ORIGINAL ARTICLE

Dimensional approach to symptom factors of major depressive disorder in Koreans, using the Brief Psychiatric Rating Scale: The Clinical Research Center for Depression of South Korea Study

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Abstract   Although major depressive disorder (MDD) has a variety of symptoms beyond the affective dimensions, the factor structure and contents of comprehensive psychiatric symptoms of this disorder have rarely been explored using the 18-item Brief Psychiatric Rating Scale (BPRS). We aimed to identify the factor structure of the 18-item BPRS in Korean MDD patients. A total of 258 MDD patients were recruited from a multicenter sample of the Clinical Research Center for Depression of South Korea study. Psychometric scales were used to assess overall psychiatric symptoms (BPRS), depression (Hamilton Depression Rating Scale), anxiety (Hamilton Anxiety Rating Scale), global severity (Clinical Global Impression of Severity Scale), suicidal

ideation (Scale for Suicide Ideation), functioning (Social and Occupational Functioning Assessment Scale), and quality of life (World Health Organization Quality of Life Assessment-abbreviated version). Common factor analysis with oblique rotation was used to yield factor structure. A four-factor structure was designed and interpreted by the symptom dimensions to reflect mood disturbance, positive symptoms/apathy, bipolarity, and thought distortion/mannerism. These individual factors were also significantly correlated with clinical variables. The findings of this study support the view that the BPRS may be a promising measuring tool for the initial assessment of MDD patients. In addition, the four-factor structure of the BPRS may be useful in understanding the mood and psychotic characteristics of these patients.

Introduction

Depression is a significant global public health concern [1–4]. Major depressive disorder (MDD) is a heterogeneous and multifactorial mental disorder encompassing a wide range of symptom dimensions affecting mood, cognition, and motor functions [5]. Most MDD patients present with several symptoms beyond the formal diagnostic constructs of the 4th edition of the *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV)* or 10th revision of the *International Statistical Classification of Diseases and Related Health Problems*. Clinical and subclinical psychotic experiences [6–8] and bipolar spectrum features [9,10] are commonly manifested in the context of MDD. From a clinical course perspective, a reciprocal relationship between depression and psychosis has been identified [11,12].

Despite these manifestations, instruments designed to measure only depression-specific characteristics have been generally used to examine the factor structure of symptoms in MDD patients. Therefore, there is a need to study the factor structure of symptoms in MDD patients using the measuring instruments specific for these various symptom dimensions. The 18-item Brief Psychiatric Rating Scale (BPRS) [13] is generally used to evaluate overall symptoms in patients with schizophrenia and other psychotic disorders [14,15]. Although the BPRS has not been developed to evaluate MDD-specific symptoms, it covers a broader range of symptom clusters than the depression-specific measuring instruments, and assesses the overall clinical manifestations. It has been suggested that the BPRS could be used to analyze the factor structure in nonpsychotic patients [16]. To our knowledge, the factor structure of the 18-item BPRS has rarely been analyzed. Biancosino et al [17] presented the factor structure of the 18-item BPRS in unipolar depression using four factors (apathy, dysphoria, depression, and psychoticism). The authors extracted the four factors by performing exploratory factor analysis with varimax rotation on the BPRS items. In another study, an exploratory factor analysis of the 24-item BPRS produced a six-factor solution (reality distortion, activation, apathy, mood disturbance, disorganization, and somatization), which reflected the symptom dimensions [18].

However, the participants in these previous studies have been recruited from one regional center, rather than from around the country. In addition, the factor structures of the BPRS have been extracted from the symptoms of unipolar depression in Europeans, including Italians and Swiss. It is known that ethnic and/or cultural factors can have pathoplastic influences on depressive symptoms [19,20]. To our knowledge, in Asians, the factor structure of symptoms in MDD patients has not yet been developed. Therefore, using data from the Clinical Research Center for Depression of South Korea (CRESCEND) study, we aimed to examine the factor structure in a multicenter sample of Korean patients with MDD. More specifically, the study aimed to reveal the factor structure of the BPRS in Koreans with MDD and the essential characteristics of the individual factors of the BPRS.

Methods

Study overview

A detailed description of the CRESCEND study is presented elsewhere [21]. In the CRESCEND study, patients with depressive disorders were recruited at 18 study centers across South Korea, including 16 university-affiliated hospitals and two general hospitals, from January 2006 to August 2008. The Institutional Review Boards of all the study centers approved the study protocol and consent forms. All the participants or their authorized representatives provided written informed consent prior to participation. The Data Management Center in the Department of Preventative Medicine of the Catholic University College of Medicine in Seoul (Korea) monitored the collection and quality of data. At the regional centers, trained and certified clinical research coordinators supervised by clinical psychiatrists collected all sociodemographic and clinical data.

Participants

Data were drawn from 1183 depressed patients of the CRESCEND study. To be consistent with the objective of this study, the following additional inclusion criteria were adopted: (1) older than 18 years; (2) a diagnosis of MDD according to DSM-IV [22], and confirmed by a Structured Clinical Interview for DSM-IV [23]; (3) a total score of ≥ 8 on the Hamilton Depression Rating Scale (HAMD) [24,25]; (4) availability of a fully completed 18-item BPRS; and (5) a total score of ≥ 19 on the BPRS, to ensure the reliability of the BPRS item responses. Of the 1183 patients, 258 who

were diagnosed with MDD and had total scores on the BPRS $\geq$ 19 were included in the study. The majority of participants were recruited from outpatient facilities (72.3%), and the remaining participants were inpatients (27.7%).

Measuring instruments

To assess clinical, social, and functional outcomes, we used the following clinician-administered measuring instruments: the 18-item BPRS [13], the HAMD [24], the Hamilton Anxiety Rating Scale (HAMA) [26], the Clinical Global Impression of Severity Scale (CGI-S) [27], and the Social and Occupational Functioning Assessment Scale (SOFAS) [28]. The self-administered Beck Scale for Suicide Ideation (SSI-Beck) [29] and the World Health Organization (WHO) Quality of Life Assessment instrument-abbreviated version (WHOQOL-BREF) [30] were also used. Higher scores on the BPRS, the HAMD, the HAMA, the CGI-S, and the SSI-Beck, and lower scores on the SOFAS and WHOQOL-BREF represented more severe symptomatology or impact. All the scales were formally translated into Korean and standardized [31–36]. In the BPRS, each item is rated from one (absence of symptoms) to seven (extremely severe). In the HAMD and HAMA, each item is rated from zero (not present) to four (severe). The score of the CGI-S is rated from one (not ill) to seven (extremely severe), and the score of the SOFAS is rated from one to 100.

In addition, according to Zimmerman et al's [25] recommendation, depressive symptom severity was classified by the following severity range for the HAMD: mild depression (8–16); moderate depression (17–23); and severe depression ($\geq$ 24).

Statistical analyses

Descriptive statistical values including means, standard deviations (SDs), and skewness were drawn from the BPRS items. To obtain concurrent validity, we calculated Pearson's correlation coefficient between total score on the BPRS and the total score, or the scores on the other measuring instruments. An exploratory factor analysis (EFA) was performed on 18 items of the BPRS with common factor analysis using the principal axis factoring. Oblique rotation of the direct oblimin method was preferred to extract concise and parsimonious factor structure, because factor independence could not be assumed. The number of factors retained for rotation was determined based on the scree plot, in addition to eigenvalues and expandability [37]. To describe the factor structure and contents clearly, only a loading of more than 0.30 was interpreted. Furthermore, Cronbach α coefficients were calculated to reveal the internal consistency of each factor that was composed of several BPRS items. Factor scores were defined by adding the item scores loading on the specific factors. Pearson's correlation coefficient was calculated to examine the association between factors.

Pearson's correlation coefficient was also calculated to examine the association between clinical variables and factors. Significance was set at $p < 0.05$ (2-tailed) for all tests. All statistical analyses were performed using SPSS version 18.0 for Windows (SPSS Inc., Chicago, IL, USA).

Results

Overall participant characteristics

The mean age of the participants was 50.7 (SD = 16.2) years. Most participants were women (71.7%). The mean score on the HAMD was 20.5 (SD = 6.2), followed by 18.2 (SD = 8.9) on the HAMA, 10.2 (SD = 8.9) on the SSI-Beck, 4.7 (SD = 1.1) on the CGI-S, 61.5 (SD = 11.6) on the SOFAS, and 62.8 (SD = 10.1) on the WHOQOL-BREF.

In addition, in terms of depressive symptom severity, the proportions of people with mild, moderate, and severe depression were 21.9%, 38.7%, and 39.3%, respectively.

Descriptive statistics for the BPRS items

Table 1 presents the descriptive statistics for the BPRS items. The mean total score on the BPRS was 32.3 (SD = 9.0). The mean scores of six (33.3%) items exceeded two. The ranges of five (27.8%) items fell between absent (score 1) and moderately severe/severe (score $\geq$ 5). The distributions of the individual items were evaluated according to Bulmer's (1979) [50] criteria. Thus, 12 (66.6%) items were strongly positively skewed ($>+1$), indicating the majority were rated one point, the lowest score. In addition, three (16.7%) items including somatic concern, emotional withdrawal, and guilt feelings were moderately positively skewed (between 0.05 and 1), indicating the items were rated relatively low. Two (11.2%) items including anxiety and depressive mood were moderately negatively skewed (between −1 and −0.05), meaning most rated it relatively high. The only tension item was approximately symmetric (between −0.05 and 0.05), and was normally distributed.

Concurrent validity

As shown in Table 2, the total score on the BPRS was positively correlated with the score on the CGI-S ($r = 0.42$; $p < 0.001$) and negatively correlated with the total scores on the WHOQOL-BREF ($r = -0.38$; $p < 0.001$) and SOFAS ($r = -0.42$; $p < 0.001$). Thus, the concurrent validity of the BPRS was considered fair. In addition, the total score on the BPRS was positively correlated with the total scores on the HAMD ($r = 0.42$; $p < 0.001$), HAMA ($r = 0.52$; $p < 0.001$), and SSI-Beck ($r = 0.31$; $p < 0.000$).

Data screening

The sample size was above the minimum that had been recommended for EFA ($n > 150$) and the Kaiser–Meyer–Olkin value of 0.73 also exceeded the recommended value [38]. The correlation matrix showed that many coefficients were >0.40, and Bartlett's test for sphericity was significant [χ^2 (153) = 884.23, $p < 0.001$]. All the indicators suggested that the data were suitable for the EFA and all the items were included in the EFA.

Exploratory factor analysis

There was a distinct change in the slope of the eigenvalues after the fourth component (Fig. 1). Thus, a four-factor

Table 1   Brief Psychiatric Rating Scale items and total scores (mean ± standard deviation).

Item	Present study			Biancosino et al [17]	Zanello et al [18],[a]
	(n = 258)	(Range)	(Skewness)	(n = 163)	(n = 240)
1. Somatic concern	2.48 ± 1.49	1—5	0.52	2.60 ± 1.20	2.23 ± 1.26
2. Anxiety	3.50 ± 1.33	1—6	−0.11	4.20 ± 0.70	5.27 ± 1.22
3. Emotional withdrawal	2.43 ± 1.56	1—6	0.75	2.20 ± 0.80	1.57 ± 0.88
4. Conceptual disorganization	1.10 ± 0.46	1—4	5.41	1.10 ± 0.30	1.13 ± 0.46
5. Guilt feelings	2.17 ± 1.41	1—5	0.88	2.70 ± 0.90	3.19 ± 1.44
6. Tension	2.57 ± 1.40	1—6	0.39	2.60 ± 0.80	1.86 ± 1.13
7. Mannerism and posturing	1.06 ± 0.39	1—4	7.34	1.40 ± 0.70	1.03 ± 0.17
8. Grandiosity	1.08 ± 0.52	1—6	8.35	1.10 ± 0.40	1.17 ± 0.70
9. Depressive mood	3.63 ± 1.50	1—5	−0.17	4.80 ± 0.70	5.20 ± 1.26
10. Hostility	1.55 ± 1.15	1—5	2.15	1.50 ± 0.70	2.75 ± 1.56
11. Suspiciousness	1.58 ± 1.15	1—5	1.92	1.20 ± 0.60	2.33 ± 1.25
12. Hallucinatory behavior	1.17 ± 0.69	1—5	4.62	1.00 ± 0.30	1.36 ± 0.85
13. Motor retardation	1.57 ± 1.10	1—5	1.98	3.40 ± 1.10	1.64 ± 0.96
14. Uncooperativeness	1.11 ± 0.49	1—5	6.38	1.30 ± 0.50	1.20 ± 0.65
15. Unusual thought content	1.16 ± 0.60	1—4	4.29	1.50 ± 0.80	1.36 ± 0.88
16. Blunted affect	1.57 ± 1.13	1—5	1.98	3.00 ± 0.80	2.13 ± 1.20
17. Excitement	1.72 ± 1.29	1—5	1.70	1.00 ± 0.20	1.47 ± 0.90
18. Disorientation	1.10 ± 0.50	1—4	5.98	1.30 ± 0.70	1.22 ± 0.54

[a] 24-item Brief Psychiatric Rating Scale.

solution was the most acceptable and explained 52.4% of the total variance. Table 3 presents the obliquely rotated factor matrix with the items ordered and grouped by their loading values. Although the loading of the disorientation item was < 0.30, it was included in the thought distortion/mannerism factor to form a comprehensive factor structure for the BPRS. The first factor was mood disturbance, and was composed of items tension, depressed mood, anxiety, excitement, somatic concern, and guilt feelings. Its Cronbach α coefficient was fair at 0.76. The second factor, positive symptoms/apathy, was loaded by the items suspiciousness, hostility, emotional withdrawal, hallucinatory behavior, motor retardation, and blunted affect. Its Cronbach α coefficient was also fair at 0.71. Bipolarity is the third factor, and was loaded by the items uncooperativeness and grandiosity. At 0.79, its Cronbach α coefficient was considered fair. The fourth factor was composed of mannerism and posturing, conceptual disorganization, unusual thought content, and disorientation items. The fourth factor did not have consistent characteristics and was

interpreted as thought distortion/mannerism. Its Cronbach α coefficient was 0.47, which is considered unacceptable. If the disorientation item was deleted, the Cronbach α coefficient was considered poor (0.55). Table 4 summarizes the correlations between the scores of the four-factor solution for the BPRS. Except mood disturbance and bipolarity (r = 0.12; p = 0.12), all correlations between factors were significant; especially, the association strengthens between mood disturbance and positive symptoms/apathy, and between bipolarity and positive symptoms/apathy (rs > 0.33, ps < 0.001).

Clinical variables and factor associations

As shown in Table 5, Pearson's correlations among the factor scores and clinical variables revealed that the mood disturbance factor was positively correlated with scores on

Table 2   Correlation between the Brief Psychiatric Rating Scale and the other measuring instruments.

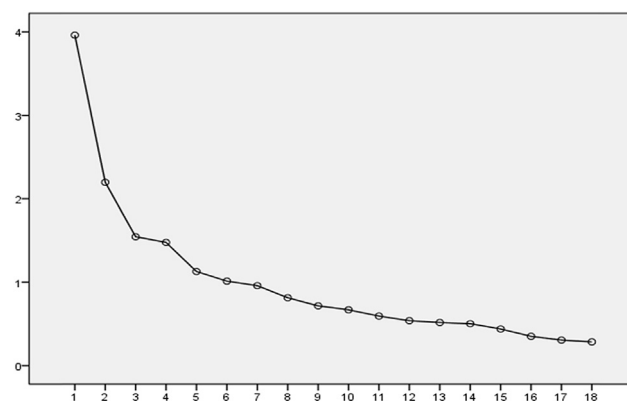|	r	p
Hamilton Depression Rating Scale	0.42	<0.001
Hamilton Anxiety Rating Scale	0.52	<0.001
Scale for Suicide Ideation	0.31	<0.001
Clinical Global Impression of Severity Scale	0.42	<0.001
Social and Occupational Functioning Assessment Scale	−0.42	<0.001
World Health Organization Quality of Life Assessment-BREF	−0.38	<0.001

Figure 1.   Scree plot of the Brief Psychiatric Rating Scale factor eigenvalues.

Table 3   The four-factor solution for the Brief Psychiatric Rating Scale.

	Eigenvalue	Variance (%)[a]	Items	Loading	Cronbach α
Mood disturbance	4.22	23.42	6. Tension	0.76	0.76
			9. Depressive mood	0.74	
			2. Anxiety	0.73	
			17. Excitement	0.64	
			1. Somatic concern	0.59	
			5. Guilt feelings	0.40	
Positive symptoms/apathy	2.12	11.79	11. Suspiciousness	0.80	0.71
			10. Hostility	0.69	
			3. Emotional withdrawal	0.59	
			12. Hallucinatory behavior	0.57	
			13. Motor retardation	0.52	
			16. Blunted affect	0.43	
Bipolarity	1.57	8.73	14. Uncooperativeness	0.88	0.79
			8. Grandiosity	0.49	
Thought distortion/mannerism	1.52	8.44	7. Mannerism and posturing	0.79	0.47
			4. Conceptual disorganization	0.62	(0.55)[b]
			15. Unusual thought content	0.54	
			18. Disorientation	0.18	

[a] The cumulative variance was 52.37%.
[b] The disorientation item was deleted.

the HAMD ($r = 0.44$; $p < 0.001$), HAMA ($r = 0.50$; $p < 0.001$), and CGI-S ($r = 0.43$; $p < 0.001$), and negatively correlated with the scores on the SOFAS ($r = -0.24$; $p = 0.01$) and WHOQOL-BREF ($r = -0.24$; $p = 0.01$). The positive symptoms/apathy factor was positively correlated with the scores on the HAMD ($r = 0.25$; $p = 0.01$), HAMA ($r = 0.38$; $p < 0.001$), SSI-Beck ($r = 0.35$; $p < 0.001$), and CGI-S ($r = 0.27$; $p < 0.001$), and negatively correlated with age ($r = -0.30$; $p < 0.001$) and scores on the SOFAS ($r = -0.36$; $p < 0.001$) and WHOQOL-BREF ($r = -0.32$; $p < 0.001$). The bipolarity factor was positively correlated with scores on the CGI-S ($r = 0.18$; $p = 0.02$) and negatively scored with the SOFAS scores ($r = -0.18$; $p = 0.02$). The thought distortion/mannerism factor was positively correlated with the score on the CGI-S ($r = 0.19$; $p = 0.01$) and the HAMA ($r = 0.15$; $p = 0.05$), and negatively correlated with the score on the SOFAS ($r = -0.17$; $p = 0.02$).

Discussion

As shown in Table 1, the means and SDs of most BPRS items in this study have been generally within the ranges of the previously reported values. However, comparison with

previous values is difficult because of the large variation between studies, possibly due to differences between psychiatric inpatients and outpatients, cultural effects on MDD manifestations, and sample composition. The only consistent difference between our results and those of previous studies has been that the mean scores on the anxiety, guilt feelings, depressive mood, and blunted affect items were lower, although the proportion of moderate/severe depression was present in more than three fourth of the participants in this study. It has been reported that Koreans with MDD experience lower levels of depressive mood and guilt feelings, but higher levels of hypochondriasis and suicidal ideas or gestures than Americans with MDD [20]. Therefore, we speculated that the characteristic features of MDD manifestations in Koreans might contribute to lower mean scores on guilt feelings and depressive mood items. As presented in Table 2, in terms of overall severity, the concurrent validity of the BPRS has been regarded as being fair. However, among overall severity, depression, anxiety, and suicidal ideation, the divergent validity of the BPRS has not been extracted. Therefore, we speculated that depression, anxiety, and suicidal ideation likely contribute to the overall severity of MDD in Koreans.

Concerning the dimensions of symptomatology of MDD, this study has revealed a four-factor structure of the BPRS.

Table 4   Correlations between factors in the four-factor solution for the Brief Psychiatric Rating Scale.

	Mood disturbance	Positive symptoms/apathy	Bipolarity	Thought distortion/mannerism
Mood disturbance	1.00			
Positive symptoms/apathy	0.44*	1.00		
Bipolarity	0.12	0.33*	1.00	
Thought distortion/mannerism	0.18**	0.24*	0.16**	1.00

* $p < 0.01$.
** $p < 0.05$.

Table 5   Clinical variables and factor associations.

	Mood disturbance	Positive symptoms/apathy	Bipolarity	Disorganization
Sex	−0.09	0.10	−0.01	−0.05
Age	0.05	−0.30*	−0.06	<0.001
HAMD	0.44*	0.25*	−0.03	0.15
HAMA	0.50*	0.38*	−0.05	0.15**
SSI-Beck	0.14	0.35*	0.04	0.13
CGI-S	0.43*	0.27*	0.18**	0.20*
SOFAS	−0.24*	−0.36*	−0.18**	−0.17**
WHOQOL-BREF	−0.24*	−0.32*	−0.03	−0.15

CGI-S = Clinical Global Impression of Severity Scale; HAMA = Hamilton Anxiety Rating Scale; HAMD = Hamilton Depression Rating Scale; SOFAS = Social and Occupational Functioning Assessment Scale; SSI-Beck = Scale for Suicide Ideation; WHOQOL-BREF = World Health Organization Quality of Life assessment instrument-abbreviated version.
* $p < 0.01$.
** $p < 0.05$.

First, mood disturbance, which is conventionally related to depressive and anxiety disorders, has been also identified in patients with unipolar depression using the 24-item BPRS [18]. It is similar to the depression—anxiety dimension identified in patients with schizophrenia [39—41]. The same factor has been divided into the dimensions of depression and dysphoria in a previous study [17]. Whereas the depression dimension represents the core depressive symptoms, the dysphoria dimension refers to a state of unpleasant tension with a tendency toward hostile re-actions [42,43]. Our findings concerning clinical variables and factor associations reveal the general characteristics of mood disturbance.

Second, positive symptoms/apathy, composed of positive symptoms (suspiciousness, hostility, and hallucinatory behavior) and negative symptoms (emotional withdrawal, motor retardation, and blunted affect), has been divided into the positive symptoms and apathy dimensions in a previous study [17]. Even psychosis-like manifestations are more common than expected in depressive patients [44]. Thus, this finding can be explained by the assumption that MDD is accompanied by several kinds of irrational ideations as well as the typical symptoms of depression. Moreover, in connection with the debate about whether apathy is a part of depression or a separate psychopathological dimension, this finding suggests that apathy is distinct from depression and may be one of the symptoms of psychosis [17,45,46]. Moreover, among its significant clinical variables and factor associations, positive symptoms/apathy is correlated with suicidal ideation. This finding supports the idea of a close link between suicidal tendencies and clinical or subclinical psychotic experiences in MDD [47]. In addition, the presence of the positive symptoms/apathy dimension among diverse symptoms of MDD cannot be interpreted to mean that all MDD patients have positive symptoms/apathy.

Bipolarity includes uncooperativeness and grandiosity, and has been identified as a part of MDD symptomatology in this study. This suggests that a significant proportion of the participants in this study have various hypomanic/manic symptoms or mixed features. To our knowledge, this factor has never been identified among the factor solutions for the 18-item BPRS in MDD patients. Although the 18-item BPRS do not have any specific items for the various hypomanic or

manic symptoms [17,18], this finding suggests that the converse symptoms for depression are measured by the bipolarity factor. Because bipolar spectrum features-measuring specific instruments were not included in this study, only the scores on the CGI-S and SOFAS have been significantly correlated with the bipolarity factor. In depressed patients, the subclinical bipolar spectrum features can be associated with the poor clinical course and outcome of MDD psychotherapy [7]. Moreover, the presence of bipolarity dimension among diverse symptoms of MDD cannot be interpreted to mean that all MDD patients have bipolarity.

Finally, thought distortion/mannerism consists of cognitive (conceptual disorganization, unusual thought content, and disorientation) items and behavioral (mannerism and posturing item) features, and has been identified with a similar pattern in the factor solution for the 24-item BPRS among unipolar depressed patients [18]. To our knowledge, this factor has never been identified in the factor solution for the 18-item BPRS among MDD patients. However, it has been represented in the factor solution for the 18- and 24-item BPRS among schizophrenic patients [48]. Because disorganization-measuring specific instruments have not been used in this study, the associations between this factor and the clinical variables have a minimal impact on clinical significances. Although the disorientation has been deleted, the internal consistency of the thought distortion/mannerism factor has been considered poor. This finding represents the clinical characteristics of the participants in this study. As this factor is regarded as a nonessential symptom of MDD, this finding can be changed if the participants include patients with depressive disorders beyond MDD and other psychiatric disorders.

As shown in Table 4, we have found significant correlations among the four key factors, except mood disturbance and bipolarity. Psychotic feature has been suggested as the high-risk factor for conversion from unipolar depression to bipolar disorder in patients [49]. Therefore, because the mood disturbance factor does not contain the contents of psychotic features, the bipolarity factor can be proposed as an independent dimension from the mood disturbance factor. This favored the use of oblique rotation of the direct oblimin method in this study. In relation to Biancosino and co-workers [17] findings, it is notable that the factors

bipolarity and thought distortion/mannerism were only identified in this study. However, this outcome suggests that it is clinically important in MDD patients to evaluate symptoms other than the typical symptoms, which are mainly evaluated by MDD-specific measuring instruments, such as HAMD. As shown in Table 5, remarkably, there is no relationship between the mood disturbance factor and current suicidal ideation. As the mood disturbance factor has been conceptualized with depressive mood/guilt feelings, anxiety/tension, somatic concern, and excitement subfactors, we speculate that the accumulation of relatively heterogeneous subfactors may contribute to the lack of a relationship.

There have been some limitations in this study. First, the specific measurement instruments for the bipolarity and thought distortion/mannerism factors have not been applied. Therefore, we could not evaluate the concurrent validity for these factors in this study. Second, the confounding effects of psychiatric comorbidity have not been considered. Third, the divergent validity of the BPRS has not been established. Fourth, formal inter-rater reliability ratings have not been measured in rating the BPRS. However, all psychometric assessments have been measured by trained and certified research coordinators under the supervision of clinical psychiatrists at each of the regional centers, and training for all of the raters is provided twice/year, with a formal consensus meeting for applying the rater-administered assessment instruments.

Despite these limitations, the study has the virtue of pioneering research to assess MDD patients using this scale. In summary, the study result demonstrates that the 18-item BPRS has a four-factor structure, consisting of mood disturbance, positive symptoms/apathy, bipolarity, and thought distortion/mannerism in Korean patients with MDD. Our findings suggest that MDD usually presents with several psychiatric symptoms in addition to mood symptoms and that the 18-item BPRS is a promising measuring instrument to evaluate the diverse symptoms that occur in MDD patients. Moreover, the four-dimension structure of the BPRS in patients with MDD shed light on the comprehension of the mood subthreshold-to-threshold other psychiatric manifestations of them.

Acknowledgments

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