A Descriptive and Comparative Study of the Prevalence of Depressive and Anxiety Disorders in Low-Income Adults With Type 2 Diabetes and Other Chronic Illnesses

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OBJECTIVE — To determine whether type 2 diabetes contributes to the presence of depressive and anxiety disorder diagnoses in low-income adults with hypertension, asthma, and/or arthritis.

RESEARCH DESIGN AND METHODS — Using a cross-sectional design, this study administered a structured diagnostic interview to low-income primary care patients diagnosed with type 2 diabetes, hypertension, arthritis, and asthma, as well as to those with no chronic illness ($n = 326$), to determine the 12-month prevalence of depressive and anxiety disorders. A logistic regression (LR) model was used to assess whether a diagnosis of depression and/or anxiety was associated with type 2 diabetes after adjusting for known risk factors.

RESULTS — A high prevalence rate of depressive and/or anxiety disorders was found in the total sample (29%) and in all three illness groups: type 2 diabetes (36%), other chronic illnesses (24%), and no chronic illness (31%). Using LR, a main effect was detected for illness group when age and education were controlled ($\chi^2 = 22.66$, df 4, $P = 0.000$). Specifically, the odds of occurrence of a depressive and/or anxiety disorder in those with comorbid type 2 diabetes were twice that in the nondiabetic, chronically ill comparison group (odds ratio 2.26, 95% CI 1.28–4.01, $P = 0.005$).

CONCLUSIONS — These results suggest a positive contribution of type 2 diabetes to increased rates of depressive and/or anxiety disorders in patients with hypertension, asthma, and/or arthritis and support prior research that type 2 diabetes may serve as an indicator of depression and anxiety in low-income adults treated in primary care clinics.

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The comorbidity of mental and physical illness is currently of considerable interest. It is generally accepted that an increased risk of psychiatric impairment accompanies the presence of a medical illness (1). Hypertension has been proposed as a risk factor for depression, given that cerebrovascular and ischemic changes in the brain may confer vulnerability to depression through independent and synergistic mechanisms ("Vascular Depression" Hypothesis) (2,3). Patients with rheumatoid arthritis have been shown to have significantly more depressive and anxiety symptoms than age- and sex-matched control subjects (4). The presence of asthma has been associated with increased anxiety and depression, in both those with acute life-threatening asthma and patients with community-based asthma (5). Furthermore, asthma has been found to be a particular risk factor for panic disorder (6).

Although some research suggests that mood and anxiety disorders are more prevalent among adults with diabetes (7–10), the evidence is contradictory. Other studies report that although medical conditions in general are a risk factor for affective disturbance, the contribution of diabetes may not add any additional risk above that found for chronic illness (11–15). This would suggest that factors involved in the general burden of illness contribute to the observed elevated prevalence of affective disturbance seen in patients with diabetes (16). In light of these inconsistent conclusions, the determination of whether depression and anxiety disorders are more common in patients with diabetes than in those without diabetes has yet to be reliably determined.

Interpreting studies comparing psychiatric prevalence rates in patients with diabetes and other medical conditions has been hampered by a number of biases and methodological problems (e.g., reliance on self-report screening measures, lack of physician verification of disease status). Additionally, most studies of psychiatric disturbance in diabetes have focused on depression, whereas few have studied anxiety disorders (17,18). Finally, prior studies have typically grouped type 1 and type 2 diabetic patients in the same cohort. Given that the affective experiences of individuals with these distinct diseases may vary substantially, it may be impor-

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Abbreviations: DIS-IV, Diagnostic Interview Schedule for Diagnostic and Statistical Manual of Mental Disorders-IV; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders-IV; LR, logistic regression.

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

tant to study these two patient populations separately.

A variety of demographic characteristics (e.g., sex, ethnicity, low income) may be associated with depressive and anxiety disorders. Most studies indicate that African-American women are more likely to be depressed than white women (19–21). However, although ethnicity may be an important determining risk factor, sex and socioeconomic status may be more significant predictors. Low income has also been associated with increased depressive and anxiety symptomatology in several studies (22–24). Therefore, given these documented risk factors, low-income minority women with chronic medical conditions may be at increased risk for depressive and anxiety disorders.

A cross-sectional study was conducted in a group of predominantly economically disadvantaged primary care adults with the following primary objective: to examine the contribution of the diagnosis of type 2 diabetes to the presence of depressive and/or anxiety disorders in those with comorbid medical illness. Because type 2 diabetes represents 90–95% of all patients with diabetes (25), the present study focused exclusively on patients with type 2 diabetes.

RESEARCH DESIGN AND METHODS

The initial sample consisted of 430 adult participants between 18 and 80 years of age. The refusal rate was 21.4%. Of the initial sample, only participants who attended the 12-month follow-up interview and for whom no data were missing were included in the current analysis ($n = 403$, 93.7% of the original sample). There were no significant differences between completers and dropouts with regard to demographic characteristics. Of the 403 participants who completed the study, 77 had medical and psychiatric conditions not of interest in the current study (e.g., gastroesophageal reflux disease, dementia, psychosis). Therefore, they were eliminated from the study and the remaining subjects ($n = 326$) were used in all analyses.

Measures

Medical record review. A primary care physician conducted medical record reviews to determine the presence of each medical illness. Specifically, medical documentation and laboratory findings were used to select patients with type 2 diabetes, asthma, rheumatoid arthritis, osteoarthritis, and hypertension, as well as those without chronic medical conditions.

Diagnostic Interview Schedule for Diagnostic and Statistical Manual of Mental Disorders-IV (DIS-IV). The DIS-IV (26) is a structured interview designed to provide reliable and valid psychiatric diagnoses based on the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV) (27). The DIS-IV determines diagnoses for lifetime and for the past 12 months. For lifetime diagnoses, the DIS-III-R test-retest reliability ranges from 0.37 to 0.59. A high concordance exists between the diagnoses of psychiatrists and the DIS (i.e., κ-coefficients between 0.40 and 1.00) (28–30). The concordance increases when the disorders are current (i.e., past 12 months) (30). There is evidence for the sensitivity of the DIS in studies of patients with diabetes (31,32). Given the lack of published empirical research documenting the validity of the fourth edition of the DIS, significant effort was made to ensure inter-rater reliability in the current study (i.e., regular observation of interviews).

Procedure

This study was conducted as part of a larger study of stress, psychopathology, and medical utilization. Random-number tables were used to select adult patients from sign-in logs of two primary care clinics located within a public medical center. Those who consented completed an assessment battery consisting of demographic, stress, and health-related self-report questionnaires. All participants were contacted via telephone on a randomly chosen day every other month for the subsequent year to administer measures of stress. At the end of 1 year, participants were invited for a face-to-face interview. At that time, the DIS-IV was administered in person by doctoral candidate research associates with Master's degrees. All participants were financially compensated for their participation.

Statistical analyses

Preliminary analyses. Given the high rate of medical illness comorbidity in this sample (e.g., all patients with type 2 diabetes also had hypertension), it was not possible to examine the contribution of each medical illness independently. Therefore, three illness groups were formed (i.e., type 2 diabetes [with or without other chronic illnesses], other chronic illnesses without type 2 diabetes [i.e., hypertension, asthma, osteoarthritis, rheumatoid arthritis], and no chronic illnesses). To identify potential confounds for later analyses, demographic differences were examined between the medical illness groups using unadjusted χ^2 test and ANOVA. Similarly, each psychiatric diagnostic group (depression only, anxiety only, both depression and anxiety, and no DSM-IV diagnoses) was compared. Based on these preliminary results, several potential confounds were identified. Therefore, a backward stepwise logistic regression (LR) using $P < 0.05$ to retain variables in the model was conducted in which these potential confounds were entered as a block. The confounds identified were used as covariates in the main analyses.

Descriptive statistics were used to generate a profile of each illness group based on the presence of depression only, anxiety only, both anxiety and depression, and those with no DSM-IV diagnoses. To determine whether there were any significant differences between each illness group in prevalence rates of each psychiatric disorder, the data were analyzed using an unadjusted 3×4 χ^2 test. Given the lack of significant univariate findings and to avoid the issue of multicollinearity, the four diagnostic groups were collapsed into two categories: depressive and/or anxiety disorders and no DSM-IV diagnoses. To determine whether there were any significant differences between each illness group in the prevalence of depression and/or anxiety disorders, an unadjusted 3×2 χ^2 test was conducted.

Main analyses. To control for the potential confounds identified in the preliminary analyses, an LR analysis was conducted in which covariates were entered together in block 1. In block 2, illness group (no illness, type 2 diabetes, and other chronic illness) was entered together. After detecting a main effect for illness group, post hoc group comparisons were analyzed. First, the no illness group versus the type 2 diabetes group and the no illness group versus the other chronic illness group were evaluated with the no illness group serving as the reference category. Next, type 2 diabetes versus other illness was evaluated using the other illness group as the reference.

Table 1—*Demographic characteristics by medical illness group* (N = 326)

Variable	Total (N = 326)	No medical illness (17.8%, n = 58)	Type 2 diabetes (31.9%, n = 104)	Other chronic illness (50.3%, n = 164)	P*
Sex					0.009†
Female	80.4 (262)	93.1 (54)	73.1 (76)	80.5 (132)	
Male	19.6 (64)	6.9 (4)	26.9 (28)	19.5 (32)	
Race					0.18 (NS)
Black	74.2 (242)	72.4 (42)	78.8 (82)	72.0 (118)	
White	25.5 (83)	25.9 (15)	21.2 (22)	28.0 (46)	
Hispanic	0.3 (1)	1.7 (1)	0 (0)	0 (0)	
Marital status					0.000†
Single	37.2 (121)	50.9 (29)	16.3 (17)	21.3 (35)	
Married	24.9 (81)	38.6 (22)	48.1 (50)	29.9 (49)	
Other	37.8 (123)	10.5 (6)	35.6 (37)	48.8 (80)	
Employment					0.009†
Unemployed	59 (190)	44.8 (26)	69.2 (72)	57.5 (92)	
Employed	41 (132)	55.2 (32)	30.8 (32)	42.5 (68)	
Insurance					0.45 (NS)
None	77.2 (251)	81 (47)	76.9 (80)	76.1 (124)	
Medicare	8.6 (28)	3.4 (2)	12.5 (13)	8 (13)	
Medicaid	6.5 (21)	6.9 (4)	3.8 (4)	8 (13)	
Private	7.7 (25)	8.6 (5)	6.7 (7)	8 (13)	
Age (years)	47.28 (13.91)	32.19 (11.34)	50.59 (12.18)	50.52 (12.19)	0.000†
Education (years)	11.10 (2.72)	12.55 (1.69)	10.16 (3.04)	11.19 (2.56)	0.000†
Monthly income ($)	498.19 (451.06)	496.42 (393.98)	455.34 (460.02)	525.99 (464.45)	0.459 (NS)
Number of chronic illnesses	2.60 (1.52)	0	3.29 (1.21)	2.93 (1.20)	0.000†

Data are n (%) or means (SD). *$P < 0.01$; †χ^2 test for categorical variables and ANOVA for continuous variables comparing the three medical illness groups.

RESULTS — As illustrated in Table 1, the sample patients were predominantly women (80%) and African American (74%), and the average individual monthly income was $498.19 (SD 451.06; range 0–3,600; skewness 2.14). Individual monthly income was calculated by dividing the total household income by the number of persons in the house. Further, the household monthly income was $980.96 (median 811.00, SD 725.96), which corresponds to a household annual income of $11,771. The average number of persons living in the home was 3.02 (SD 1.61). Based on the U.S. Bureau of Census estimates (33), ~70% of the participants had an annual household income that placed them below the poverty threshold for an average family size of three adults ($13,853). Overall, the sample was representative of the demographic profile of patients seen at public primary care clinics in the state of Louisiana and elsewhere (34).

Preliminary analyses

Medical illness groups. As indicated in Table 1, significant illness group difference were detected for sex ($\chi^2 = 9.46$, $P = 0.009$), marital status ($\chi^2 = 41.57$, $P < 0.000$), employment status ($\chi^2 = 9.46$, $P = 0.009$), age ($F = 55.40$, df 2, $P < 0.000$), number of chronic illnesses ($F = 133.37$, df 2, $P < 0.000$), and education ($F = 15.75$, df 2, $P < 0.000$).

Diagnostic groups. As indicated in Table 2, after collapsing the diagnostic groups into those with a depressive and/or anxiety diagnosis and those with no DSM-IV diagnoses, significant diagnostic group differences were detected for sex ($\chi^2 = 5.26$, $P = 0.02$) and years of education ($F = 9.65$, df 1, $P = 0.002$).

Comparative prevalence estimates. As indicated in Table 3, an unadjusted χ^2 analysis found no significant differences between any of the three illness groups in percentage of participants diagnosed with depression, anxiety disorders, or both anxiety and depression, and those with no DSM-IV disorders ($\chi^2 = 8.18$, df 6, $P = 0.225$). Further, when the psychiatric groups were collapsed into depression and/or anxiety and no psychiatric diagnoses, χ^2 analyses again found no significant group differences ($\chi^2 = 4.48$, df 2, $P = 0.106$). However, covariates identified in preliminary univariate analyses and other known risk factors for increased rates of depression and anxiety were not controlled in these preliminary analyses.

Preliminary logistic regression. Results of a preliminary LR analysis in which all potential confounds were entered as a block identified sex and education as significant covariates. Specifically, woman had approximately double the odds of having a depressive and/or anxiety disorder (odds ratio [OR] 2.22, 95% CI 1.06–4.64, $P = 0.03$), and the diagnostic probability increased by an OR of 1.19 (95% CI 1.06–1.34, $P = 0.002$) for each year of education. Therefore, both sex and years of education were statistically controlled in the main LR analyses.

Main LR analyses

A significant main effect was found when sex and education were entered together in block 1 ($\chi^2 = 14.30$, df 2, $P = 0.001$). In block 2, the medical illness group was entered and a significant main effect was also observed ($\chi^2 = 22.66$, df 4, $P < 0.000$). Although a significant main effect for illness group was found for the overall illness group model ($P = 0.016$), post hoc

Table 2—*Demographic characteristics by psychiatric diagnostic group (N = 326)*

Variable	Depressive diagnoses (10%, *n* = 33)	Anxiety diagnosis (10%, *n* = 33)	Both (8.6%, *n* = 28)	No diagnosis (71%, *n* = 232)	*P**	Depressive and/or anxiety diagnosis (28%, *n* = 94)
Sex					0.129 (NS)	0.022†‡
Female	90.9 (30)	84.8 (28)	89.3 (25)	77.2 (179)		88.3 (83)
Male	9.1 (3)	15.2 (5)	10.7 (3)	22.8 (53)		11.7 (11)
Race					0.60 (NS)	0.435 (NS)†
Black	60.6 (20)	78.8 (26)	71.4 (20)	75.8 (176)		70.2 (66)
White	39.4 (13)	21.2 (7)	28.6 (8)	23.7 (66)		29.8 (28)
Hispanic	0 (0)	0 (0)	0 (0)	.4 (1)		0 (0)
Marital status					0.159 (NS)	0.067 (NS)†
Single	21.2 (7)	6.3 (2)	21.4 (6)	28.4 (66)		16.1 (15)
Married	33.3 (11)	53.1 (17)	39.3 (11)	35.3 (82)		41.9 (39)
Other	45.5 (15)	40.6 (13)	39.3 (11)	36.2 (84)		41.9 (39)
Employment					0.046‡	0.364 (NS)†
Unemployed	54.5 (18)	42.4 (14)	77.8 (21)	59.8 (137)		57.0 (53)
Employed	45.5 (15)	57.6 (19)	22.2 (6)	40.2 (92)		43 (40)
Insurance					0.392 (NS)	0.353 (NS)†
None	72.7 (24)	81.3 (26)	82.1 (23)	76.7 (178)		78.5 (73)
Medicare	9.1 (3)	0 (0)	10.7 (3)	9.5 (22)		6.5 (6)
Medicaid	9.1 (3)	3.1 (1)	0 (0)	7.3 (17)		4.3 (4)
Private	9.1 (3)	15.6 (5)	7.1 (2)	6.5 (15)		10.8 (10)
Age (years)	46.18 (13.37)	47.45 (11.13)	41.25 (12.32)	48.14 (14.40)	0.09 (NS)	*P* = 0.08 (NS)† 45.16 (12.45)
Education (years)	12.10 (2.69)	11.75 (2.25)	11.60 (2.13)	10.18 (2.80)	0.018‡	*P* = 0.002†§ 11.83 (2.36)
Income ($)	558.31 (454.75)	647.45 (502.93)	411.85 (471.33)	478.83 (437.74)	0.12 (NS)	*P* = 0.22 (NS)† 545.98 (481.46)
Number of illnesses	2.93 (1.39)	2.66 (1.77)	2.60 (1.83)	2.54 (1.46)	0.58 (NS)	*P* = 0.29 (NS)† 2.74 (1.65)

*Data are *n* (%) or means (SD). χ^2 test for categorical variables and ANOVA for continuous variables comparing the four diagnostic groups (depressive diagnosis, anxiety diagnosis, both diagnoses, and no diagnosis); †χ^2 test for categorical variables and ANOVA for continuous variables comparing those with depression and/or anxiety diagnosis and those with no diagnosis; ‡$P < 0.05$; §$P < 0.01$.

comparison found no significant differences when the no chronic illness group was contrasted with the type 2 diabetic group (95% CI 0.993–4.35, $P = 0.052$; Wald 2.09, 1) or the other chronic illness group (0.465–1.81, $P = 0.084$; Wald 0.370, 1). The only significant group contrast was between the type 2 diabetes group and other chronic illness group. Specifically, when compared with the group with other chronic illnesses, the contribution of type 2 diabetes increased the probability of having a depressive and/or anxiety disorder diagnosis by an OR of 2.26 (1.28–4.01, $P = 0.005$; Wald 6.74, 1).

CONCLUSIONS — The results of this study indicate that, after controlling for sex and education, the contribution of the diagnosis of type 2 diabetes is associated with increased depressive and/or anxiety disorder diagnoses in a sample of low-income adults seen in primary care clinics. A higher 12-month prevalence of affective disturbance in patients with comorbid type 2 diabetes was expected given the effect of diabetes-associated self-management demands (i.e., controlled dietary intake, social interference, exercise requirements) may have on daily functioning. Perhaps most important from a psychological and behavioral perspective is that patients must adhere to the demanding requirements of diabetes management while knowing that eventual onset of complications is almost inevitable.

However, our results conflict with those found by Weyerer et al. (14), who observed that although patients with diabetes had a higher 7-day prevalence of psychiatric impairment than those with no somatic illness, no differences were noted when they were compared with individuals with other somatic illnesses. However, their study included predominantly Caucasians with both type 1 and type 2 diabetes who volunteered to participate in a community field study. Further, as compared with our sample, they reported a lower prevalence of patients diagnosed with diabetes (4%) and a lower percentage of patients with depression (i.e., 27.3% met criteria for a depressive disorder during the prior 7-day period). Wells et al. (13) examined a general category of psychiatric disorders in eight chronic medical conditions in a community sample in the Los Angeles site of the Epidemiologic Catchment Area Program. They reported no significant association between the 6-month prevalence of psychiatric diagnoses in patients diagnosed with diabetes when compared with those with other chronic medical conditions and those with no medical conditions (22.7, 24.7, and 17.5%, respectively). However, the diagnosis of diabetes was

Table 3—*Prevalence and results of comparative analyses of DSM-IV depressive and anxiety diagnoses in the total sample and within each medical illness group*

Psychiatric diagnosis group	Total sample (N = 326)	No chronic illness (n = 58)	Type 2-diabetes (n = 104)	Other chronic illness (n = 164)
No DIS-IV diagnosis	71 (232)	69 (40)	64 (67)	76 (125)
Depressive disorder diagnosis:§	10 (33)	7 (4)	13 (13)	10 (16)
Major depressive disorder, single episode	6 (20)	7 (4)	11 (11)	3 (5)
Major depressive disorder, recurrent	9 (28)	12 (7)	7 (7)	9 (14)
Dysthymia	0.003 (1)	0	0.09 (1)	0
Anxiety disorder diagnosis:§	10 (33)	12 (7)	11 (11)	9 (15)
Panic disorder, with agoraphobia	1 (4)	2 (1)	0.009 (1)	1 (2)
Panic disorder, without agoraphobia	2 (6)	3 (2)	3 (3)	0.006 (1)
Post-traumatic stress disorder	10 (31)	14 (8)	11 (11)	7 (12)
Obsessive-compulsive disorder	2 (5)	2 (1)	0.009 (1)	2 (3)
Generalized anxiety disorder	7 (23)	12 (7)	9 (9)	4 (7)
Both depressive and anxiety disorder diagnosis	9 (28)	12 (7)	13 (13)	5 (8)
Depression and/or anxiety*†	29 (94)	31 (18)‡	36 (37)‡	24 (39)‡

*Unadjusted χ^2 test results comparing the three medical illness groups was NS (P = 0.10); †LR results after adjusting for sex and years of education found a main effect for illness group (P = 0.016); ‡LR post-hoc comparisons noted a significant contrast effect when comparing those with type 2-diabetes with those with other chronic illnesses (P = 0.005). No significant differences were found when those with type 2 diabetes were compared with those with no illness (P = 0.052) or when those with other chronic illnesses were compared with those with no illness (P = 0.80); §there were no participants in the sample who met DSM-IV criteria for depressive disorder, Not Otherwise Specified, or social phobia.

based on self-report and was not validated by physician examination or laboratory studies.

Our results may be explained by several factors. Consistent with prior research examining the prevalence of depressive disorders in primary care populations, our study identified elevated rates of both depressive and anxiety disorders. Although these results are at the high end of the 10–30% reported in prior general population–based, primary care studies (35,36), they were expected given the results of research documenting elevated rates of affective disturbance in women (27), those with chronic medical illnesses (37), and those from lower socioeconomic backgrounds (38). Finally, the stress of racial attitudes may combine with the strain of poverty to make low-income African Americans particularly vulnerable to depressive and anxiety disorders (39).

Finally, although it is estimated that 6% of the U.S. population currently suffers from diabetes (25), 26% of the originally screened sample patients (n = 403) had type 2 diabetes and 41% of the sample had hypertension, asthma, and/or arthritis, often comorbid with type 2 diabetes. This high rate of chronic illness may also serve to explain the high rates of psychopathology. These data suggest important implications for recognition of affective disorders in low-income, primary care adults. Particularly, the high rate of depression and anxiety disorders found in this sample emphasizes the need for screening measures that sensitize clinicians to the presence of these psychiatric disorders.

The lack of a significant difference noted when unadjusted analyses were used to compare the three illness groups flies in the face of prior research and thereby deserves further clarification. The influence of sex and education in this sample may account for these seemingly inconsistent findings. Results of analyses of each medical illness group found that the group with no chronic illnesses was younger and was composed of a smaller percentage of men compared with those with type 2 diabetes and those with other chronic illnesses. Further, those with no medical illness completed the highest number of years of education as compared with those in the other groups. Therefore, in this sample, it may be that the young, relatively educated women with no chronic illness who attend primary care clinics do so seeking assistance with somatic complaints, possibly secondary to depressive and/or anxiety disorders.

Consistent with prior research, the odds of having an affective disorder were approximately twice as high in women as in men (27). Biological research has implicated genetic factors and hormonal influences as essential variables for increased vulnerability to psychopathology in women. Interestingly, results of the present study also identified education level as a unique risk factor predicting depression and anxiety, although not in the direction expected. Research examining the social patterns of depression has consistently found higher levels of education to be associated with lower levels of depression; however, results of the present study indicate that as the number of years of formal education increase, the corresponding odds of having an affective disorder also increase (at a rate of 16% per year of education). Accordingly, it may be that these factors predisposed the group with no chronic illness to increased rates of depression and anxiety disorders; however, this hypothesis deserves further research.

Limitations and future directions

Several limitations of the study deserve comment. First, the results may be limited to similar primary care populations of low-income adults. Far exceeding the ratio in the general population with diabetes, the ratio of women to men in this sample was 3:1. Although women with diabetes are more likely to attend primary care clinics (40), these results should not be assumed to apply to all low-income

adults in other settings and in other demographic regions. There is a possibility that other demographic and medical factors not examined in the current study may serve as predictors of depression and anxiety disturbance in this population. The failure to document the onset of each medical and psychiatric condition raises the possibility that psychiatric disorders may have been present before the onset of a medical illness. This study is also limited by the small sample size (e.g., only 33 patients had an anxiety disorder) and by the failure to assess the degree of functional impairment associated with disease. Finally, although the results of the present study suggest that low-income adults with type 2 diabetes may be at increased risk for depressive and anxiety disorders (i.e., a disease-specific model), the cross-sectional, correlational nature of the design limits causal interpretations. The reasons for the observed association between depression and/or anxiety disorders and comorbid type 2 diabetes are, at best, unclear at this time.

Future studies are recommended to attempt to replicate these findings using larger sample sizes. Although not statistically significant, the distinctively different pattern of depressive and anxiety disorders across medical illness groups (e.g., those with no illnesses had the highest prevalence rates of depressive illnesses but the lowest rates of anxiety disorders) may argue against combining the depressive illness and anxiety disorder diagnoses into one category. Therefore, future studies are recommended to evaluate the contribution of each medical diagnosis to the presence of each independent psychiatric condition. Furthermore, future studies might include longitudinal designs and an examination of functional impairment (e.g., disease burden, ambulatory status) when examining prevalence rates of depressive and/or anxiety disorders across medical conditions. Finally, identification of variables relatively unique to type 2 diabetes, as well as those common across medical disorders (e.g., social support), may assist in elucidating factors contributing to increased depressive and anxiety disturbance and assist clinicians in planning interventions.

In summary, the main implication of this study is that a diagnosis of type 2 diabetes may be an important contributor to the presence of depressive and anxiety disorder diagnoses in low-income primary care patients. If confirmed in prospective longitudinal studies, this supports the premise that biochemical and/or behavioral factors associated with the disease of diabetes may be uniquely associated with depression and anxiety disturbance.

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