deviations of Health Indicators by Gender and Race (N = 55)

| Health indicators | Male<br>(n = 14) | Female<br>(n = 41) | White<br>(n = 25) | Black<br>(n = 30) | Total participants<br>(N = 55) | Possible score<br>range |
|-------------------|------------------|--------------------|-------------------|-------------------|--------------------------------|-------------------------|
| Comorbidities     | 1.35             | 1.56               | 1.48              | 1.57              | 1.53                           | 0–4                     |

**TABLE 1** Mean Scores and Standard Deviations of Health Indicators by Gender and Race (N = 55)

| Health indicators | Male<br>(n = 14)           | Female<br>(n = 41)        | White<br>(n = 25)         | Black<br>(n = 30)         | Total participants<br>(N = 55) | Possible score<br>range |
|-------------------|----------------------------|---------------------------|---------------------------|---------------------------|--------------------------------|-------------------------|
| Symptom distress  | (1.00)<br>22.93<br>(10.27) | (1.07)<br>25.22<br>(6.36) | (1.16)<br>27.48<br>(8.44) | (0.97)<br>22.27<br>(5.77) | (1.05)<br>24.64<br>(7.51)      | 13–65                   |
| Functional status | 6.50<br>(2.03)             | 6.85<br>(1.22)            | 6.60<br>(1.58)            | 6.90<br>(1.34)            | 6.76<br>(1.45)                 | 0–8                     |
| Depression        | 4.00<br>(3.11)             | 2.78<br>(2.46)            | 4.04<br>(2.48)            | 2.30<br>(2.28)            | 3.09<br>(2.66)                 | 0–15                    |

### Comorbid Conditions

The average number of comorbid conditions ( $M = 1.53$ ) indicates that respondents were likely to have one or two chronic conditions in addition to their diabetes. The comparison of average number of conditions between gender and race groups reveals similar high levels of comorbidity.

### Symptom Distress

The overall average score on the SDS was 24.64, indicating a relatively low level of symptom distress. The most commonly reported symptoms were pain (81.8%) and fatigue (81.8%), followed by frequency of pain (69.2%) and cough (69.1%). Overall, 52.7% of the participants had mild symptom distress, 30.9% had moderate distress, and 16.4% had severe distress (see Table 2). White participants reported more severe distress than did black participants (32.0% vs. 3.3%,  $X^2(1, N = 55) = 10.97, p < .05$ ). Female participants reported significantly higher symptom rates than males for frequency of pain (80.0% vs. 3.3%) ( $X^2(1, N = 55) = 9.44, p < .05$ ), and concerns about appearance (43.9% vs. 14.3%) ( $X^2(1, N = 55) = 3.95, p < .05$ ). Comparison of symptoms by race indicated that white participants reported significantly greater frequency of nausea than black participants (60.9% vs. 46.4%) ( $X^2(1, N = 55) = 1.05, p < .05$ ), as well as greater loss of appetite (32.0% vs. 10.0%) ( $X^2(1, N = 55) = 4.13, p < .05$ ), difficulties with mental concentration (40.0% vs. 26.7%) ( $X^2(1, N = 55) = 0.27, p < .05$ ), and breathing difficulties (48.0% vs. 16.7%) ( $X^2(1, N = 55) = 6.27, p < .05$ ).

**TABLE 2** Symptom Distress, Functional Status and Depression by Gender and Race (N = 55)

| Scale                       | Male<br>(N = 14) | Female<br>(N = 41) | White <sup>a</sup><br>(N = 25) | Black<br>(N = 30) | Total<br>participants<br>(N = 55) |
|-----------------------------|------------------|--------------------|--------------------------------|-------------------|-----------------------------------|
| SDS Total score             |                  |                    |                                |                   |                                   |
| 13–24 (mild distress)       | 64.3%            | 48.8%              | 32.0%                          | 70.0%             | 52.7%                             |
| 25–32 (moderate distress)   | 14.3%            | 36.6%              | 36.0%                          | 26.7%             | 30.9%                             |
| 33–65 (severe distress)     | 21.4%            | 14.6%              | 32.0%                          | 3.3%              | 16.4%                             |
| IADL total                  |                  |                    |                                |                   |                                   |
| 0–4 (dependent)             | 21.4%            | 4.9%               | 12.0%                          | 6.7%              | 9.1%                              |
| 5–8 (independent)           | 78.6%            | 95.1%              | 88.0%                          | 93.0%             | 90.9%                             |
| GDS total score             |                  |                    |                                |                   |                                   |
| 0–4 (No depression or mild) | 57.1%            | 78.0%              | 64.0%                          | 80.0%             | 72.7%                             |
| 5–9 (moderate)              | 35.7%            | 19.5%              | 28.0%                          | 20.0%             | 23.6%                             |

**TABLE 2** Symptom Distress, Functional Status and Depression by Gender and Race (*N* = 55)

| Scale          | Male             | Female           | White <sup>a</sup> | Black            | Total                            |
|----------------|------------------|------------------|--------------------|------------------|----------------------------------|
|                | ( <i>N</i> = 14) | ( <i>N</i> = 41) | ( <i>N</i> = 25)   | ( <i>N</i> = 30) | participants<br>( <i>N</i> = 55) |
| 10–15 (severe) | 7.1%             | 2.4%             | 8.0%               | 0.0%             | 3.6%                             |

*Note.* Symptom distress was measured by the SDS. A score of 25 to 32 = moderate distress, a score of 33 or greater = severe distress. <sup>a</sup>Significant differences ( $p < .05$ ) were found between Whites and Blacks across all three distress levels; Functional status was measured by the IADL. Scores range from 0 = very dependent to 8 = totally independent; Geriatric depression was measured by the GDS. A score over 5 points is suggestive of depression. Scores over 10 are almost always indicative of depression.

### Functional Status

The average score on the IADL was 6.76, which indicates respondents were above average in their daily functioning. Based on the total IADL score, a majority (90.9%) of the respondents were functioning independently. Male participants tended to report less functional ability than females (21.4% vs. 4.9%) and more Whites than Blacks indicated difficulties in functioning (12.0% vs. 6.7%) (see Table 2). These differences were not significantly different when examined by specific daily activity; male participants had more functional impairment than females preparing food (28.6% vs. 17.1%), keeping house (14.3% vs. 4.9%), doing laundry (21.4% vs. 7.5%), and taking responsibility for their own medication (15.4% vs. 4.9%). Comparison by race also revealed a pattern of differences. Whites, in comparison with Blacks, tended to report more functional impairment in shopping (44.0% vs. 36.7%), transportation (36.0% vs. 27.0%), and taking responsibility for their own medication (12.0% vs. 3.4%).

### Depression

The average score of 3.09 on the GDS indicated that the sample as a whole had mild depressive symptoms (Table 1). Twenty-four percent of the participants had a score between 5 and 9 (moderate depression) and only 3.6% had a score between 10 and 15 (severe depression) (see Table 2). Male participants were significantly more likely to report being moderately and severely depressed than female participants (42.8% vs. 21.9%). Whites indicated more moderate and severe depressive symptoms than Blacks (36.0% vs. 20.0%) (see Table 2).

### Prediction of Depression

Initially, Pearson correlations were computed to test for bivariate relationships. The results revealed that symptom distress was significantly positively correlated with depression ( $r = .66, p < .001$ ). Functional status also was significantly correlated with the depression scores ( $r = -.38, p < .001$ ). The inverse relationship between functional status and depression indicated that the less an individual functioned, the more a person was depressed. The number of comorbid conditions was not significantly correlated with depression ( $r = .12, p > .05$ ). A multiple regression was then conducted to determine the degree to which respondents' gender, race, comorbidities, symptom distress level, and functional status predicted the variance in reported depression. The variables were entered into the model in two sequential steps with gender and race first, followed by the simultaneous inclusion of the number of comorbid conditions, symptom distress score, and functional status score. The final model was significant  $F(5, 49) = 11.13, p < .001$ . The results of the five-variable model are shown in Table 3. Based on the beta coefficients, symptom distress was found to be the strongest predictor of depression, indicating that greater symptom distress was associated with higher levels of depressive symptomatology. The results also indicate that males were more likely to report being depressed than females did. The number of comorbid conditions, functional status level, and race were negligible predictors of depression. Overall the model accounted for 53% of the variance in depression as measured on the GDS.

**TABLE 3** Multiple Regression Analysis of Gender, Race, Comorbidities, Symptoms, and Functional Status on Depression (*N* =

| Variable          | $\beta$ | SE  | R <sup>2</sup> |
|-------------------|---------|-----|----------------|
| Final model       |         |     | 0.53           |
| Gender            | -.27*   | .62 |                |
| Race              | -.06    | .57 |                |
| Comorbidities     | -.04    | .26 |                |
| Functional status | -.11    | .20 |                |
| Symptom distress  | .63**   | .04 |                |

Note. The final model was significant,  $F = 11.13$ ,  $p < .001$ . \*  $p < .05$ , \*\*  $p < .01$ .

## DISCUSSION

This study examined the relationships of number of comorbid conditions, symptom distress, and functional status with depression among a community sample of elderly residents with diabetes. Being male, white, and having at least a moderate level of symptom distress were significantly related to reported levels of depression. The presence or extent of comorbid conditions and functional status were not critical determinants of depression.

Our findings that male and white participants had substantially higher depression are in conflict with the results reported by [Blazer and colleagues (2002)] and [Katon et al. (2004)]. In contrast to our study in which males reported higher levels of depressive symptoms, these other researchers found significant associations between being female and depression and being black and depression. The finding that the males in our sample were more likely than females to report depressive symptoms may be attributed to age and living situation. Older males may have more difficulty adjusting to a public housing environment and the increasing physical limitations that often occur with advancing age. Similarly, it also might be the case that the men were more greatly affected by their diabetes, experiencing more difficulty caring for themselves and had more stressors than did the women. Studies have shown that men react to psychosocial and medical stressors with increased stress hormones and blood pressure, which may worsen diabetes outcomes ([Vitaliano, Zhang, & Scanlan, 2003]). It is also the case that living alone and being economically challenged, characteristic of the sample, are other factors that increase the risk of becoming depressed ([Pibernik-Okanovic, Peros, Szbo, Begict, & Metelko, 2005]; [Swenson, Baxter, Shetterly, Scarbro, & Hamman, 2000]).

Women may have more coping strategies than men and consequently may be less likely to develop depression ([Unruh, Ritchie, & Merskey, 1999]). That white participants reported more severe symptoms than black participants in our study may be due to the higher levels of depression reported among Whites. White diabetics have been found to report their diabetes as being more of a health burden in comparison with African American and Hispanic diabetics ([Black, Ray, & Markides, 1999]). Our data indicate that while Blacks are more likely to manifest diabetes, they are less likely than Whites to have depressive symptomatology.

Participants in our study, overall, reported having few depressive symptoms. Our sample was drawn however from public housing facilities that contained Nursing Centers where faculty members and nursing students provide wellness checkups and home visits on a weekly basis. This access to on-site health care services and regular opportunities to interact with other residents (i.e., daily congregate lunch meals) may have contributed to less depressive symptomatology.

### *Comorbid Conditions*

A majority of the older adults in the study had more than one chronic condition. Having additional serious chronic health conditions is a well known determinant of depression in older adults with diabetes ([Black, 1999]). [Pouwer et al. (2003)], for example, found that almost 20% of the participants in their study with diabetes and comorbid diseases reported pervasive depression compared to diabetic participants without chronic conditions (8%). The limited relationship between the number of comorbid conditions and depression in

diabetes in our study, however, may suggest that the presence of other conditions was only a minor factor in depression. This may have been due to the sample as a whole reporting a small number of comorbid conditions (on average less than two). It also may be the case that the type of comorbid conditions characteristic of the sample posed no additional health care or health concern burdens beyond what their diabetes presented.

### *Symptom Distress*

An important finding in this study was that symptom distress as measured by the SDS was the most important predictor of depression. The positive relationship between symptoms and depression indicated that greater symptom distress was associated with higher depression. Previous studies have reported that depression may amplify symptoms and contribute to increased symptom burden ([Katon & Ciechanowski, 2002]). Similarly, our study demonstrated that symptom distress is significantly associated with depression in older adults with diabetes. The findings also may reflect the impact of symptom distress since more than half of older adults in this study had mild symptom distress, one third had moderate distress, and approximately one fourth had severe distress. Although the majority of our sample reported only mild symptom distress, pain and fatigue were the most common symptoms reported by the participants. The identification of pain as the most common symptom reported by independent older adults is consistent with the reports of a previous study ([Amoako, Richardson-Campbell, & Kennedy-Malone, 2003]). [Stover and colleagues (2001)] also reported that individuals with diabetes experience a variety of symptom distress.

Results of the comparison of this indicator by gender and race showed that white and female participants in our study reported substantially higher and severe symptom distress than did black and male participants. Overall, the pattern of differences for the symptoms indicates that perception of symptoms is likely to vary by gender and race. However, the small sample size in this study limits further analysis of finding.

### *Functional Status*

Functional impairment was associated with greater depression, but was not a significant predictor of depressive symptomatology in the multiple regression. [Fisher and colleagues (2001)] found functional impairment to be a significant predictor of both anxiety and depression. Several previous studies also demonstrated the link between depression and functional impairment in older adults ([Blazer, Moody-Ayers, Craft-Morgan, & Burchett, 2002]; [Caruso, Silliman, Demissie, Greenfield, & Wagner, 2000]). Males and Blacks showed greater functional impairment than females and Whites in our study. Dunlop, Manheim, Sohn, Liu, and [Chang (2002)] also found that gender and race predicted moderate functional impairment in older adults, and chronic conditions appeared to be associated with moderate functional limitations in older women and Blacks. Our data also demonstrated that the comorbidity count was moderately associated with functional status. This may explain why black older adults who experienced a greater number of comorbid conditions than Whites had more functional impairment. However, the possible explanation for the discrepancy with [Dunlop and colleagues' (2002)] findings is that males in our study had more severe symptoms, which may greatly influence their functional status.

### *Clinical Implications*

The occurrence of depression and diabetes together in older adults pose multiple implications for health care providers, especially mental health nurses. Although the sample in this study had low levels of symptom distress and reasonably high levels of functioning, there was a sufficient predictive relationship between symptom distress and depressive symptoms. Thus, frequent assessment for risk of depressive symptoms is warranted for older adults with both diabetes and moderate levels of symptom distress. Older adults often display depressive symptoms, which, while not sufficient to currently meet the criteria for a diagnosis of major clinical depression, are symptomatic enough to pose risk to diabetics regarding their mental health, self-care, and their perceived quality of life. Therefore, health care professionals should assess older adults even with mild symptom distress and moderate levels of functioning for depressive symptoms. Assessment of this population's level of symptom distress associated with chronic illnesses, especially diabetes, is important in determining their potential risk for clinical depression or associated symptoms representing sub-threshold depression



([Whittemore, Melkus, & Grey, 2004]).

Although the respondents' daily functioning in the current study was above average and a negligible predictor of depression, functional status has been reported in other studies as a significant predictor of depression ([Fisher et al., 2001]). Therefore, assessment of functional status also may be important to identifying those older adults at risk for depression. Clinicians in all settings should consider screening for depression in older adults especially those with diabetes, high levels of symptoms of distress, and with some evidence of functional impairment. Living environment could have an impact on self-reports of symptom distress and depressive symptoms. The fact that our sample has higher levels of functioning and relatively low levels of symptom distress and lower depressive symptoms than other samples living in senior subsidized public housing may be due to the social and health support features of their residential environment. Settings like the one in this study with a nursing wellness center, onsite checkups, home visits, and congregate meals may represent a potential model for promoting wellness and detecting sublevels of depressive symptoms, symptom distress, and functional status.

Active engagement in comprehensive holistic nursing care for older diabetic patients with risk for depression is essential. Patients should be given information related not only to medications, therapy, and diabetic self-care, but also to depression ([McKellar, Humpeys, & Plette, 2004]). Intervention studies have shown that education, problem-solving treatment, or support for antidepressant management can decrease depression in older diabetic patients ([Williams et al., 2004]). Early treatment and management of depression has implications for individuals' abilities to manage diabetic self-care and subsequently their quality of life ([McKellar, Humphreys, & Plette, 2004]). For this reason, among others, the ADA works with Screening for Mental Health and co-sponsors the National Depression Screening Day ([ADA, 2005b]). This is an excellent example of how holistic care not only for medical, but also mental health is important. Nurses working together in the community, through home health agencies, health departments, and physician practices must include mental health in their plan of care; just as mental health nurses should take an active role in providing holistic medical care to their clients.

### *Limitations and Future Studies*

Limitations of the study include small sample sizes, which limit the generalizability of the findings. In addition, other factors that may be associated with the onset of depression, such as complications of diabetes ([Caruso et al., 2000]), living alone, low socioeconomic status ([Pibernik-Okanovic, Peros, Szbo, Begict, & Metelko, 2005]; [Swenson, Baxter, Shetterly, Scarbro, & Hamman, 2000]), and absence of social support, need to be considered in future studies. Research is needed to identify effective interventions to manage symptom distress and improve functioning and quality of life.

### CONCLUSION

Our study found that gender, race, number of comorbid conditions, symptom distress, and functional status together are related to the incidence of depression in older adults with diabetes. Symptom distress was the most significant predictor of depression. These findings serve as an important reminder for nurses to assess symptom distress level and functional status, and screen for depressive symptoms in older adults with diabetes. Effective diabetes education should include information related to physical health, self-care management, and mental health. Having diabetes may not be a sufficient trigger for the onset of depression, but having diabetes is likely to increase the risk, because of concomitant effects on pain, stress, and loss of mobility and independence. Support for this project was provided by the School of Nursing and the Office of Research and Private/Public Partnerships at the University of North Carolina at Greensboro.

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