Health Perception, Pain, and Disability as Correlates of Anxiety and Depression Symptoms in Primary Care Patients

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Background: **Anxiety and depression occur frequently, and recognition of their symptoms can be difficult because of comorbid medical conditions. The purpose of this study was to analyze the relations among symptoms, diagnoses, and severity of illness as indicators of anxiety and depression in primary care.**

Methods: **This was an observational, cross-sectional study of adult patients in a large, academic family medicine clinic. Patients completed the Duke Health Profile, which measures health-related quality of life and screens for anxiety and depression. Providers recorded patient diagnoses and assessed severity of illness.**

Results: **Patients with higher levels of anxiety and depression symptoms were more likely to have the diagnoses of headache, osteoarthritis, abdominal pain, and diabetes mellitus. These diagnoses, however, were no longer highly associated with anxiety and depression after controlling for age, sex, payer status, perceived health, pain, and disability. The indicators of high anxiety and depression symptom levels that persisted after controlling for all the other variables were female sex, low perceived health, more pain, and greater disability.**

Conclusion: **In a primary care setting, female sex, self-reported perceived health, pain, and disability were more predictive of anxiety and depression than any of the most prevalent medical illnesses. Primary care providers need to be knowledgeable about these health measures so they can recognize patients at risk for anxiety and depression regardless of their medical diagnoses. (J Am Board Fam Pract 2002;15:183–90.)**

Anxiety and depression occur frequently in the general population, with estimates of lifetime prevalence as high as 25% for anxiety and 20% for depression.[1] Primary care providers interact daily with a large sample of the general population and have the task of distinguishing which patients are anxious and depressed from all the patients who seek care for undifferentiated symptoms and multiple health problems. The ability to recognize anxiety and depression symptoms as psychologically important is sometimes difficult, because the same symptoms can be characteristic of medical conditions other than psychological. For example, fatigue can be a symptom of depression as well as congestive heart failure.

Providers have been made aware that anxiety and depression are often associated with specific medical illnesses and have an adverse effect on their outcomes. For example, patients with anxiety have been shown to have a high prevalence of ulcer disease, angina, and thyroid disease.[2] Anxiety and depression have been associated with poorer blood glucose control and more complications in diabetes mellitus,[3] and treatment of depression has been shown to improve control.[4] Depression has been found to worsen the outcome of myocardial infarction[5] and many other medical conditions.[6] There is no evidence, however, that specific medical diagnoses are independent markers for anxiety and depression.

The question arises as to whether there might be a set of symptoms and perceptions that are shared by different medical conditions which might be

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indicators of anxiety and depression in addition to the symptoms traditionally attributed to anxiety and depression. A partial answer was found in the Medical Outcomes Study,[7,8] which measured health-related quality of life in patients with the chronic medical conditions of diabetes, hypertension, angina, myocardial infarction, congestive heart failure, chronic lung problems, gastrointestinal problems, back problems, and arthritis. Those patients who also had depressive symptoms or a diagnosis of depressive disorder reported more often three generic characteristics: low perceived health, increased pain, and more disability in terms of days in bed.[8]

To examine further the issue of medical illness symptoms that might indicate comorbid anxiety and depression, we undertook an exploratory study to analyze the relations between patient-reported symptoms and perceptions and provider-reported diagnoses and severity of illness for patients who completed a generic health-related quality-of-life questionnaire in a large primary care clinic.

Methods

Study Design and Study Population

We did secondary analyses on data that were collected in another primary care study.[9] Adult patients, aged 18 years and older, were recruited at the Duke Family Medicine Center, a university-based family practice clinic in Durham, NC, which has approximately 50,000 patient visits per year. At the time of the study, primary care was provided by 15 faculty physicians, 18 residents, 2 physician assistants, and 1 nurse practitioner. Enrollment and data collection occurred during a 30-month period ending in March 1998.

Patients were randomly selected by eight age-sex strata: male and female, in age-groups 18 to 33 years, 34 to 49 years, 50 to 65 years, and older than 65 years. Excluded were Duke University students, employees of the Duke Family Medicine Center, and patients declining to complete questionnaires. Eligible patients completed the Duke Health Profile (DUKE) questionnaire (Appendix 1)[10,11] in the waiting room before the visit with the provider, and the provider completed the Duke Severity of Illness Checklist (DUSOI)[11,12] within 24 hours after the visit.

The DUKE is a well-validated 17-item questionnaire with 11 subscales that measure functional health status and health-related quality of life during a 1-week period.[10,11] Items on 5 of the subscales (physical health, mental health, social health, perceived health, and disability) are independent of each other, and those on the other 6 (anxiety, depression, anxiety-depression, self-esteem, pain, and general health) are subsets of at least one of the independent groups.

The Duke Anxiety-Depression Scale (DUKE-AD)[11–13] is the 7-item anxiety-depression subscale of the DUKE that has been validated separately as a screening instrument for anxiety and depression. The items inquire about nervousness, feeling depressed or sad, getting tired easily, trouble sleeping, being comfortable around people, difficulty concentrating, and giving up too easily (items 4, 5, 7, 10, 12, 13, and 14 in Appendix 1). Validation of the DUKE-AD[13] has supported its predictive accuracy by receiver operating characteristic curves of 72.3% for major types of anxiety and 78.3% for major types of depression as defined by the *Diagnostic and Statistical Manual of Mental Disorders, Third Edition* (DSM-III).[14] High risk of major anxiety and depression was defined as a DUKE-AD score greater than 30 on the scale of 0 to 100.

Three DUKE subscales (perceived health, pain, and disability) consist of single items (items 3, 11, and 17 in Appendix 1) that are not contained in the DUKE-AD subscale. In this context, disability is indicated by the proportion of time during the preceding week that the respondent was confined to home or health care facility because of a health problem.

The DUSOI[11,12] measures severity of illness by having the provider assess severity of each problem based on four parameters: symptom level, complications, prognosis without treatment, and treatability, ie, expected response to treatment. The diagnosis severity scores are combined into one overall score for each patient. In the present study, the overall severity score for medical diagnoses was calculated by subtracting the severity score for mental health diagnoses from the total overall score.

The following sociodemographic and diagnostic data were obtained from the clinic administrative database: age, sex, race, payer, and diagnoses recorded by the provider treating the patient. The provider was unaware of patient responses on the DUKE. The study was approved by the Duke University Medical Center Institutional Review Board.

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Statistical Analysis

Student's t test was used to test for statistically significant differences between continuous variables, such as age, perceived health, disability, pain, and severity of illness for patients having high levels of anxiety and depression symptoms (DUKE-AD score $>$ 30) and for patients having low levels (score $<$ 30). The chi-square statistic was used to test for differences between categorical variables, such as payer status, sex, and diagnosis. For multivariate analyses, logistic regression was used to measure the predictive effect of the independent variables on high and low DUKE-AD scores.

Results

Of the 3,031 adult patients who were asked to complete the DUKE during the 30-month study, 1,997 (65.9%) agreed. Comparison of these patients with the 1,034 who declined indicated that the 1,997 who agreed were somewhat older (47.1 vs 44.6 years, $P = .0001$) and were more likely to be female (66.9% vs 63.0%, $P = .03$). There were no statistically significant differences by race. Nine of the 10 most common diagnoses were the same in both groups. Of the 1,997 patients who completed the DUKE, 1,822 answered all the DUKE-AD subscale questions and are included in the analyses of this study. The mean age of the 1,822 respondents was 46.1 (±16.4 SD) years, 66.7% were female, 62.1% were white, 34.1% were African American, and 3.8% were of other races.

Of the 1,822 study patients, 541 (29.7%) had high levels of anxiety and depression symptoms. As shown in Table 1, patients with higher symptom levels were more likely than those with lower levels to be older, female, African American, and Medicaid or Medicare recipients. Also, they had higher severity of physical illness, pain, and disability scores, and lower perceived health scores. The providers, who were blinded to the questionnaire results, rated severity of physical health problems higher for patients who had more symptoms of anxiety and depression. The patients who had more anxiety and depression symptoms self-reported poorer perception of their own health status, more pain, and increased disability (days of confinement during the previous week) than did patients with fewer anxiety and depression symptoms.

The 1,822 patients had 3,982 diagnoses reported by their providers, with the most frequent being health maintenance (25.5%) and hypertension (15.0%). Depression (5.2%) was the fifth most common diagnosis, and anxiety (2.4%) was 14th. Some major medical diagnoses had lower prevalence rates, eg, coronary heart disease (2.2%) and asthma (2.1%). As shown in Table 2, the prevalence of 10 of the 22 most common diagnoses was statistically significantly different when comparing patients with high-anxiety, low-anxiety, and depression symptom levels.

As would be expected, patients with higher symptom levels of anxiety and depression were more likely to have a diagnosis of insomnia, anxiety state, depressive disorder, and other mental illnesses than patients with lower levels. In addition, patients with higher symptom levels were less likely to have the diagnoses health maintenance and hyperlipidemia, which are usually asymptomatic clinically. Patients with high symptom levels, however, had a higher prevalence of the physically manifested illnesses headache, osteoarthritis, abdominal pain, and diabetes mellitus. For example, the prevalence of osteoarthritis in patients with higher anx-

Table 1. Comparison of Sociodemographic Characteristics, Health-Related Quality of Life, and Severity of Illness by Level of Anxiety and Depression Symptoms.

Patient Characteristic	Anxiety and Depression Symptom Level: Higher* (n = 541)	Lower† (n = 1,281)	*P* Value
	%	%	
Female	73.9	63.7	.001
African American	39.4	32.2	.03
Medicaid	11.5	5.0	.001
Medicare	18.9	10.5	.001
	Mean (SD)	*Mean (SD)*	
Age, years	47.7 (16.9)	45.4 (16.2)	.008
Perceived health‡	59.9 (35.2)	82.9 (26.7)	.0001
Disability‡	22.2 (34.9)	8.0 (22.9)	.0001
Pain‡	62.0 (33.3)	39.1 (32.6)	.0001
Severity of illness§	38.4 (21.7)	31.6 (20.2)	.0001

*Higher = score $>$ 30 on Duke Anxiety and Depression Scale (DUKE-AD). Scale from 0–100 from low to high level of symptoms.
†Lower = Score $\leq$ 30 on DUKE-AD.
‡Measured by the Duke Health Profile (DUKE). Scale 0–100 from low to high health-related quality of life.
§Severity of physical health problems as measured by the Duke Severity of Illness Checklist (DUSOI). Scale 0–100 from low to high severity of illness.

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Table 2. Prevalence of 22 Most Common Health Problems by Level of Anxiety and Depression Symptoms (n = 1,822 patients with 3,982 problems).

Diagnosis	Anxiety and Depression Symptom Level		
	Higher* (n = 541)	Lower† (n = 1,281)	*P* Value
Insomnia	2.4	0.4	.001
Anxiety state	5.7	0.9	.001
Depressive disorder	10.9	2.8	.001
Health maintenance	17.9	28.6	.001
Hyperlipidemia	4.1	7.8	.004
Mental illness, other than depression or anxiety	3.7	1.7	.01
Headache	4.4	2.3	.01
Osteoarthritis	2.8	1.2	.02
Abdominal pain	4.1	2.3	.03
Diabetes mellitus	8.5	5.9	.05
Back pain	5.4	4.0	.19
Asthma	2.8	1.9	.23
Tobacco abuse	2.8	3.7	.30
Allergic rhinitis	3.5	2.7	.32
Menopausal symptoms	2.8	3.6	.38
Coronary heart disease	2.6	2.0	.46
Gastroesophageal reflux	2.4	1.9	.54
Obesity	4.1	3.7	.75
Hypothyroidism	2.4	2.2	.78
Pain in limb	2.8	2.8	.79
Pain in joint	4.4	4.7	.87
Hypertension	14.8	15.1	.88

*Higher = score > 30 on Duke Anxiety and Depression Scale, (DUKE-AD). Scale 0–100 from low to high level of symptoms.
†Lower = score ≤ 30 on DUKE-AD.

iety and depression symptom levels was 2.8%, compared with 1.2% for those with lower symptom levels ($P = .02$). There was no statistically significant difference for the remaining 12 health problems, including coronary heart disease and asthma, for which we had expected a difference.

Multivariate analyses were performed to show the predictive effect of sociodemographic characteristics, patient-reported perceived health, pain, and disability and provider-reported diagnoses and severity of illness on high levels of anxiety and depression symptoms. As shown in Table 3, age, race, Medicaid and Medicare status, and severity of physical illness were no longer statistically significant after controlling for perceived health, pain, and disability. Only female sex, lower perceived health, more pain, and greater disability were statistically significant predictors of high anxiety and depression symptoms. For example, the odds ratio (OR) of 0.987 for perceived health indicates that, after controlling for all the other factors in the model, a patient with a perceived health score 20 points lower than another patient would be 1.3 times (or 30%) more likely to have a higher anxiety and depression score. (OR^n, where OR = 0.987and n = −20, 0.987^{-20} = 1.3 increased chance of higher score.)

Additional multivariate analyses were done to include each of the 10 diagnoses that had a statistically significantly different prevalence between high- and low-symptom patients in the univariate analyses. As shown in Table 4, the 10 separate logistic regression models showed that only four diagnoses—insomnia, anxiety state, depressive disorder, and health maintenance—remained statistically significant after controlling for age, sex, race, Medicaid and Medicare status, perceived health, pain, disability, and severity of physical illness. None of the physically manifested diagnoses independently predicted high levels of anxiety and depression symptoms. On the other hand, in all the 10 logistic regressions, female sex, lower perceived health, more pain, and greater disability persisted as statistically significant positive predictors of higher anxiety and depression symptoms.

Discussion

We have shown in this primary care study that female sex and three patient-reported factors (perception of general health, pain, and disability), which are not included as DSM-IV criteria for anxiety or depression, were more closely associated with anxiety and depression symptoms than medical diagnoses or severity of illness as reported by health care providers. The univariate analyses of our study showed that certain medical diagnoses (headache, osteoarthritis, abdominal pain, and diabetes mellitus) were associated with anxiety and depression, as clinicians might predict. After controlling for sex, health perception, pain, and disability in the multivariate analyses, however, these physical problems were no longer statistically significant indicators of anxiety and depression.

Female sex is widely accepted as a risk factor for anxiety and depression. Our finding of perception of general health, pain, and disability as correlates of anxiety and depression confirms, for primary care patients with multiple medical diagnoses, the

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Table 3. Comparison of the Predictive Effects of Sociodemographic Characteristics, Health-Related Quality of Life, and Severity of Illness for the Higher Level of Anxiety and Depression Symptoms (n = 710 patients).

Characteristic	Polarity	Logistic Regression Estimates			*P* Value
		Odds Ratio*	*df*	Chi-Square	
Female	+	1.821	1	7.3	.007
African American	−	0.976	1	0.0	.90
Medicaid	−	0.734	1	0.5	.48
Medicare	+	1.639	1	1.7	.20
Age, years	−	0.995	1	0.4	.54
Perceived health†	−	0.987	1	16.7	.0001
Disability†	+	1.009	1	7.5	.006
Pain†	+	1.017	1	28.9	.0001
Severity of illness‡	+	1.004	1	0.6	.44

Note: Higher level of symptoms = score > 30 on Duke Anxiety and Depression Scale (DUKE-AD). Scale 0–100 from low to high level of symptoms.
*The odds ratio (OR) indicates that n units of change in predictor variable units would increase the chance of higher symptoms by OR^n times.
†Measured by the Duke Health Profile (DUKE). Scale 0–100 from low to high health-related quality of life.
‡Severity of physical health problems measured by the Duke Severity of Illness Checklist (DUSOI). Scale 0–100 from low to high severity of illness.

similar findings of the Medical Outcomes Study[8] for depression in multiple-site patients with a limited group of chronic diagnoses. Chronic pain symptoms are often confused with neurovegetative symptoms of depression,[15] and some researchers suggest that pain is the best indicator of depression in certain populations, such as the elderly.[16] Three of the four individual diagnoses that predicted anxiety and depression symptoms (headache, abdominal pain, and osteoarthritis) in our study are painful conditions that are frequently diagnosed by primary care clinicians.

Primary care providers can apply these research findings about anxiety and depression and how they

Table 4. Comparison of Predictive Effects of Clinical Diagnoses on Anxiety and Depression Symptoms, after Controlling for Sociodemographic Characteristics, Health-Related Quality of Life, and Severity of Physical Illness (n = 710 patients).

Model* No.	Diagnosis	Polarity	Logistic Regression Estimates			*P* Value
			Odds Ratio†	*df*	Chi-Square	
1	Insomnia	+	19.991	1	12.5	.0004
2	Anxiety state	+	9.266	1	17.4	.0001
3	Depressive disorder	+	3.878	1	11.2	.0008
4	Health maintenance	−	0.550	1	5.6	.02
5	Hyperlipidemia	−	0.662	1	0.9	.34
6	Mental illness, other than depression or anxiety	+	2.678	1	2.3	.13
7	Headache	+	1.307	1	0.3	.61
8	Osteoarthritis	+	1.296	1	0.1	.76
9	Abdominal pain	−	0.807	1	0.1	.74
10	Diabetes mellitus	+	1.708	1	1.6	.20

*Each full logistic regression model included the specific health problem plus age, race, sex, Medicare and Medicaid status, health-related quality of life, and severity of physical illness as independent variables, and Duke Anxiety-Depression Scale score > 30 (scale = 0–100) as the dependent variable.
†Odds ratio (OR) indicates that n units of change in predictor variable units would increase the chance of higher symptoms by OR^n times.

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relate to medical diagnoses, health perception, pain, and disability by using one of the following screening instruments for anxiety and depression: the Hospital Anxiety and Depression Scale,[17] the Primary Care Evaluation of Mental Disorders,[18] or the DUKE-AD,[13] as well as a health-related quality-of-life questionnaire, eg, Medical Outcomes Study Short Form 36[19] or the DUKE.[9] The DUKE, which was used in the present study, has the advantage of including both types of survey in the same instrument. Although some of these measures have been available for the past 20 years, none has been used widely in primary care practices.

Our study has several limitations. The findings are not generalizable to all primary care settings because the study was conducted in one practice, a family medicine clinic adjacent to a tertiary care center. The low prevalence of some of the serious physical health problems that are encountered more frequently in subspeciality clinics might explain in part why our study did not confirm the strong relation between some of the major medical diagnoses and anxiety and depression that has been found in other studies. For example, one study that showed up to 18% prevalence of depression in coronary heart patients was undertaken with a group that included only patients with coronary heart disease.[20]

Our study is cross-sectional and lacks the capability of showing causal relations between symptoms of anxiety and depression and the other factors we measured. Other studies have found it difficult to sort out whether health-related quality-of-life impairments are caused by the mental disorders themselves or by negative cognitive biases associated with anxiety or depression.[21] Also, the link between physical disease and mental illness is complex. For certain diagnoses, it is possible that depression predates the onset of the physical illness, as has been shown in one study for diabetes.[22] Other symptoms, such as insomnia, can predate depression.[23] Also, it has been shown that depression worsens the course of certain preexisting physical illnesses, such as coronary artery disease.[5]

We did not attempt to study anxiety and depression as defined by DSM-IV criteria,[24] which would have required administration of diagnostic psychological interviews. As a result, we were not able to measure detection rates for DSM-IV anxiety and depression and compare characteristics between those two structured diagnoses. We chose to use the diagnoses of anxiety and depression as made by the clinicians' own criteria and recorded in the clinic database. Our DUKE-AD screening instrument combined key symptoms of anxiety and depression because of the known overlap in symptoms and the overlap of DSM-IV criteria for major types of anxiety and depression.[24] Frequently, anxiety and depression coexist in the same patient.[25] Also, patients with both disorders respond well to selective serotonin-reuptake inhibitors,[26–28] suggesting that overlapping neurochemical mechanisms might underlie the symptoms.

In summary, symptoms of anxiety and depression were significantly correlated with female sex and self-reported perceived health, pain, and disability in a primary care clinic. These indicators were more predictive of anxiety and depression than any of the most prevalent medical illnesses. Clinically this finding is potentially useful because these factors can be measured with relative ease during a short visit, regardless of the chief complaint or illness. Primary care providers need to go beyond their usual medical history and ask all patients, regardless of diagnosis type or severity, specifically about their symptoms of anxiety and depression. Providers also need to ask patients about their perceptions of general health status, pain, and disability. The thoroughness of questioning might be improved by using structured sets of items, such as those in patient questionnaires, to augment verbal history taking.

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Appendix 1.

DUKE HEALTH PROFILE (The DUKE)

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Date Today:_____ Name: _____ ID Number: _____
Date of Birth:_____ Female____ Male

INSTRUCTIONS: Here are some questions about your health and feelings. Please read each question carefully and check (√) your best answer. You should answer the questions in your own way. There are no right or wrong answers.

		Yes, describes me exactly	Somewhat describes me	No, doesn't describe me at all
1.	I like who I am			
2.	I am not an easy person to get along with			
3.	I am basically a healthy person			
4.	I give up too easily			
5.	I have difficulty concentrating			
6.	I am happy with my family relationships			
7.	I am comfortable being around people			

TODAY would you have any physical trouble or difficulty:

		None	Some	A Lot
8.	Walking up a flight of stairs			
9.	Running the length of a football field			

DURING THE PAST WEEK: How much trouble have you had with:

		None	Some	A Lot
10.	Sleeping			
11.	Hurting or aching in any part of your body			
12.	Getting tired easily			
13.	Feeling depressed or sad			
14.	Nervousness			

DURING THE PAST WEEK: How often did you:

		None	Some	A Lot
15.	Socialize with other people (talk or visit with friends or relatives)			
16.	Take part in social, religious, or recreation activities (meetings, church, movies, sports, parties)			

DURING THE PAST WEEK: How often did you:

		None	1-4 Days	5-7 Days
17.	Stay in your home, a nursing home, or hospital because of sickness, injury, or other health problem...			

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