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Regular Article

Validation of the Chinese version of the Mood Disorder Questionnaire in a psychiatric population in Hong Kong

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Aims: The aim of the present study was to determine the validity of a Chinese version of the Mood Disorder Questionnaire (MDQ) as a screening instrument for bipolar disorder in a psychiatric outpatient population in Hong Kong.

Methods: A total of 185 patients primarily being treated for mood disorders were asked to fill in the Chinese MDQ and supply other personal data during their scheduled clinic visit. The mean age was 43.0 years and 65.9% were female. A subsample of 102 randomly selected subjects, stratified by the MDQ symptom score, received a telephone-based Structured Clinical Interview for DSM-IV (SCID). Sixty-two patients (60.8%) were suffering from bipolar disorder (bipolar I, $n = 48$; bipolar II, $n = 9$; bipolar disorder not otherwise specified, $n = 5$), 35 (34.3%) from depressive disorder, and one (1.0%) from substance dependence, while four (3.9%) were unaffected by either mood or alcohol/substance use disorder. The internal consistency, factor structure and operating characteristics of the Chinese MDQ were analyzed.

Results: The internal consistency of the Chinese MDQ, evaluated using Cronbach alpha, was 0.82. Principal component analysis with varimax rotation indicated an 'energized-activity' factor and an 'irritability-racing thoughts' factor, which explained 47.2% of the rotated variance. The optimal cut-off was seven or more manic symptoms occurring within the same time period, which yielded a sensitivity of 0.73 and a specificity of 0.88 for detecting bipolar disorder. An additional criterion that the symptoms cause impairment resulted in significant loss of sensitivity.

Conclusion: The Chinese MDQ is a valid screening instrument for bipolar disorder in a psychiatric outpatient population.

Key words: bipolar disorder, Chinese, mood disorders, Mood Disorder Questionnaire, screening.

BIPOLAR DISORDER IS a complex chronic condition, recognized as a leading cause of disability and is associated with high health-care costs.[1,2] A US survey of 600 individuals with bipolar disorder showed that 69% of the respondents had been misdiagnosed and 35% reported a lapse of more than 10 years between seeking their first treatment and a correct diagnosis.[3] A delay in diagnosis often has substantial adverse results. A recent study showed that patients with bipolar disorder, misdiagnosed with major depressive disorder, had a lower quality of life than patients correctly diagnosed with either major depressive disorder or bipolar disorder.[4] Previous studies have shown that patients with bipolar disorder, who had been misdiagnosed, received inappropriate and costly treatment regimens.[5,6] They also had higher medical costs than those recognized to have the condition.[5]

A number of strategies can be used to screen for bipolar disorder in clinical practice. These include

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Table 1. Studies on the Mood Disorder Questionnaire screening performance

Author (Year)	Country/ sample	Diagnostic system	Selection for diagnostic interview	Prevalence of BP, BP I, BP II and BP NOS in the interviewed sample (%)	Cut-off score/ level of impairment	Sensitivity (%)	Specificity (%)
Hirschfeld *et al.* (2000)[7]	USA/ *n* = 198; psychiatric outpatients at clinics that primarily treat patients with mood disorders	SCID	All subjects	55.1, 35.4, 13.1, 6.6	Standard criteria†	73	90
Hirschfeld *et al.* (2003)[8]	USA/ *n* = 711; general population	SCID mood and substance use modules	Stratified by MDQ score	11.0, 9.8, 1.1, 0.0	Standard criteria	28	97
Isometsa *et al.* (2003)[9]	Finland/ *n* = 38; consecutive non-schizophrenic psychiatric out- and inpatients	SCID	Based on MDQ score and clinical suspicion of having BP	52.6, 26.3, 26.3, 0.0	Standard criteria	85	47
					8 or more; minor, moderate or serious problems	90	59
Benazzi (2003)[10]	Italy/ *n* = 101; consecutive remitted outpatients with BP I, BP II or major depressive disorder in a private practice	SCID	All subjects	76.2, 16.8, 59.4, 0.0	7 or more; omitting the impairment criterion	88	46
Miller *et al.* (2004)[11]	USA/ *n* = 72; consecutive bipolar spectrum and unipolar depressed outpatients	SCID mood module	All subjects	50.0, 36.1, 11.1, 4.2	Standard criteria	58	67
					7 or more; omitting the impairment criterion	78	64
Rouget *et al.* (2005)[12]	France/ *n* = 96; outpatients with mood disorders	SCID mood module	All subjects	56.3, 32.3, 21.9, 2.1	8 or more; moderate or serious problems	74	95
					7 or more; minor, moderate or serious problems	87	86
Hirschfeld *et al.* (2005)[13]	USA/ *n* = 180; primary care outpatients being treated for depression with antidepressants	SCID mood and substance use modules	Subjects consented to SCID telephone interview	32.8, 22.2, 9.4, 1.1	Standard criteria	58‡	93‡
Graves *et al.* (2007)[14]	USA/ *n* = 228; primary care outpatients with a history of significant trauma	SCID	Subjects consented to further assessment	9.2§	Standard criteria	69	62

†Presence of seven or more symptom items that clustered within the same time period and cause either moderate or serious problems.
‡Adjusted for sampling protocol.
§No data on bipolar subtype.
BP, bipolar disorder; MDQ, Mood Disorder Questionnaire; NOS, not otherwise specified; SCID, Structured Clinical Interview for DSM-IV.

eliciting a history of manic symptoms or behaviors from the patient, obtaining collateral information from family and friends, and the prospective use of a mood diary. For a clinician with limited time, screening questionnaires can be very useful. A brief and easy-to-use screening tool, the Mood Disorder Questionnaire (MDQ) has been developed.[7] The MDQ screens for a lifetime history of a manic or hypomanic syndrome by asking 13 yes/no items derived from DSM-IV criteria and clinical experience. An additional yes/no question asks whether several of any reported manic symptoms or behaviors were experienced concurrently. Finally, the level of functional impairment due to these symptoms is also assessed. On the basis of the results of the initial validation study,[7] the presence of seven or more symptom items that cluster within the same time period, and cause either moderate or serious problems, is considered to be a positive indicator of bipolar disorder. The MDQ has been translated into many languages and tested among psychiatric outpatients, community samples and the general population.[7–14] Table 1 presents a summary of the relevant studies on the scale's screening performance. Although the sensitivity, specificity and optimal criteria for a positive screen vary depending on the study population and country sampled, all

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studies showed that the MDQ is a valid screening instrument for bipolar disorder.

There have been recent comments upon the limitations of the MDQ. Zimmerman *et al.* noted that the sensitivity of the MDQ is too low for routine use as a screening measure in clinical and non-clinical samples.[15] The authors added that a modified version of the scale is warranted. Phelps and Ghaemi suggested that the MDQ would be better used as a measure to rule out rather than rule in bipolar disorder, and believed that the sensitivity of the MDQ was too low to identify milder bipolar spectrum disorders.[16] Miller *et al.* found that patients with marked impairment of insight tended to have false negative MDQ screens.[11] A few studies showed that modifying the criteria for a positive screen by adjusting the cut-off score or lowering the impairment criterion could improve the sensitivity of the MDQ without significant reduction in the specificity (Table 1). Despite these limitations, in the updated Canadian Network for Mood and Anxiety Treatments Guidelines the MDQ was still considered a useful screening instrument for bipolar disorder,[17] and remained a tool in recent epidemiological studies on bipolar disorder.[18,19]

The lifetime prevalence of bipolar I disorder is approximately 1% in the general population in the USA[20] and 1.5–2% in European countries.[21] A recent study in metropolitan China using WHO Composite International Diagnostic Interview found that the lifetime prevalence of DSM-IV bipolar I and II disorders was only 0.1%,[22] while a similar study in Korea showed that the lifetime prevalence was 0.2%.[23] Kawakami *et al.* found that the lifetime prevalence of DSM-III-R bipolar disorder in Japan was 0.1%.[24] A local study in the mid-1980s showed that the lifetime rate for bipolar disorder using the DSM-III criteria was 0.15%.[25] It is possible that rates for bipolar I disorder in Asian countries have been underestimated, and that milder bipolar spectrum disorders go unrecognized. The use of the MDQ may improve the recognition of bipolar disorder among the Chinese. The aim of the present study was therefore to examine the psychometric properties of a Chinese version of the MDQ and its accuracy as a screening tool for bipolar disorder in a psychiatric outpatient sample, and compare the screening performance of the MDQ at different impairment criteria. The hypothesis was that the Chinese MDQ may be a valid screening instrument for bipolar disorder in a psychiatric outpatient population but the optimal criteria for a positive screen may be different from the standard criteria used by its developers.

METHODS

Subjects

The study was conducted in the outpatient clinic of the Department of Psychiatry at Queen Mary Hospital, a regional teaching hospital in Hong Kong. The clinic had approximately 8500 outpatients between 18 and 65 years of age. The authors (KFC, KCT, MW) and two clinicians helped recruit eligible subjects from their active cases. We enrolled 185 subjects aged 18–65 years who were receiving treatment primarily for mood disorders, who were assessed as being clinically stable and willing to participate in an in-depth telephone interview. Table 2 presents the subject characteristics. The subject mean age was 43.0 years. A total of 122 were female (65.9%). Written informed consent was obtained from all participants, and all procedures used in the present study were reviewed and approved by the local institutional review board.

Table 2. Sample characteristics

Variables	Total sample (n = 185)
Age in year, mean (SD, range)	43.0 (10.0, 20–64)
Female gender, n (%)	122 (65.9)
Education, n (%)	
Sixth grade or below	37 (20.0)
Seventh to twelfth grade	95 (51.4)
University or above	53 (28.6)
Marital status, n (%)†	
Married/cohabiting	98 (53.3)
Never married	63 (34.2)
Divorced/widowed	23 (12.5)
Occupation, n (%)	
Professional and associate professional	24 (13.0)
Skilled and semi-skilled worker	49 (26.5)
Unskilled worker	16 (8.6)
Homemaker	45 (24.3)
Student	4 (2.2)
Retired	7 (3.8)
Unemployed	40 (21.6)

†n = 184.

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Measures

The translation of the MDQ into Chinese is outlined here. Approval for translation was obtained from one of the authors of the original version (MAH).[7] The English version was translated into Chinese (by MW) and it was independently translated back into English and re-edited to make the Chinese version comparable to the original. The comprehension of each item of the Chinese version was assessed in a pilot sample of 10 patients with mood disorders. A final Chinese version was re-edited and confirmed by all authors.

We used the Chinese version of the Structured Clinical Interview for DSM-IV (SCID) to derive current and lifetime diagnoses of Axis I disorders.[26,27] Only the modules assessing depressive disorders, bipolar disorders and alcohol/substance abuse and dependence were administered.

Procedure

The subjects were recruited at their scheduled clinic visit, during which they completed the Chinese version of the MDQ and recorded their age, marital status, occupation, monthly income and level of education.

The frequency of endorsement of the MDQ items ranged from 17.8% for 'more interested in sex' to 65.9% for 'easily distracted'. Reports from 71 respondents (38.3%) showed a clustering of seven or more symptoms, and 54 of the 71 subjects indicated moderate or serious problems caused by their symptoms.

The target sample for telephone-based diagnostic interview was 100 randomly selected subjects stratified by MDQ symptom score. This strategy for selecting subjects for diagnostic interview was used in a previous study to ensure a fair proportion of interviewed subjects with bipolar disorder.[8] Five subjects were selected for each MDQ score from 0 to 4, regardless of the additional criteria, and for each score of 5–13, five patients who had moderate or serious problems and five who had minor or no impairment were also selected. When there were fewer than five consenting subjects in a stratified group, replacements were randomly selected. Two authors (KCT and EC) blind to MDQ results contacted the selected subjects by telephone within several weeks of MDQ completion to derive psychiatric diagnoses using the SCID. The average duration between completing the MDQ and administering SCID was 2.1 weeks (SD, 1.6; range, 0.3–5.6 weeks). Telephone assessment is thought to have comparable validity to face-to-face administration and is widely accepted in clinical reappraisal studies.[28,29] The interviewers were experienced raters and each had received training on the use of the SCID. To test the interrater reliability of the SCID-derived diagnosis, the two interviewers separately conducted telephone interviews in the same 10 subjects. The kappa coefficient for diagnosis of bipolar disorder was 0.82, suggesting excellent interrater agreement.

Of the 119 patients randomly selected to receive the SCID, 11 subjects could not be contacted by telephone, six refused the interview, hence 102 subjects completed the SCID. A SCID diagnosis of bipolar disorder (bipolar I, $n = 48$; bipolar II, $n = 9$; and bipolar disorder not otherwise specified, $n = 5$) was given to 62 patients (60.8%); that of depressive disorder to 35 patients (34.3%); substance dependence to one patient (1.0%), and neither mood nor alcohol/substance use disorder to four patients (3.9%).

Data analysis

All statistical analysis was done using SPSS 15.0 for Windows (SPSS, Chicago, IL, USA). We used principal component analysis with varimax rotation to determine the construct validity of the Chinese version of the MDQ. The factors were selected according to eigenvalue >1 and Scree plot inspection. We presented the rotated item loadings for items with absolute values >0.5. We assessed the internal consistency of the scale using Cronbach alpha. Criterion validity of the Chinese version of the MDQ was tested against SCID-diagnosed bipolar disorder. The receiver operating characteristic (ROC) curve was used to compare the screening performance of the MDQ at three different impairment criteria: omission of the impairment criterion; symptoms causing mild, moderate or serious problems; and symptoms causing moderate or serious problems. The area under the curve was calculated using formulas reported by Hanley and McNeil.[30] Operating characteristics of the MDQ were computed from 2×2 contingency tables and reported as crude estimates of sensitivity, specificity, positive predictive value and negative predictive value. The kappa coefficient was used to assess the chance corrected level of agreement.[31]

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Table 3. Rotated factor loadings for the Chinese MDQ scale items >0.5 ($n = 185$)

Scale item	Factor 1	Factor 2
Hyper	0.58	
Irritable		0.65
More self-confident	0.72	
Less sleep	0.51	
More talkative	0.66	
Thoughts raced		0.72
Easily distracted		0.72
Much more energy	0.81	
Much more active	0.81	
Much more social	0.52	
Much more sex		
Excessive, foolish or risky things		0.66
Spending got into trouble	0.57	
Variance, %	29.4	17.8
Eigenvalue	3.8	2.3

RESULTS

Principal component analysis with varimax rotation found two factors with eigenvalue >1, and the same number of factors was indicated by the Scree plot. The two factors explained 47.2% of the rotated variance (Table 3). The first factor explained 29.4% of the variance and had high loadings on elevated mood, grandiosity, decreased need for sleep, talkativeness, increased energy and activities and excessive spending. The second factor included items of irritability, racing thoughts, distractibility and risk behavior and accounted for 17.8% of the variance.

The internal consistency of the Chinese version of the MDQ in this sample was very good. The Cronbach α coefficient for the 13-item symptom scale was 0.82. The item-total scale correlations using Pearson's correlation ranged from 0.33 to 0.70. The elimination of each item did not lead to a substantial increase in the scale's internal consistency.

The sensitivity and specificity of the MDQ at three different impairment criteria were combined in an ROC plot (Fig. 1). The area under the curve was 0.84; 0.77; and 0.63 when the symptom cut-off was conditioned on symptom co-occurrence and omission of the impairment criterion; symptoms causing mild, moderate or serious problems; and symptoms causing moderate or serious problems, respectively.

The sensitivity for the standard criteria, defined as the presence of seven or more symptom items that clustered within the same time period and caused either moderate or serious problems was 0.45; its specificity was 0.95 (Table 4). The positive predictive value was 0.93, but the negative predictive value was only 0.53. The kappa for the standard criteria was 0.35, suggesting that the strength of agreement beyond chance was fair. The sensitivity of the standard criteria for bipolar I group was 0.46 while the sensitivity for bipolar II/not otherwise specified was 0.43.

The screening performance of the MDQ was better when the impairment criterion was lowered or omitted. A cluster of seven or more symptoms with omission of the impairment criterion was considered the optimal cut-off, because it provided good sensitivity (0.73) and very good specificity (0.88). The positive predictive value was 0.90, while the negative predictive value was 0.67. The threshold level had the highest kappa (0.57) among all MDQ symptom cut-offs and levels of impairment. The sensitivity of the threshold level for bipolar I group was 0.73 while the sensitivity for bipolar II/not otherwise specified was 0.71.

DISCUSSION

The present results provide evidence for the validity of the Chinese version of the MDQ as a screen for bipolar disorder in psychiatric outpatient settings in Hong Kong. The two-factor structure of the Chinese MDQ was comparable to an 'energized-activity' factor

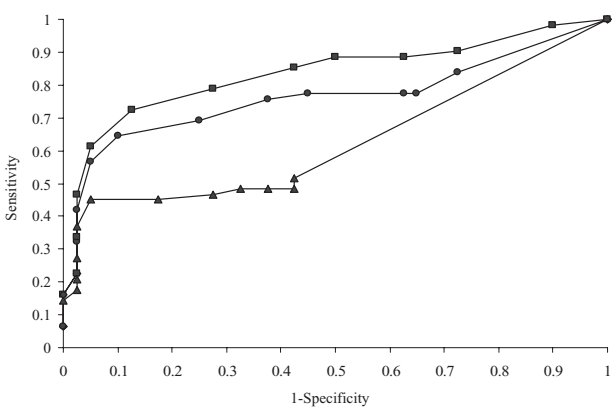

Figure 1. Receiver operating characteristic curve plots for the Chinese Mood Disorder Questionnaire at three impairment criterion levels: (■), omission of impairment criterion; (●), mild, moderate or serious problems; (▲), moderate or serious problems.

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Table 4. Sensitivity, specificity, predictive values and kappa for various MDQ cut-offs

MDQ cut-offs	Sensitivity	Specificity	Positive predictive value	Negative predictive value	κ
Symptoms causing moderate or serious problems					
0	1	0	0.61	–	0
1	0.52	0.58	0.65	0.43	0.09
2	0.48	0.58	0.64	0.42	0.06
3	0.48	0.63	0.67	0.44	0.10
4	0.48	0.68	0.70	0.46	0.15
5	0.47	0.73	0.73	0.47	0.18
6	0.45	0.83	0.80	0.49	0.25
7	0.45	0.95	0.93	0.53	0.35
8	0.37	0.98	0.96	0.50	0.30
9	0.27	0.98	0.94	0.46	0.21
10	0.21	0.98	0.93	0.44	0.15
11	0.18	0.98	0.92	0.43	0.12
12	0.15	1	1	0.43	0.12
13	0.06	1	1	0.41	0.05
Symptoms causing minor, moderate or serious problems					
0	1	0	0.61	–	0
1	0.84	0.28	0.64	0.52	0.12
2	0.77	0.35	0.65	0.50	0.13
3	0.77	0.38	0.66	0.52	0.16
4	0.77	0.55	0.73	0.61	0.33
5	0.76	0.63	0.76	0.63	0.38
6	0.69	0.75	0.81	0.61	0.43
7	0.65	0.90	0.91	0.62	0.50
8	0.56	0.95	0.95	0.58	0.46
9	0.42	0.98	0.96	0.52	0.34
10	0.32	0.98	0.95	0.48	0.25
11	0.23	0.98	0.93	0.45	0.17
12	0.16	1	1	0.43	0.13
13	0.06	1	1	0.41	0.05
Omission of impairment criterion					
0	1	0	0.61	–	0
1	0.98	0.10	0.63	0.80	0.10
2	0.90	0.28	0.66	0.65	0.20
3	0.89	0.38	0.69	0.68	0.28
4	0.89	0.50	0.73	0.74	0.41
5	0.85	0.58	0.76	0.72	0.45
6	0.79	0.73	0.82	0.69	0.51
7	0.73	0.88	0.90	0.67	0.57
8	0.61	0.95	0.95	0.61	0.51
9	0.47	0.98	0.97	0.54	0.39
10	0.34	0.98	0.95	0.49	0.27
11	0.23	0.98	0.93	0.45	0.17
12	0.16	1	1	0.43	0.13
13	0.06	1	1	0.41	0.05

MDQ, Mood Disorder Questionnaire.

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and an 'irritability-racing thoughts' factor in previous factor analytic studies of the MDQ.[32,33] Similar factors were also obtained in the factor analysis of mania, assessed by clinical interview during the episode.[34,35] The internal consistency of the Chinese MDQ was similar to those previously described in psychiatric samples.[7,9,12]

The operating characteristics of the Chinese MDQ were good, and comparable to those obtained in Western populations,[7–14] but the optimal criteria for a positive screen was different from the standard criteria used by its developers. The Chinese MDQ's sensitivity of 0.73 and specificity of 0.88 was achieved by omission of the impairment criterion. Previous studies have commented on the problems of asking subjects to assess the impairment caused by their bipolar symptoms.[10,11] First, individuals with bipolar II or not otherwise specified disorders may not be significantly impaired by their symptoms. Second, patients with bipolar disorder may under-appreciate the severity of their manic symptoms, and thus inaccurately report the extent of impairment. This may also be true of the present sample and might explain the high rate of false negatives when the standard impairment criterion was adopted.

We found that the performance of the Chinese MDQ was similar for bipolar I, bipolar II and the not otherwise specified groups. Previous studies have found that the MDQ is less sensitive but more specific than the Hypomania Symptom Checklist-32 (HCL-32).[36,37] Although the present study was not designed to directly compare the screening instruments for bipolar disorder, the sensitivity of the Chinese MDQ at its optimal cut-off was lower than a sensitivity of 0.82 for the HCL-32 used in a psychiatric setting in Taiwan.[38] But the specificity of the MDQ was higher than the HCL-32's specificity of 0.67. The areas under the curve for the Chinese versions of the MDQ and HCL-32 were almost the same at 0.84 and 0.83, respectively.

There are several limitations to the present study. The subjects agreed to participate in the study, hence they were likely to have good insight into their illness. Also, only 1% of the present sample had a substance use disorder. It is possible that the sensitivity and specificity of the Chinese MDQ in everyday clinical settings may be lower. The subjects were considered clinically stable, but standardized rating scales were not used to quantify psychiatric symptoms.

In conclusion, the Chinese version of the MDQ is a brief and feasible method for improving the recognition of bipolar disorder in psychiatric outpatient settings. The MDQ has been successfully used to improve recognition of bipolar disorder in patients treated for depression in a family medicine clinic.[13] Future studies should evaluate the usefulness of the Chinese MDQ for screening bipolar disorder in community samples and patients with comorbid disorders, which frequently occur with bipolar disorder.

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