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Screening for Bipolar Disorder in a County Jail at the Time of Criminal Arrest

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Abstract

Objective—This study assessed the operating characteristics of the Mood Disorder Questionnaire (MDQ) among offenders arrested and detained at a county jail.

Method—The MDQ, a brief self-report instrument designed to screen for all subtypes of bipolar disorder (BP I, II and NOS) was voluntarily administered to adult detainees at the Ottawa County Jail in Port Clinton, Ohio. A confirmatory diagnostic evaluation was also performed using the Mini-International Neuropsychiatric Interview (MINI). The MDQ was scored using a standard algorithm requiring endorsement of 7/13 mood items as well as two items that assess whether manic or hypomanic symptoms co-occur and cause moderate to severe functional impairment. In addition to the standard algorithm for scoring the MDQ, modifications were also tested in an attempt to improve overall sensitivity.

Results—Among 526 jail detainees who completed the MDQ, 37 (7%) screened positive for bipolar disorder. Of 164 detainees who agreed to a research diagnostic evaluation, 32 (19.5%) screened positive on the MDQ, while 55 (33.5%) met criteria for bipolar disorder according to the MINI. When administered to the sample of 164 adult jail detainees, the sensitivity of the MDQ was 0.47 and the specificity was 0.94. The MDQ was significantly better at detecting BP I (0.59) than BP II/NOS (0.19; $p = 0.008$). Modification of scoring the MDQ improved the sensitivity for detection of BP II from 0.23 to 0.54 with minimal decrease in specificity (0.84). The optimum sensitivity and specificity of the MDQ was achieved by decreasing the item threshold to 3/13 and eliminating the symptom co-occurrence and functional impairment items.

Conclusion—The MDQ was found to have limited utility as a screening tool for bipolar disorder in a correctional setting, particularly for the BP II subtype.

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Keywords

Bipolar Disorder; Mood Disorder Questionnaire; Jail; Screening; Bipolar II; Psychometrics

Introduction

Bipolar disorder is a chronic and recurrent illness characterized by high morbidity including widespread role impairment (Calabrese et. al. 2004), substantial health care costs (Kleinman et. al. 2003), and a lifetime rate of attempting suicide that exceeds any other psychiatric illness (Chen & Dilsaver 1996; Kessler et. al. 1999). The National Comorbidity Survey Replication estimates the lifetime and 12-month prevalence of bipolar I and II disorders (BP I and BP II) to be 3.9% and 2.6%, respectively (Kessler et. al. 2005). Taking into account individuals affected by bipolar spectrum conditions, including cyclothymia and subsyndromal mania and hypomania, a more accurate assessment of lifetime prevalence may be closer to 6% (Angst 1998; Judd & Akiskal 2003). Recognition of the high prevalence of bipolar disorder argues for improved identification of the illness and consequently better therapeutic interventions. Unfortunately, under-recognition is common, with delays often lagging 8–10 years between symptom onset and being correctly diagnosed with bipolar disorder (Hirschfeld et. al. 2003a; Lish et. al. 1994). Explanations for this delay have been attributed to misdiagnosis and poor detection of the illness by health care providers in both psychiatric and primary care settings (Akiskal et. al. 2000; Ghaemi et. al. 2002).

The lack of recognition of mental illness may be even more prevalent in underserved populations, such as in jails and prisons. Independent studies estimate the prevalence of inmates with chronic mental illness to range from a low of 6.4% among males (Teplin 1990) to a high of 15.1% among females (Teplin et. al. 1996). According to Epidemiologic Catchment Area data, as many as 6% of inmates may suffer from BP I (Robins & Regier 1991).

Inmates identified as having bipolar disorder are most often arrested in a manic or mixed phase of illness and are more likely to suffer from a substance use disorder than are hospitalized patients without an arrest history (Quanbeck, 2004). When compared to individuals with major depressive disorder or to control subjects, men with bipolar disorder display twice the rate of criminality, including a greater number of convictions for property crimes and drug violations (Modestin et. al. 1997). This is supported by our prior report that found 26% of men who screened positive for bipolar disorder had a history of being jailed, arrested, or convicted of a crime (other than driving under the influence of alcohol or drugs) compared with the base population rate of 5% (Calabrese et. al. 2003).

Given the foregoing evidence of an association between bipolar disorder and involvement with the criminal justice system, we hypothesized that a sizable proportion of individuals being arrested for a criminal offense would screen positive for bipolar disorder. In clinical settings with a high prevalence of mood disorders, the Mood Disorder Questionnaire (MDQ) is a valid screening instrument to identify individuals with bipolar disorder. The psychometric properties of the MDQ have been assessed across psychiatric clinics (Hirschfeld et. al. 2000; Isometsa et. al. 2003), primary care clinics (Das et. al. 2005), and the general population (Hirschfeld et. al. 2003b), with modified versions developed for the screening of adolescents (Wagner et. al. 2006) and for international use, with translations into French (Weber Rouget et. al. 2005), Italian (Hardoy et. al. 2005), and Finnish (Isometsa et. al. 2003).

As the MDQ is a brief and easily administered self-report scale, it could readily be adopted by corrections staff as part of routine screening for bipolar disorder. To our knowledge, the psychometric properties of the MDQ have not been previously reported when used in a forensic

setting. The present study focuses on screening for bipolar disorder and efforts to test whether the MDQ is a clinically useful and practical tool to employ in a correctional setting among inmates recently charged with a criminal offense.

Methods

After protocol approval by the Institutional Review Board at Case Western Reserve University, the study was conducted at the Ottawa County Jail in Port Clinton, Ohio, between July 2003 and November 2004. The Ottawa County Jail is a 48-bed facility housing adult men and women charged with or convicted of a misdemeanor and/or felony offense. The Ottawa County Jail serves a population of 41,583 and in 2006 processed approximately 1500 bookings (Sheriff Robert Bratton, personal communication, January 4, 2007). As part of standard operating procedure during the booking (intake) process at the Ottawa County Jail, all detainees are asked if they have ever been diagnosed and treated for a mental disorder and are asked to complete the MDQ. After the booking process was completed, detainees were invited to participate in the present research study and were provided nominal compensation for their time. Subjects provided signed informed consent and were notified that their agreement or refusal to participate would not impact their legal situation nor qualify/disqualify them for any programs or services for which they were eligible. Consenting subjects underwent a confirmatory diagnostic interview based upon *DSM-IV* criteria using the MINI International Neuropsychiatric Interview (MINI) (Sheehan et. al. 1998). The diagnostic interview was completed within 24–48 hours after booking and completion of the MDQ.

Prior to conducting the MINI, the research assistant was blinded to the MDQ results of the participant. Research assistants were trained to administer the diagnostic assessments by a senior research psychiatrist (JRC) and other members of the research infrastructure at the Mood Disorders Program at Case Western Reserve University. The research assistants were given a thorough didactic overview of the *DSM-IV* criteria and were instructed how to administer and score the MINI. The research assistant observed an expert rater conduct 5 consecutive MINI evaluations and subsequently performed a minimum of 5 independent MINI evaluations under the supervision of an expert rater. In order to be certified to administer the MINI, the research assistant and expert rater must have agreed upon the diagnoses for all 10 interviews ($\kappa = 100\%$), and maintained inter-rater agreement for at least 80% of the individual items. Data were analyzed with the Statistical Package for Social Sciences (SPSS) version 14.0.

The MDQ is a self-administered questionnaire consisting of 13 yes/no questions designed to screen for the lifetime presence of manic or hypomanic symptoms. The items were derived from *DSM-IV* criteria as well as clinical experience. Two additional items assess for severity and co-occurrence of symptoms. One item asks the respondent to describe the impact of symptoms on overall functioning (from “no problem” to a “serious problem”) and the other item asks whether or not symptoms occurred during the same period of time. To screen positive on the MDQ, an individual must endorse 7 of 13 questions positively, report the symptoms to cause moderate to severe impairment, and experience the occurrence of symptoms simultaneously.

The operating characteristics of the MDQ were calculated from 2×2 contingency tables and reported as the crude estimates of sensitivity and specificity. Socio-demographic data and other parameters were compared using a Fisher’s exact test or chi-square for nominal or ordinal data. Continuous data were compared using a Student’s *t* test for independent samples.

A Receiver Operating Characteristic (ROC) analysis yielded the sensitivity and specificity of the MDQ to discriminate between subjects with and without bipolar disorder. The area under the ROC curve was calculated by the trapezoidal rule (Rosner, 2006).

Results

Between July 2003 and November 2004, a total of 597 individuals were detained at the Ottawa County Jail. The MDQ was completed by 526 detainees (350 male, 80 female, and 96 gender not indicated) as part of jail standard operating procedures. The remaining 71 detainees either refused or provided an incomplete questionnaire. Of 526 detainees who completed the MDQ, 37 (7%) screened positive for bipolar disorder. After the booking process was completed, 164 subjects (142 male, 22 female) volunteered to participate in a research evaluation where the MINI was administered. The mean age (SD) of the research subjects was 33.4 (10.9) years old. The ethnicity of the sample was 87.8% (n = 144) Caucasian, 9.1% (n = 15) African-American, 3.0% Hispanic (n = 5), and 0.6% (n = 1) other, which was reflective of the respective county.

A MINI primary diagnosis of bipolar disorder was assigned to 55 (33.5%) inmates (bipolar I: N=39, bipolar II: N=13, bipolar disorder not otherwise specified (NOS): N=3). Of the inmates screening positive on the MDQ, 6 subjects were not found to have bipolar disorder according to the MINI. Among these subjects, 4 were diagnosed with schizoaffective disorder and 2 were not found to have a diagnosable Axis I disorder.

Limited socio-demographic data regarding age, ethnicity, and gender was available on the larger sample of 597 jail detainees who completed the MDQ as part of jail standard operating procedure as presented in Table 1. Compared to the 164 subjects who volunteered to participate in the diagnostic interview, no differences were observed in age or gender. A greater number of African-American subjects agreed to participate in the diagnostic interview, though the statistical significance of this association should be interpreted with caution given the small number of subjects available for analysis in this subgroup. The complete socio-demographic characteristics of the volunteer sample in relation to MDQ scores are presented in Table 2. No differences in age, educational level, or marital status were observed between those screening positive on the MDQ and those screening negative. Anxiety disorders, both lifetime and current, were more prevalent in those screening positive ($p < .001$). Similarly, rates of current substance use disorders ($p = .003$) and rates of lifetime substance abuse ($p = .024$) and dependence ($p = .003$) were more prevalent in the MDQ positive cohort. Comparisons of anxiety and substance use disorders are shown in Table 3. Arrests for crimes against persons, including domestic violence, rape, assault, and violation of a protection order were more common in the MDQ positive group ($p = .017$). No differences were found between groups in the rates of property crimes (e.g. robbery, breaking and entering, or trespassing), disorderly conduct, or drug violations. A history of physical ($p = .003$) and emotional ($p = .023$) abuse, but not sexual abuse ($p = .167$), was more common among subjects screening positive for bipolar disorder.

Sensitivity, specificity, and predictive values of the MDQ were calculated. The MDQ correctly screened out 103 of 109 individuals not meeting the MINI criteria for lifetime bipolar disorder, resulting in a specificity of 0.94. However, the MDQ correctly identified only 26 of 55 individuals meeting the MINI criteria for bipolar disorder, resulting in a sensitivity of 0.47. The positive predictive value of the MDQ was 0.81 and the negative predictive value was 0.78. Figure 1 shows the ROC curve of the MDQ in this sample and Figure 2 shows the sensitivity and specificity of the MDQ plotted across different scoring thresholds. Sensitivity indices were also calculated based upon the bipolar disorder subtypes I or II. The MDQ did not identify any of the 3 patients who were found to have BP NOS. Among the 39 individuals with BP I, 23 were correctly identified by the MDQ, while only 3 of 13 subjects with BP II were correctly identified. The difference in sensitivity for detecting BP I (0.59) versus BP II (0.23) trended toward significance ($p = 0.052$). The sensitivity of the MDQ for detecting BP I (0.59) was significantly better than for detecting BP II/NOS combined (0.19; $p = .008$).

In an attempt to improve the sensitivity for detecting BP II, we modified the scoring algorithm by adapting the MDQ from a 13-item to a 15-item questionnaire. The items measuring symptom severity and symptom co-occurrence were converted into dichotomous measures. In this manner, any patient endorsing 7/15 items would be considered to have a positive MDQ test. The scoring modification allowed for the detection of 13 additional cases of bipolar disorder. The sensitivity for detecting BP II more than doubled, increasing from 0.23 to 0.54, and the overall sensitivity for detecting bipolar disorder improved modestly from 0.47 to 0.55, with minimal decrease in specificity (0.94 to 0.84).

Among the 29 subjects identified as false negatives (i.e. did not screen positive for bipolar disorder on the MDQ but were subsequently found to have bipolar disorder on the MINI), comparison of responses on the MDQ and the MINI revealed that 28/29 subjects failed to endorse that manic or hypomanic symptoms co-occurred or resulted in moderate to severe problems. This suggests that requesting patients with bipolar disorder to recall lifetime symptom co-occurrence or functional impairment on a screening questionnaire may be a challenging task. Thus, we undertook a separate analysis to determine if eliminating these 2 items substantially altered the operating characteristics of the MDQ. Despite this modification, the sensitivity remained unchanged at 0.47 but the specificity decreased from 0.94 to 0.88. An ROC curve was constructed to determine whether a different scoring threshold might improve the detection of bipolar disorder (see Figure 3 and Figure 4). Interestingly, the optimum combination of sensitivity (0.71) and specificity (0.68) was obtained with a positive response to ≥ 3 of the 13 core mood questions, resulting in an Area under the Curve value of 0.75.

Discussion

In this study of criminal offenders in a county jail, 7% screened positive for bipolar disorder on the MDQ at the time of the routine booking process. The 7% prevalence is consistent with data from the Epidemiologic Catchment Area study which reported 6% of inmates to suffer from bipolar disorder (Robins & Regier 1991). For the volunteer subsample that completed a structured diagnostic interview, 33.5% were positive for bipolar disorder. Although the use of this volunteer sample introduced a selection bias into estimates of prevalence, it permitted a comparison of the operating characteristics of the MDQ with a structured clinical interview in a group of jail detainees willing to undergo more comprehensive psychiatric assessments, as well as an opportunity to study phenomenology of mental illness as it presents in correctional settings.

The MDQ correctly identified only 47% of inmates subsequently found to have bipolar disorder by structured clinical interview, which is lower than the 73% and 58% sensitivity when administered in a psychiatric outpatient (Hirschfeld et. al. 2000) and family practice (Hirschfeld et. al. 2005) setting, respectively. However, it is higher than the 28% sensitivity when administered to the general population (Hirschfeld et. al. 2003b). The instrument demonstrated an unacceptably low sensitivity (0.19) for detecting bipolar II and NOS disorders. Other authors have also found the MDQ to be better suited at detecting BP I than bipolar spectrum disorders (Benazzi 2003; Miller et. al. 2004; Phelps & Ghaemi 2006), though our results are believed to be the first time a significant difference has been shown favoring the detection of BP I as compared to BP II/NOS.

Modification of the scoring algorithm for the MDQ suggests that decreasing the threshold for a positive MDQ test to 3 or more items in addition to not requiring subjects to recall symptom co-occurrence or impairment in functioning may be useful when employing the MDQ in a jail or prison. Such modification optimizes the combination of sensitivity (0.71) and specificity (0.68). However, this finding requires confirmation or refutation in future studies designed to assess the prevalence of bipolar disorder in correctional settings.

The psychometric variability of the MDQ when administered in the Ottawa County Jail as compared with the original validation sample is not surprising. The MDQ has been criticized when used in specialized mood disorder clinics as the psychoeducation and expertise provided to patients in these environments may allow for improved awareness of the illness and its characteristic symptoms, possibly leading to inflation of the true performance of the instrument (Zimmerman et. al. 2004). That the sensitivity of the MDQ was lower when administered to inmates in a county jail than to patients treated at an academic center may be attributed to a less sophisticated understanding of the disorder (Hirschfeld et. al. 2000; Zimmerman et. al. 2004).

Although the specificity (0.94) of the instrument was very good, the low sensitivity would likely cause over half of jail detainees with bipolar disorder to go unrecognized. The present results do not suggest that incorporating the MDQ in the routine screening for mental illness is an optimal means of identifying inmates with bipolar disorder using the conventional scoring criteria. More efficient and sensitive measures appear to be needed.

There are currently no valid, standardized, convenient-to-use tools that provide initial screening for mental illness in jails and prisons (Steadman et. al. 2005). The Referral Decision Scale (RDS) has been proposed as a screening tool for use by correctional staff to identify inmates with schizophrenia, major depression, or bipolar disorder (Teplin & Swartz 1989). However, the RDS was found to lack validity for the identification of bipolar disorder in a study of 108 male jail detainees (Rogers et. al. 1995). A subsequent instrument, the Brief Jail Mental Health Screen, was designed to improve upon the limitations of the RDS, but was found to poorly detect women with a psychiatric disorder (Steadman et. al. 2005). Other screening tools, such as the multi-lingual Hypomania Checklist (HCL-32) (Angst et. al. 2005) and the Bipolar Spectrum Diagnostic Scale (BSDS) (Ghaemi et. al. 2005) have been developed to detect hypomanic and milder bipolar spectrum symptoms. The sensitivity of the BSDS was 76% and differed minimally in its ability to identify subjects with BP I versus those with BP II/NOS. The HCL-32 demonstrated acceptable sensitivity (80%) but rather low specificity (51%) for bipolar disorder. Further research is needed to determine whether these instruments show greater validity than the MDQ when employed in a correctional setting.

This report provides a unique assessment of the psychometric properties of the MDQ when administered to offenders in a county jail at the time of criminal arrest. The higher rates of anxiety disorders, substance use disorders, and arrests for personal crimes in subjects scoring positive on the MDQ are consistent with the multi-morbid presentations of bipolar disorder and its extensive psychosocial impairments. A major strength of the present study is that subjects were assessed soon after detainment, without confounding of criminality by reliance upon conviction records or self-reports. The study population may also be more representative of the community than a prison population, as jails often house individuals convicted of misdemeanors or those awaiting trial hearings. In contrast, prisons house people convicted of felonies, with sentences often exceeding 1 year in duration. However, the study is limited in that subjects were only recruited from one site, decreasing the generalizability to jails with a different demographic composition.

Bipolar II disorder, frequently mischaracterized as unipolar depression, may be challenging for clinicians to diagnose (Akiskal et. al. 2000) and is shown in this report to be less amenable to detection by the MDQ. Simple modification of the instrument, at least when administered in a correctional setting, can improve the validity for detection of BP II, reaching a sensitivity comparable to that for BP I. Eliminating the symptom co-occurrence and functional impairment items of the MDQ in conjunction with decreasing the scoring threshold to require endorsement of ≥ 3 hypomanic or manic symptoms may further improve the ability to detect bipolar disorder. Research is warranted to assess the validity of other screening instruments for identifying

bipolar disorder in jail detainees. Future studies should assess whether the MDQ performs similarly in state and federal prisons and whether routine screening for bipolar disorder in correctional settings facilitates linkage to community resources and improved clinical outcomes.

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Figure 1.

^a ROC curve generated using the conventional scoring algorithm for the MDQ as described by Hirschfeld et. al. 2000.

Figure 2.

^a A score of ≥ 8 (vertical line) was identified as the optimal cutoff.

^b In addition to achieving the threshold number of symptom items, the subject must also have indicated that the symptoms occurred during the same time period and caused moderate or serious problems.

Figure 3.

^a ROC curve generated using a modified scoring algorithm for the MDQ that did *not* require subjects to indicate that the symptoms occurred during the same time period and caused moderate or serious problems.

Figure 4.

^a A score of ≥ 3 (vertical line) was identified as the optimal cutoff.

^b Subjects were *not* required to indicate that the symptoms occurred during the same time period and caused moderate or serious problems.

Table 1

Sociodemographic Characteristics of Inmates Refusing Versus Consenting to Participate in a Research Diagnostic Evaluation

	Did not sign consent N = 323	Signed consent N = 164	P
Gender	N (%)	N (%)	
Male	261 (80.8)	142 (86.6)	0.111
Female	62 (19.2)	22 (13.4)	
Ethnicity	N = 322	N = 164	
Caucasian	279 (86.6)	143 (87.2)	0.866
African-American	13 (4.0)	15 (9.1)	*
Native-American	5 (1.6)	0 (0.0)	0.109
Hispanic	20 (6.2)	5 (3.0)	0.136
Age (SD)	N = 309	N = 164	
Mean Age	32.0 (10.8)	33.5 (11.1)	0.160

* Significance testing should be interpreted with caution due to the small sample size

Table 2
Sociodemographic Characteristics Versus MDQ Results

Characteristics	MDQ Negative N = 132	MDQ Positive N = 32	P
Age (SD)			
Mean Years	33.3 (11.1)	34.4 (10.1)	0.564
Gender			
Male	114 (86.4%)	28 (87.5%)	0.866
Female	18 (13.6%)	4 (12.5%)	
Education			
Non-high school graduate	30 (22.7%)	11 (34.4%)	0.172
High school graduate or higher	102 (77.3%)	21 (65.6%)	
Marital Status			
Married	25 (18.9%)	9 (28.1%)	0.250
Unmarried	107 (81.1%)	23 (71.9%)	
Ethnicity			
Caucasian	119 (90.2%)	24 (75.0%)	0.035
Non-Caucasian	13 (9.8%)	8 (25.0%)	
Family History			
Psychiatric Disorder	34 (26.2%)	13 (40.6%)	0.106
Alcohol Use Disorder	74 (56.9%)	21 (65.6%)	0.371
Drug Use Disorder	36 (27.7%)	16 (50.0%)	0.015
Prior Psychiatric Treatment			
Yes	36 (31.6%)	11 (40.7%)	0.364
No	78 (68.4%)	16 (59.3%)	

Table 3
Substance Use and Anxiety Disorder Co-Morbidity Versus MDQ Results

Characteristics	MDQ Negative N = 132	MDQ Positive N = 32	P
Current Anxiety Disorder	29 (22.0%)	22 (68.8%)	<0.001
Generalized Anxiety Disorder	12 (9.1%)	11 (34.4%)	<0.001
Obsessive-Compulsive Disorder	1 (0.8%)	4 (12.5%)	0.001
Panic Disorder	8 (6.1%)	9 (28.1%)	0.001
Post-Traumatic Stress Disorder	16 (12.1%)	12 (37.5%)	0.001
Social Phobia	6 (4.5%)	4 (12.5%)	0.092
Lifetime Anxiety Disorder	32 (24.2%)	22 (68.8%)	<0.001
Generalized Anxiety Disorder	14 (10.6%)	11 (34.4%)	0.001
Obsessive Compulsive Disorder	1 (0.8%)	4 (12.5%)	0.001
Panic Disorder	9 (6.8%)	9 (28.1%)	0.001
Post-Traumatic Stress Disorder	18 (13.6%)	14 (43.8%)	<0.001
Social Phobia	8 (6.1%)	4 (12.5%)	0.210
Current Substance Use Disorder	34 (25.8%)	17 (53.1%)	0.003
Alcohol Abuse/Dependence	69 (52.3%)	19 (59.4%)	0.470
Marijuana Abuse/Dependence	23 (17.4%)	15 (46.9%)	<0.001
Cocaine Abuse/Dependence	7 (5.3%)	7 (21.9%)	0.003
Lifetime Substance Use Disorder	120 (90.9%)	30 (93.8%)	0.606
Alcohol Abuse	35 (26.5%)	2 (6.3%)	0.014
Marijuana Abuse	17 (12.9%)	2 (6.3%)	0.293
Cocaine Abuse	4 (3.0%)	1 (3.1%)	0.978
Alcohol Dependence	78 (59.1%)	26 (81.3%)	0.020
Marijuana Dependence	44 (33.3%)	19 (59.4%)	0.007
Cocaine Dependence	19 (14.4%)	12 (37.5%)	0.003