Factors Associated With Positive Screens on the Mood Disorder Questionnaire in Primary Care

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Objective: This article examines the prevalence of positive testing for bipolar tendencies on the Mood Disorder Questionnaire (MDQ) in a primary care office setting.

Method: Participants in this study were older than 18 years of age and had not been previously diagnosed with bipolar disorder at the time of study participation. 688 individuals submitted appropriately completed forms and were included in the study, which was conducted from October through November 2004.

Results: 10.8% of screened individuals tested positive for bipolar tendencies using the criteria determined by the investigators. These findings exceed estimates in previous studies of the prevalence of bipolar disorder in the general population. Statistically significant predictors of MDQ results included age (< 35 or ≥ 35 years), complaints of anxiety or depression, and psychotropic medication use (none, 1 or more). Study participants who were under 35 years of age and complained of anxiety or depression and took 1 or more psychotropic medications had a probability of testing positive on the MDQ of 0.45. Those under the age of 35 years who complained of anxiety or depression and had no history of psychotropic medication use had a probability of testing positive on the MDQ of 0.27. The sample group consisting of individuals aged 35 years or older who complained of anxiety or depression and took psychotropic medications yielded a probability of positivity of 0.30; the probability of positivity for the 35-and-over subgroup who complained of anxiety or depression but did not take psychotropic medications was 0.16.

Conclusion: Participants who did not complain of anxiety or depression and did not have a history of psychotropic medication use exhibited a lower incidence of positive MDQ scores compared with those who did complain of anxiety and depression and did have a history of psychotropic medication use. No other correlations were found to be statistically significant. No separate validation of the MDQ results cited was independently performed during this study.

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Bipolar disorder is a problem that is often encountered in primary care. Studies have shown that approximately one third of individuals who are currently cared for by psychiatrists suffer from bipolar disorder for 8 to 10 years from onset of symptoms to formal diagnosis.[1,2] The obscurities of the disease symptom subset, as well as the insidious nature of the symptom onset, are believed to cause the delay in recognition of the symptoms of bipolar disorder. In addition, misdiagnosis of symptoms and incorrect or incomplete treatment can also hinder diagnosis of bipolar disorder.[1,2] Approximately 69% of patients eventually diagnosed with bipolar disorder were initially misdiagnosed, most commonly with unipolar depression.[2]

The use of screening tools has been shown to enhance sensitivity for identifying patients with bipolar tendencies. Hirschfeld et al.[3] developed a tool that can assist the clinician in developing data that may eventually lead to the diagnosis of bipolar disorder: the Mood Disorder Questionnaire (MDQ), when used in conjunction with a clinical interview, can assist the practitioner in more rapidly diagnosing bipolar tendencies. Positive results on the MDQ may lead to early recognition of patients with bipolar disorder and may also lead to intervention before consequences of the disease have developed. Positive responses to 7 or more questions in part 1, in conjunction with an answer of "moderate" to "severe" in response to a question in part 2 about the "severity of the problem," correspond to a 90% specificity and 70% sensitivity for eventual diagnosis of bipolar disorder.[3]

Hirschfeld and colleagues[4] estimated that 3.7% of the general population test positive (as defined above) on the MDQ. Individuals who tested positive reported symptoms of migraine headache, allergies, asthma, and alcohol and drug abuse substantially more often than individuals who did not test positive.[5]

Individuals who present for treatment to the office of a primary care physician (PCP) constitute a subset of the general population. The subset of patients presenting to a

primary care office may be demographically different from the general population; therefore, the results of a study that samples a primary care office population may not be widely applicable to the general population.

Traditionally, many primary care clinicians have reserved bipolar disorder assessment for patients who presented with manic or hypomanic behavior; however, research has shown that patients may remain in the depressive phase of bipolar disorder for prolonged time intervals compared with manic or hypomanic phases. Judd et al.[6] found that patients diagnosed with bipolar disorder who were followed weekly for 20 years exhibited depressive symptoms for 59.1% of the study duration; manic or hypomanic symptoms were noted for only 1.9% of the study duration.

Patients diagnosed with bipolar disorder are at significantly higher risk for completed suicide. The incidence of completed suicide in patients diagnosed with bipolar disorder has been reported to be as high as 20%.[7] Attempted suicide in the population of patients diagnosed with bipolar disorder has been shown to be as high as 25.6%.[8] Controversy exists regarding the widely held belief that patients with bipolar disorder type I are more likely to attempt suicide than patients diagnosed with bipolar disorder type II. One study[9] suggests that patients with bipolar disorder type II are more likely to attempt suicide than those with bipolar disorder type I; the researchers postulated that many patients whose suicide was attributed to depression instead may have suffered from bipolar disorder type II and possibly were in the depressive phase of the bipolar disorder cycle when suicide occurred. This finding suggests that the rate of suicide in the bipolar disorder population may be higher than reported; conversely, the rate of suicide in the population of patients diagnosed with unipolar depression may be proportionally lower.

The financial burden of bipolar disorder is estimated to be $45.2 billion (based on 1991 values) using prevalence-based cost-of-illness criteria.[10] A significant portion of this burden is due to costs related to hospitalization.[10] Due to the pathophysiology of the subtypes of bipolar disorder, patients suffering from bipolar disorder type II usually do not require hospitalization as frequently as those suffering from bipolar disorder type I; however, patients diagnosed with bipolar disorder type II have an increased incidence of institutionalization in facilities other than hospitals, such as prisons.[11] Early detection of bipolar disorder may increase the effectiveness of treatment, decrease patient suffering, and ease the societal financial burden associated with the care of these individuals.

To assess the relationship of patient characteristics to bipolar tendencies, the authors conducted a pilot study[12] from September through October 2002 in which 15% of 177 patients tested positive for bipolar tendencies using the MDQ. After completing the pilot study, the authors expanded the scope of the study to include 7 primary care office settings encompassing the Eastern Seaboard of the United States. The investigators felt that regionality would be less of a limiting factor given the expanded area from which the study population was derived.

METHOD

Study Population and Setting

Seven primary care offices along the Eastern Seaboard were contacted regarding participation in this study. All offices were solo primary care settings; a combination of urban and suburban settings was included. None of the sites was primarily affiliated with a teaching facility. All sites were family practices; no specialty practices were represented in the sampling.

Study Methods and Procedure

Each participating office identified a research liaison who was responsible for the logistic component of the data collection. An instruction sheet with contact information and frequently asked questions was distributed to each liaison; the liaison then collected all data and returned the raw data to the researchers. Participants at each practice were selected by asking 100 consecutive patients over the age of 18 years to complete a demographic questionnaire and the MDQ. Participants were selected based only on order of presentation and without regard for the reason for presenting for care. Patients not wishing to participate simply returned their questionnaires blank, and those forms were then distributed to the next consecutive patient. No identifying data were collected, thus ensuring complete anonymity; because anonymity was assured, no separate consent for participation was necessary.

The demographic questionnaire inquired about the age, sex, primary complaint, duration of that problem, secondary complaints (more than 1 could be selected), total number of medications taken, and number of psychotropic medications, if any. Primary complaints listed included pain, headache, stomach pain, illness, anxiety, depression, diabetes, and hypertension. Duration of primary complaint was also queried; time intervals were graduated from 1 week to 1 year. The secondary complaint question included the same complaints as listed for the primary complaint question; participants were permitted to identify more than 1 secondary complaint. Participants were asked to identify the total number of medications taken (up to 7); a separate question asked the participant to identify the number of psychotropic medications prescribed. Participants were also asked to identify if their waist was larger than their hips; this question was included to potentially identify a link between the prevalence of bipolar tendencies and metabolic syndrome.

Upon completion of the demographic questionnaire, participants were then asked to complete the MDQ. The PCP did not view the individual questionnaires; collection

Table 1. Primary Psychiatric Complaint of Study Participants by Age Group and Number of Medications (N = 688)

Age Group and No. of Medications	Primary Complaint, N: Anxiety or Depression	Primary Complaint, N: Other Complaint
Under 35 y		
None	12	100
1 or more	22	37
35 y or older		
None	20	292
1 or more	45	160

took place prior to participant examination. However, a short note included on the demographic questionnaire did encourage participants to discuss the meaning of the MDQ with their PCP; if the PCP had a high suspicion for presence of bipolar disorder, they were encouraged to readminister the MDQ during the office visit for diagnostic and treatment/referral purposes. Study questionnaires were not used during the PCP examination of participants. The demographic data and the results of the MDQ were then extracted, subjected to statistical analysis, and reported.

Data Analysis

The data collected on the 699 subjects consisted of 7 explanatory variables at a total of 34 levels (5832 crossed levels). Eleven of the subjects had missing data and were deleted from the study (total N = 688).

The response variable was the MDQ test result (0 = negative screen, 1 = positive screen). The pilot study suggested that the following 3 explanatory variables should be retained: age at 2 levels (under 35 years, 35 years and over), primary complaint at 3 levels (anxiety, depression, other), and psychotropic medication use at 3 levels (none, 1, 2 or more).

Binary logistic regression with effect coding was performed. First, the joint effect of age, complaint, and medication was tested. All possible joint effects were evaluated and found to be statistically insignificant. The main effects of age, complaint, and medication were then analyzed. Each was found to be statistically significant when entered last into the regression analysis. Finally, the regression coefficients were tested to determine if levels could be combined. For the main effect of complaint, anxiety versus depression was found to be statistically insignificant (t = .43, df = 682, 2-tailed p = .66), anxiety versus other was significant (t = 3.67, df = 682, p = .0002), and depression versus other was significant (t = 3.83, df = 682, p = .0002). Based upon these results, primary complaint can be examined at 2 levels: "anxiety or depression" and "other." For the main effect of medication use, none versus 1 was found to be statistically significant (t = 2.05, df = 682, p = .04), none versus 2 or more was significant (t = 3.36, df = 682, p = .0008), and 1 versus 2 or more was insignificant (t = 1.32, df = 682, p = .19). Based upon these results, psychotropic medication use can be examined on 2 levels: "none" and "1 or more." All analyses were performed using SPSS version 11.0 (SPSS Inc., Chicago, Ill.).

RESULTS

Sample Demographic and Diagnostic Data

The 688 individuals included in the sample were categorized according to age, primary complaint, and number of psychotropic medications being used. The data appear in Table 1.

MDQ Response Versus Demographic and Diagnostic Factors

The univariate associations between the demographic and diagnostic factors and the MDQ response are displayed in Table 2. The difference in the proportions of positive MDQ responses between individuals presenting with anxiety or depression and those presenting with another primary complaint was significant in the under-35 age group (estimate of difference = 31.0%, p = .000) and in the 35-or-older group (estimate of difference = 18.0%, p = .000).

The difference in the proportions of positive MDQ responses between individuals taking 1 or more psychotropic medications and those taking no psychotropic medications was significant in the under-35 age group (estimate of difference = 24.2%, p = .000) and in the 35-or-older group (estimate of difference = 7.1%, p = .006).

Multivariate Model Results

Three factors were significantly related to MDQ result, each at 2 levels: Age (under 35 years, 35 years or over), primary complaint (anxiety or depression, other), and psychotropic medications (none, 1 or more). The final logistic regression result is found in Table 3. Therefore, the predicted probability of a positive MDQ response is given by

$$P\{MDQ^{+}\} = \frac{1}{1 + e^{-Y}}$$

where $Y = -1.613 + 0.325(age) + 0.687(primary\ complaint) - 0.419(medications\ used)$. These predicted probabilities are displayed in Table 4 along with the odds of a positive MDQ response. In each age group, those individuals presenting with a primary complaint of anxiety or depression were found to be at higher risk for testing positive than those who complained of other symptoms. Also, at each complaint level, those patients who took 1 or more psychotropic medications were at higher risk than those who did not. The odds ratios are displayed in Table 5. Also included are the odds ratios for the Hirschfeld et al.[4] estimate of the general population (3.7%) for comparison.

Table 2. Univariate Associations Between Demographic and Diagnostic Factors and MDQ Response (N = 688)

	Primary Complaint					
	Anxiety or Depression		Other Complaint		Total	
Age Group and No. of Medications	MDQ+, N (%)	MDQ–, N	MDQ+, N (%)	MDQ–, N	MDQ+, N (%)	MDQ–, N
Under 35 y						
None	4 (33.3)	8	5 (5.0)	95	9 (8.0)	103
1 or more	10 (45.5)	12	9 (24.3)	28	19 (32.2)	40
Total	14 (41.2)	20	14 (10.2)	123	28 (16.4)	143
35 y or older						
None	6 (30.0)	14	13 (4.5)	279	19 (6.1)	293
1 or more	10 (22.2)	35	17 (10.6)	143	27 (13.2)	178
Total	16 (24.6)	49	30 (6.6)	422	46 (8.9)	471

Abbreviation: MDQ = Mood Disorder Questionnaire.
Symbols: + = positive, – = negative.

Table 3. Results of Logistic Regression Analysis of Factors Related to MDQ Result[a]

Factor	β	SE	Wald	df	p Value	Exp(B)	95% CI
Age	0.325	0.137	5.644	1	.018	1.384	1.059 to 1.809
Primary complaint	0.687	0.142	23.398	1	.000	1.987	1.504 to 2.624
Medications used	–0.419	0.136	9.562	1	.002	0.657	0.504 to 0.858
Constant	–1.613	0.145	123.323	1	.000	0.199	…

[a]Effect codes are as follows: age: 1 = under 35 years; –1 = 35 years or over; primary complaint: 1 = anxiety or depression, –1 = other; medications used: 1 = none, –1 = one or more.
Abbreviation: MDQ = Mood Disorder Questionnaire.

Table 4. Predicted Probability and Odds of a Positive Mood Disorder Questionnaire (MDQ) Response by Interaction of Complaint and Medication Use

	Probability (odds) of Positive MDQ Response	
Interaction	Under 35 y	35 y or Over
Anxiety or depression + 1 or more medications	0.45 (0.82)	0.30 (0.43)
Anxiety or depression + no medications	0.27 (0.37)	0.16 (0.19)
Other symptom + 1 or more medications	0.17 (0.20)	0.10 (0.11)
Other symptom + no medications	0.08 (0.09)	0.05 (0.05)

DISCUSSION

This study found that patients under the age of 35 years complaining of anxiety or depression, whether taking or not taking any psychotropic medications, were at increased risk for bipolar tendencies. On the basis of these findings, the researchers suggest that individuals under the age of 35 years presenting to a primary care setting with a chief complaint of anxiety or depression should undergo screening for bipolar tendencies, and the results of the screening should guide further assessment and, if indicated, treatment and referral.

Primary care clinicians also should consider the subpopulation of patients aged 35 years and older who present with a primary complaint of anxiety or depression and who are taking 1 or more psychotropic medications to be at risk for bipolar disorder tendencies. Screening tools should be utilized, and for those patients testing positive for bipolar disorder tendencies, if further evaluation confirms the need, treatment and/or referral plans should be developed. Participants over the age of 35 years who did not take psychotropic medications were not found to be at higher risk for bipolar disorder tendencies, regardless of complaint.

Statistical analysis failed to reveal further statistically significant correlations. The results of this study did not reveal a statistically significant correlation between somatic complaint and increased incidence of bipolar tendencies. Thus, anxiety and depression remain the hallmark symptoms for bipolar tendencies.

The diagnosis of bipolar disorder relies on the recognition of manic or hypomanic behaviors; both the presence of these behaviors and a minimum duration of their presence are essential for bipolar disorder diagnosis. Investigators have examined the effect of reducing the severity and duration requirements for mania or hypomania for bipolar disorder diagnosis, as well as the potential effect of changing the behavior requirements to assess the presence of bipolar disorder. Research using a less severe behavior threshold for diagnosis of bipolar disorder has been performed; in that study, the prevalence in the general population rose to 10.9%.[13]

No separate validation studies of the MDQ results were performed during the course of the study, either with clinical interviews or by using standardized testing methods. Regionality is also a limitation, as the cultural and socioeconomic factors were not assessed during the course of the study. Clinicians should be aware that a positive MDQ screen without other methods of diagnosis should not lead to a diagnosis of bipolar disorder, nor should any treatment be initiated on the sole basis of a positive MDQ screen.

Bipolar disorder is prevalent in the general population in the United States. The subset of individuals who present for care to a primary care office setting exhibits a higher prevalence for testing positive on the MDQ; the existing body of research suggests that this population has a higher incidence of bipolar disorder diagnosis. Bipolar disorder remains difficult to diagnose, carries a high mortality rate, and drains the economy of funds that are

Table 5. Odds Ratios of Having a Positive Screen on the Mood Disorder Questionnaire (MDQ) in Patients With and Without Anxiety or Depression or Other Symptoms Who Were or Were Not Taking Psychotropic Medications[a]

Variable	Anxiety or Depression + 1 or More Medications	Anxiety or Depression + No Medications	Other Symptom + 1 or More Medications	Other Symptom + No Medications
Under 35 y				
Anxiety or depression + 1 or more medications	1.00			
Anxiety or depression + no medications	2.21	1.00		
Other symptom + 1 or more medications	3.99	1.81	1.00	
Other symptom + no medications	9.41	4.25	2.36	1.00
Hirschfeld et al estimate[b]	21.29	9.63	5.33	2.26
35 y or over				
Anxiety or depression + 1 or more medications	1.00			
Anxiety or depression + no medications	2.25	1.00		
Other symptom + 1 or more medications	3.86	1.71	1.00	
Other symptom + no medications	8.14	3.62	2.11	1.00
Hirschfeld et al estimate[b]	11.15	4.96	2.89	1.37

[a]Odds ratios shown are the odds of column factors' being associated with a positive MDQ screen ÷ the odds of row factors' being associated with a positive MDQ screen.
[b]The odds ratio for the estimate made by Hirschfeld et al.[4] that 3.7% of the general population would have a positive test on the MDQ.

needed to treat and care for these individuals. This study identified subgroups of patients presenting to primary care settings who may be at increased risk of suffering from the debilitating and potentially life-threatening effects of bipolar disorder. Identification of these subgroups will allow primary care practitioners to more effectively diagnose bipolar disorder; timely diagnosis and treatment of bipolar disorder will decrease the burden on already overtaxed health care resources, decrease comorbidities, and ultimately improve quality of life for affected patients.

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