



Research report

Intelligence, temperament, and personality are related to over- or under-reporting of affective symptoms by patients with euthymic mood disorder

Eun Young Kim^{a,1}, Samuel Suk-Hyun Hwang^{b,c,1}, Nam Young Lee^d, Se Hyun Kim^e,
Hyun Jeong Lee^a, Yong Sik Kim^d, Yong Min Ahn^{a,c,*}

^a Department of Psychiatry, Seoul National University Hospital, Seoul 110-744, Republic of Korea

^b Department Addiction, Rehabilitation, & Social Welfare, Eulji University, Seungnam 461-713, Republic of Korea

^c Institute of Human Behavioral Medicine, Seoul National University College of Medicine, Seoul 110-744, Republic of Korea

^d Department of Neuropsychiatry, Dongguk University Medical School, Dongguk University International Hospital, Goyang 410-773, Republic of Korea

^e Institute of Human Behavioral Medicine, Medical Research Institute, Seoul National University, Seoul 110-744, Republic of Korea

ARTICLE INFO

Article history:

Received 23 July 2012

Received in revised form

29 November 2012

Accepted 29 November 2012

Keywords:

Mood disorder

Self-reporting

Clinician rating

Intelligence

Personality

Temperament

ABSTRACT

Background: Many patients with mood disorders report subjective indicators of depression that are inconsistent with clinicians' objective ratings. This study used the self-report Beck Depressive Inventory (BDI) and the observer-rated Hamilton Depression Rating Scale (HAMD) to evaluate the extent to which temperament, personality traits, and clinical characteristics accounted for discrepancies between self-reports and clinician ratings of depressive symptoms in patients experiencing the euthymic period of a mood disorder.

Method: The sample consisted of 100 individuals with bipolar disorder ($n=72$) or major depressive disorder ($n=28$). The HAMD and Young Mania Rating Scale were administered, and participants completed the BDI and Barratt Impulsivity Scale. Intelligence was assessed with the Korean Wechsler Adult Intelligence Scale. Patients completed the Temperament Evaluation of the Memphis, Pisa, Paris, and San Diego Autoquestionnaire and the NEO-Five-Factor Inventory.

Results: The BDI and HAMD were significantly but modestly correlated with each other ($r=0.319$, $p<0.001$). Lower intelligence and a less conscientious personality were independent contributors to differences between Z-scores for the BDI and the HAMD. Higher impulsivity and a more anxious temperament were also observed in the group that self-reported more symptoms than were noted by clinicians.

Limitations: Generalizability of results can be limited in ethnic difference.

Conclusions: Subjective and objective assessments of the depressive symptoms of patients with mood disorders in a euthymic mood state are frequently discordant. Clinicians should consider the subjective aspects of depressive symptoms along with objective information about the influence of intelligence and personality on patients' self-reports.

© 2012 Elsevier B.V. All rights reserved.

1. Introduction

In evaluating depressive symptoms, discrepancies between patients' self-reporting and clinicians' assessments have frequently been reported. Traditionally, clinician rated scales are considered to be more objective and valid than self-rating scales for assessing the severity of symptoms as outcome measures. However, observer

rating may be biased by a rater's clinical experience and familiarity with the scale, diagnostic impressions, or preconceptions regarding therapeutic effect (Moller, 2000). Recently, self-reporting scales have become increasingly important for the assessment of psychiatric disorders because the emphasis has shifted toward subjective outcomes such as psychological well-being, functional recovery, treatment satisfaction, or symptoms based on patients' views or judgment and they are particularly important in the assessment of depressive symptoms because they might be more reliable than clinician-rating scales due to absence of inter-rater variability (McCabe et al., 2007). After all, self-reporting scales may be more suitable for the assessment of subjective symptoms such as guilt, anxiety, or suicidal ideation, which must rely on report by the patient in observer rating

* Corresponding author at: Seoul National University Hospital, Department of Psychiatry, 28 Yongon-Dong, Chongno-Gu, Seoul 110-744, Republic of Korea.
Tel.: +82 2 2072 0710; fax: +82 2 744 7241.

E-mail address: aym@snu.ac.kr (Y.M. Ahn).

¹ These authors contributed equally to the paper.

scales (Moller, 2000). Therefore, it is clinically relevant to understand the nature, extent, and constituents of the discrepancy of self-reporting scales and clinician-rating scales for the comprehensive evaluation of depressive symptoms in both psychiatric research and clinical practice.

Several studies conducted during the last few decades examining this important issue in patients with mood symptoms have reported a wide range of correlation coefficients between the patients scores on the Beck Depression Inventory (BDI) (Beck et al., 1961), a self-report scale for depressive symptoms, and the Hamilton Depression Rating Scale (HAMD) (Hamilton, 1960), a clinician-scored scale. Although a previous review reported a relatively high degree of correlation, ranging from 0.6 to 0.9 (Beck, 1992), between the BDI and HAMD, other reviews have found considerably different correlation coefficients, ranging from 0.2 to 0.8 (Moller, 1991; Moller and von Zerssen, 1995; Richter et al., 1998; Uher et al., 2008). Recent studies have shown that the BDI was modestly correlated with the HAMD ($r=0.45$, $p<0.001$) in patients with treatment-resistant depression (Rane et al., 2010). A variety of clinical factors may be involved in important differences between them. Although such disparities are partly attributable to the divergent conceptualizations used by different instruments (e.g., the BDI is more concerned with the cognitive aspect of depressive psychopathology, and the HAMD focuses more on the somatic and behavioral aspects) (Uher et al., 2008), several studies have attempted to identify the clinical and demographic characteristics that are related to discrepancies between data from self-reports and those provided by clinicians.

Previous research has found that depressed patients who had fewer years of formal education (Enns et al., 2000; Sayer et al., 1993) and were older under-reported depression compared with ratings given by observers (Enns et al., 2000), although these results have not been replicated consistently. In terms of the subtypes of depression, patients with melancholic features are likely to report less severe depressive symptoms than are their clinicians (Prusoff et al., 1972; Rush et al., 1987), whereas depressed patients with non-endogenous or neurotic features tend to self-report more severe depression than do their clinicians (Domken et al., 1994; Rush et al., 1987).

According to a recent study, the degree of the discrepancy between BDI and HAMD scores was higher in patients with co-morbid personality disorders and lower in those with psychosis and associated anxiety (Rane et al., 2010). The severity of depression is negatively correlated with the magnitude of the discrepancy between self- and observer ratings. Patients with mild to moderate depression tended to rate their symptoms as more severe than did clinicians (Bailey and Coppen, 1976; Domken et al., 1994; Moller, 1991; Rush et al., 1987). However, other studies have found that symptom improvement during successful antidepressant treatment was related to increased correlations between BDI and HAMD scores (Bailey and Coppen, 1976; Sayer et al., 1993).

Particular personality and temperamental characteristics have also been related to discrepancies between subjective reports by patients and objective ratings given by clinicians. Over-reporting of affective symptoms has been observed among those with borderline personality disorder (Stanley and Wilson, 2006) as well as among patients high in neuroticism, low in extraversion, low in openness to experience, and low in agreeableness and self-esteem (Corruble et al., 1999; Domken et al., 1994; Duberstein and Heisel, 2007; Enns et al., 2000; Paykel et al., 1995).

A recent study reported that a disparity between clinician's observations and patients' subjective perceptions about their status is observed in half of patients, although patients with major depressive disorder were in a euthymic state based on criteria of observer rating scale (Zimmerman et al., 2012). Such

differences partially reflect unmet needs related to patients' subjective distress or a desire for additional treatment intervention. Therefore, the elucidation of factors that affect the difference between clinician and self rated depressive symptoms may help to identify the patients who need special attention and treatment modification for their unobserved symptoms, and increase therapeutic alliance or treatment outcomes.

The present study investigated the associations of intelligence, temperament, and personality traits with discrepancies between self- and clinician-rated affective symptoms, as measured by the BDI and HAMD, respectively, of patients with euthymic mood disorders. In consideration of differences between the individual items of the BDI and the HAMD, we conducted additional separate analyses on the somatic and psychological domains addressed by each scale.

2. Method

This cross-sectional study was conducted in Korea from July 2007 through December 2009 in accordance with the guidelines of the International Conference on Harmonization for good clinical practice as stipulated in the Declaration of Helsinki. The Institutional Review Board of Seoul National University Hospital approved the study protocol. All participants provided written informed consent prior to their participation in this study.

2.1. Participants

This study included outpatients aged 18 years or older who were diagnosed with major depressive disorder or bipolar disorder type I or II and who had no current mood episode as defined by DSM-IV and verified by the Korean Version Diagnostic Interview for Genetic Studies (DIGS-K) (Joo et al., 2004). If no current mood episode could be defined according to the DSM-IV with HAMD score ≤ 8 and Young Mania Rating Scale (YMRS) score ≤ 6 , it was concluded that the participant was in a euthymic state (Martinez-Aran et al., 2004). Patients were excluded if they had been diagnosed with a co-morbid DSM-IV Axis I disorder, such as drug dependence (other than nicotine or caffeine), schizophrenia, or schizoaffective disorder, within the past 3 months. Diagnoses for inclusion were reviewed to confirm that they met DSM-IV criteria in consensus diagnostic meetings that included three certified psychiatrists; NYL, SHK and YMA. An experienced psychiatric research nurse, HYY, assessed clinician rating scales.

2.2. Measures

2.2.1. Symptom severity

The 21-item BDI was used as a self-administered assessment of depressive symptoms during the week prior to the interview (Beck et al., 1961; Hahn et al., 1986). Each question is scored from 0 to 3 with total score ranging from 0 to 63, with higher scores indicating greater depressive symptom severity. The Korean version of BDI showed good psychometric properties with a high Cronbach's alpha of 0.85 and cutoff score of ≥ 24 , which indicated depressive disorder (Rhee et al., 1995). Each of the scores of 0–9, 10–18, 19–29, or over 30 suggested the severity of minimal, mild, moderate, or severe depression, respectively (Beck et al., 1988). Cronbach's alpha was 0.75 in the current study.

The objective severity of depressive symptoms was measured with the 17-item HAMD (Hamilton, 1960, 1976; Yi et al., 2004). The item response options are on a 3-point scale ranging from 0 to 2 for insomnia, gastrointestinal somatic, general somatic, genital symptoms, loss of weight and insight, and on a 5-point scale ranging from 0 to 4 for the other symptoms. The total score

ranges from 0 to 52 and higher scores reflect severe depressive symptoms. A score of 0–8 is accepted to be within normal or euthymic limits while a score of ≥ 17 indicates major depression (Martinez-Aran et al., 2004). Cronbach's alpha of the Korean version of HAMD in depressive patients was 0.76 and inter-rater reliability is high (total score correlations=0.94) (Yi et al., 2004). Cronbach's alpha was 0.71 in the current study.

Discrepancies between self-rated and observer-rated symptoms were defined in terms of differences in BDI and HAMD scores (Cassidy et al., 2009; Rane et al., 2010). In consideration of the different items in each instrument, we divided items on the BDI and HAMD into somatic and psychological domains (Duberstein and Heisel, 2007; Uher et al., 2008). The somatic domain of the BDI included questions addressing work difficulty (loss of energy), insomnia, fatigability, loss of appetite, and weight loss while the HAMD included questions addressing somatic–gastrointestinal issues, weight loss, insomnia (early, middle, late), retardation, agitation, anxiety-somatic, and somatic-general symptoms. The psychological domain of the BDI included questions measuring sadness, pessimism, sense of failure, dissatisfaction, guilt, expectation of punishment, self-dislike, self-accusation, suicidal ideation, crying, irritability, social withdrawal (loss of interest in other people), indecisiveness, worry about looking unattractive, somatic preoccupation (hypochondriasis), and loss of interest in sex while the HAMD included questions about depressed mood, insight, guilt, suicide, loss of interest, hypochondriasis, anxiety-psychic issues, and genital symptoms.

YMRS was used to assess the severity of manic symptoms (Jung et al., 2003; Young et al., 1978). The YMRS includes 11 items yielding a total score ranging from 0 to 60 with higher scores indicating greater manic symptoms. Seven items are scored 0–4 and four items are scored 0–8. A score of ≤ 6 is accepted to be within the normal or euthymic and ≥ 12 indicates manic or hypomanic episode (Martinez-Aran et al., 2004). Cronbach's alpha of the Korean version of YMRS was 0.73 and inter-rater reliability was 0.93 (Jung et al., 2003). Cronbach's alpha of the current study was 0.67.

2.2.2. Intelligence

We assessed the intelligence of subjects with the Korean version of the Wechsler Adult Intelligence Scale (K-WAIS), the most widely used and reliable instrument for the assessment of intelligence, and obtained overall intelligence quotients (IQs) (Wechsler, 1981; Yum et al., 1992). The K-WAIS shows good psychometric properties with Cronbach's alphas of 0.82 or higher in the 11 subtests (Kim et al., 1992; Yum et al., 1992). It was performed by a clinical psychologist, SSH, who was blind to the diagnosis of patients.

2.2.3. Impulsivity

Impulsivity is one of core symptoms of bipolar disorder and is significantly correlated with the severity of hopelessness and anhedonia in depression (Corruble et al., 2003; Lewis et al., 2009). Subjects completed the Barratt Impulsivity Scale (BIS) (Patton et al., 1995), a 30-item self-report measure designed to assess impulsivity with regard to attention, motor activity, and planning. Individual items are rated on scales ranging from 1 to 4, yielding total scores from 30 to 120 with higher scores indicating greater impulsivity. Internal consistency coefficient for the BIS total score was reported to be 0.83 for general psychiatric patients (Patton et al., 1995). Cronbach's alpha of the current study was 0.82.

2.2.4. Temperament and personality

We used the short version (39 items) of the Temperament Evaluation scale of the Memphis, Pisa, Paris, and San Diego

Autoquestionnaire (TEMPS-A) to assess affective temperament (Akiskal et al., 2005). This self-report measure, whose items are answered in a yes/no fashion, was developed to identify emotional, cognitive, psychomotor (energy-level-related), circadian (sleep-related), and social (anxiety-related) traits that may predispose individuals to mood disorders. Factor analysis of the 39-item TEMPS-A yielded five factors: cyclothymia, dysthymia, irritability, hyperthymia, and anxiety (Akiskal et al., 2005). Coefficients alpha for internal consistency have been found to range from 0.67 to 0.91 (Akiskal et al., 2005), which are comparable to those of this sample, which range from 0.66 to 0.81.

We evaluated personality traits with the NEO-Five-Factor Inventory (NEO-FFI), an abbreviated version of the 240-item Revised NEO Personality Inventory (NEO-PI-R) (Costa and McCrae, 1985, 1989, 1992; Digman, 1990). The inventory consists of 60 items, each of which is rated on a five-point scale to measure five dimensions of personality structure: neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Internal consistency coefficients for the NEO-FFI scales range from 0.68 to 0.86 (Costa and McCrae, 1992) and from 0.69 to 0.81 in this sample.

2.3. Data analysis

Clinical and demographic characteristics were analyzed using descriptive statistics. BDI and HAMD scores were normalized by Z-score transformations and then used to calculate differences between objective and subjective ratings (Carter et al., 2010; Enns et al., 2000). Thus, differences between Z-scores were calculated by subtracting HAMD Z-scores from BDI Z-scores; the result was defined as Z-total. Differences between the psychological and somatic domains of the two scales (i.e., Z-somatic and Z-psychological, respectively) were calculated following the same procedure (Duberstein and Heisel, 2007; Enns et al., 2000). Thus, positive differences between Z-scores indicated that patients over-reported affective symptoms compared with the ratings given by clinicians, and negative differences between Z-scores indicated that patients under-reported compared with the ratings given by clinicians.

Pearson correlation coefficients were calculated to examine associations between BDI and HAMD total and subscale scores. To evaluate the association between differences in Z-scores (i.e., Z-total, Z-somatic, Z-psychological) and demographic, clinical, temperamental, and personality variables, Pearson's correlation coefficients were calculated for continuous variables, and independent-sample *t*-tests were calculated for categorical variables. Using factors found to be significant in the correlation analysis, multiple regression analysis was performed to develop specific models of the contributions of dependent variables to discrepancies between patient and clinician ratings of depressive symptoms. Collinearity between variables was tested, and no evidence of significant collinearity was observed, as all variance inflation factors were < 2.0 .

We used a one-way ANOVA to examine differences in intelligence, impulsivity (BIS), temperament, and personality among three groups, divided by the standard deviation (SD) of Z-total scores. Group A included subjects with Z-scores more than 1 SD below the mean, Group B included subjects with Z-scores within ± 1 SD from the mean, and Group C included subjects with Z-scores more than 1 SD above the mean. Thus, Group A, C and B included subjects who under-reported their symptoms, over-reported their symptoms, and reported similarly compared to those given by clinicians, respectively. Post hoc comparisons were conducted using Scheffe's test. All tests were performed using two-tailed probabilities, with the significance level set at .05. No adjustments were made for multiple comparisons.

3. Results

3.1. Demographic and clinical characteristics (Table 1)

One-hundred patients were assessed. The mean (SD) age of the sample was 33.5 (10.4) years, and 58.0% was female (Table 1). A high percentage of subjects were diagnosed with bipolar disorder (72.0%, $n=72$), and the remaining 28.0% were diagnosed with major depressive disorder ($n=28$). The mean (SD) IQ score according to the K-WAIS was 109.3 (16.1).

The mean (SD) total scores were as follows: 9.9 (5.3) on the BDI ranging from 0 to 25; 2.9 (2.5) on the HAMD; and 1.0 (1.3) on the YMRS. The discrepancy (SD) between BDI and HAMD total scores was 7.1 (5.3). The Pearson's correlation coefficient of BDI and HAMD scores were 0.319 ($p < 0.001$).

3.2. Relationship between study variables and Z-score discrepancies (Table 2)

Table 2 reveals the association between study variables and Z-score discrepancies. We found no significant associations between Z-score differences and the demographic and clinical variables presented in Table 1 (e.g., age, sex, education, and diagnosis). However, intelligence was significantly negatively correlated with Z-total ($r = -0.323$, $p = 0.002$) and Z-psychological ($r = -0.290$, $p = 0.005$) scores. Greater impulsivity was significantly correlated with higher Z-total ($r = 0.266$, $p = 0.008$) and Z-psychological ($r = 0.335$, $p = 0.001$) scores. Z-total scores were

positively correlated with depressive ($r = 0.192$, $p = 0.056$) and anxious ($r = 0.229$, $p = 0.022$) personality traits but negatively correlated with conscientiousness ($r = -0.321$, $p = 0.001$). Additionally, we observed a similar correlation between Z-psychological and cyclothymic ($r = 0.193$, $p = 0.055$), anxious ($r = 0.268$, $p = 0.007$), and conscientious ($r = -0.340$, $p = 0.001$) traits, whereas Z-somatic scores were not correlated with any of the study variables.

3.3. Predictors for Z-total scores (Table 3)

To identify the clinical variables contributing to discrepancies between self- and clinician-ratings of depressive symptoms, multiple regression analysis was performed using variables that were associated with differences in Z-total scores ($p < 0.06$) (Table 3). Intelligence, impulsivity, depressive and anxious personality traits, and conscientious temperament were entered into the regression model for predicting Z-total scores. Results demonstrated that the overall model showed a strong significance (adjusted $R^2 = 0.164$, $p = 0.001$) but that intelligence ($\beta = -0.276$, $p = 0.009$) and a conscientious temperament ($\beta = -0.312$, $p = 0.016$) were significant independent contributors to Z-total scores. Similar to the analysis of Z-total scores, the multiple regression model for Z-psychological scores included intelligence, impulsivity, cyclothymic and anxious personality traits, and conscientious temperament as independent variables. Intelligence ($\beta = -0.215$, $p = 0.042$), anxious temperament ($\beta = 0.208$, $p = 0.043$) and a conscientious temperament ($\beta = -0.245$, $p = 0.041$) were statistically significant predictors of Z-psychological scores.

We further examined the relationship between Z-total scores and clinical, temperamental, and personality variables by dividing the study subjects into three groups based on ± 1 SD difference from the mean Z-total scores, as described earlier (Figs. 1–3).

The results presented in Fig. 1 show that Group C, i.e., patients whose self-reports indicated more symptoms than did their clinician's estimate, was characterized by lower IQs and higher impulsivity than were Groups A and B, who rated their symptoms as similar to or less severe than their clinicians did, respectively (Fig. 1). Similarly, members of Group C showed significantly greater anxiety and significantly lower conscientiousness compared with the other groups (Figs. 2 and 3).

4. Discussion

We found a statistically significant difference between self-rated symptoms and clinician-rated symptoms, as measured by the BDI and HAMD, respectively, among patients who were diagnosed with bipolar disorder or major depressive disorder and were in a euthymic mood state during the study. The correlation between BDI and HAMD scores was modest ($r = 0.319$), and the discrepancy between these scales was related to several clinical and personality/temperamental factors. Lower IQ and a less conscientious personality were significant predictors of more severe self-reported compared with clinician-rated symptoms. Higher impulsivity and a more anxious temperament were also observed in the group that seemed to over-report their symptoms compared with the group whose ratings of their depressive symptoms were similar to or less severe than those given by clinicians. These predictor variables were better able than the somatic symptoms of depression to account for discrepancies between self- and observer ratings of the psychological symptoms of depression.

Table 1
Characteristics of subjects ($N=100$).

Variables		Mean (SD) or n (%)
Demographic		
Age		33.5 (10.4)
Sex	Female	58 (58.0)
Education (years)		15.0 (2.7)
Clinical		
Diagnosis	Bipolar I disorder	45 (45.0)
	Bipolar II disorder	27 (27.0)
	Major depressive disorder	28 (28.0)
Age at onset		26.2 (10.0)
Duration of illness (years)		7.3 (8.8)
Affective symptom scale		
BDI total		9.9 (5.3)
BDI somatic		1.9 (1.5)
BDI psychological		8.0 (4.8)
HAMD total		2.9 (2.5)
HAMD somatic		1.3 (1.4)
HAMD psychological		1.7 (1.5)
YMRS		1.0 (1.3)
Impulsivity (BIS)		64.4 (10.7)
Intelligence (IQ)		109.3 (16.1)
Temperament		
TEMPS-A	Cyclothymic	4.0 (3.2)
	Depressive	1.9 (2.0)
	Irritable	1.6 (1.6)
	Hyperthymic	2.7 (2.0)
	Anxious	1.1 (1.0)
Personality trait		
NEO-FFI	Neuroticism	23.5 (7.6)
	Extraversion	25.3 (6.9)
	Openness	26.9 (6.5)
	Agreeableness	30.8 (5.9)
	Conscientious	28.1 (6.2)

SD, standard deviation; BDI, Beck Depression Inventory; HAMD, Hamilton Depression Rating Scale; YMRS, Young Mania Rating Scale; BIS, Barratt Impulsivity Scale; TEMPS-A, temperament evaluation of Memphis, Pisa, Paris and San Diego autoquestionnaire; NEO-FFI, NEO five-factor personality inventory.

Table 2
Association between study variables and Z-score discrepancy.

Variable	Z-total		Z-somatic		Z-psychological	
	r or t	p	r or t	p	r or t	p
Demographic and clinical						
Age ^a	0.045	0.656	0.098	0.339	0.005	0.958
Sex ^b	–1.164	0.247	–1.934	0.056	–0.818	0.415
Education ^a	–0.161	0.109	–0.048	0.632	–0.179	0.075
Diagnosis ^b	0.855	0.429	2.038	0.136	0.668	0.515
Age at onset ^a	0.168	0.095	0.190	0.058	0.118	0.244
Duration of illness ^a	–0.137	0.174	–0.101	0.316	–0.167	0.099
HAMD total ^a	–0.583	< 0.001	–0.409	< 0.001	–0.484	< 0.001
Intelligence (IQ) ^a	–0.323	0.002	–0.140	0.183	–0.290	0.005
Impulsivity (BIS) ^a	0.266	0.008	–0.081	0.425	0.335	0.001
Temperament ^a						
TEMPS-A						
Cyclothymic	0.162	0.107	–0.076	0.452	0.193	0.055
Depressive	0.192	0.056	–0.031	0.761	0.164	0.103
Irritable	0.049	0.626	–0.130	0.196	0.130	0.197
Hyperthymic	–0.150	0.137	–0.033	0.745	–0.130	0.196
Anxious	0.229	0.022	0.025	0.802	0.268	0.007
Personality trait ^a						
NEO-FFI						
Neuroticism	0.137	0.175	–0.077	0.446	0.131	0.194
Extraversion	–0.137	0.174	–0.001	0.991	–0.090	0.372
Openness	–0.096	0.344	0.103	0.307	–0.158	0.116
Agreeableness	–0.124	0.219	0.104	0.303	–0.186	0.064
Conscientious	–0.321	0.001	0.021	0.840	–0.340	0.001

Z-total was calculated by subtracting Z-score of HAMD from Z-score of BDI, Z-somatic by subtracting Z-score of HAMD somatic items from Z-score of BDI somatic items, and Z-psychological by subtracting Z-score of HAMD psychological items from Z-score of BDI psychological items.

BIS, Barratt Impulsivity Scale; TEMPS-A, Temperament Evaluation of Memphis, Pisa, Paris and San Diego autoquestionnaire; NEO-FFI, NEO five-factor personality inventory

^a Pearson correlation coefficient.

^b Independent t-test.

Table 3
Results of regression analysis for dependent variables Z-total and Z-psychological.

Variables	Regression ^a		
	β	t	p
Z-total			
Intelligence (IQ)	–0.276	–2.660	0.009
Impulsivity (BIS)	–0.006	–0.043	0.966
Depressive	–0.077	–0.636	0.526
Anxious	0.159	1.539	0.128
Conscientious	–0.312	–2.452	0.016
Adjusted R ² = 0.164			
Z-psychological			
Intelligence (IQ)	–0.215	–2.066	0.042
Impulsivity (BIS)	0.032	0.240	0.811
Cyclothymic	0.017	0.161	0.872
Anxious	0.208	2.055	0.043
Conscientious	–0.245	–2.074	0.041
Adjusted R ² = 0.169			

Z-total was calculated by subtracting Z-score of HAMD from Z-score of BDI and Z-psychological by subtracting Z-score of HAMD psychological items from Z-score of BDI psychological items BIS, Barratt Impulsivity Scale.

^a Multiple linear regression analysis.

4.1. Discrepancy between self- and observer-rated depressive symptoms

As far as we know, this study is the first to address the factors related to the discrepancies between self- and clinician-rated depressive symptoms in patients with euthymic mood disorders. Indeed, most previous studies addressed similar issues in patients who were exhibiting some degree of depression but who were diagnosed with a heterogeneous group of disorders. Despite differences among subjects with regard to characteristics such

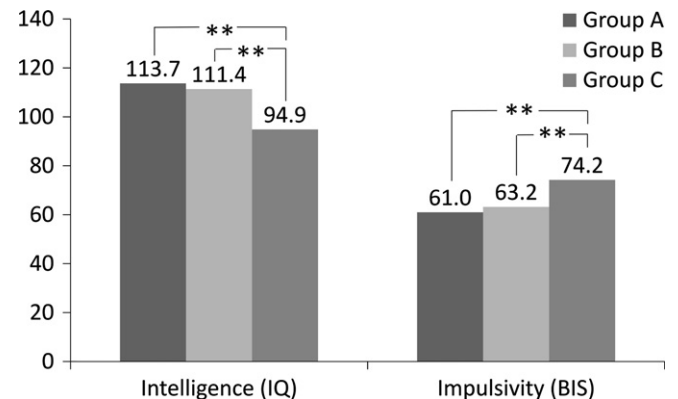


Fig. 1. Difference of intelligence and impulsivity among three groups classified by Z-total score. Group A include subjects with Z-score below than –1 SD of Z-total score distribution; Group B includes subjects with Z-score within ± 1 SD of Z-total score distribution; Group C includes subjects with Z-score above than 1 SD of Z-total score distribution. Mean intelligence or impulsivity score of Group C was significantly different from Group A or B (* $p < 0.05$, ** $p < 0.005$).

as severity of illness and diagnosis, the medium correlation between self- and clinician-rated affective symptoms observed in our study is consistent with the results of earlier studies using the 17-item HAMD and 21-item BDI (Enns et al., 2000; Rane et al., 2010) and lower than those in studies using diverse self-report or observer-rated scales (Carter et al., 2010; Cassidy et al., 2009; Uher et al., 2008). A previous review suggested that the magnitude of the correlation between self- and observer-scored scales increased as depressive symptoms improved during treatment (Moller, 2000). Given that our subjects were in a euthymic state, we would expect the level of correlation found in our study to be higher than that found in earlier studies that included patients

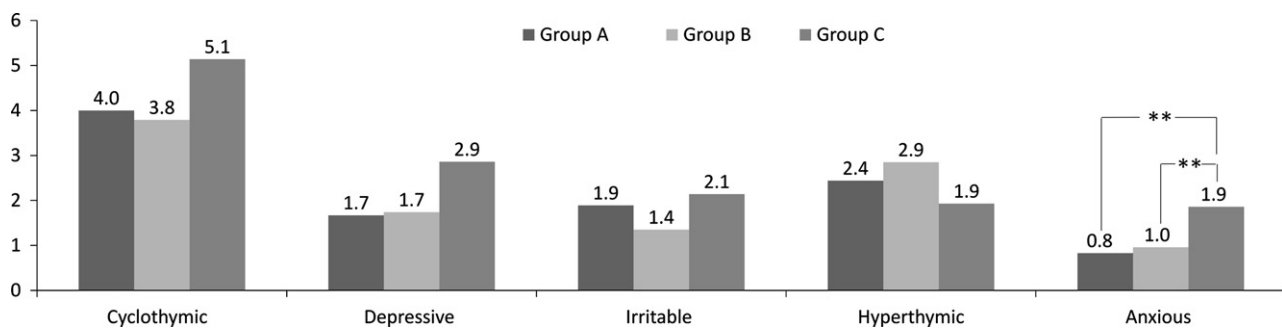


Fig. 2. Difference of temperament among three groups classified by Z-total score. Group A includes subjects with Z-score below than -1 SD of Z-total score distribution; Group B includes subjects with Z-score within ± 1 SD of Z-total score distribution; Group C includes subjects with Z-score above than 1 SD of Z-total score distribution. Mean anxious score of Group C was significantly different from Group A or B ($*p < 0.05$, $**p < 0.005$).

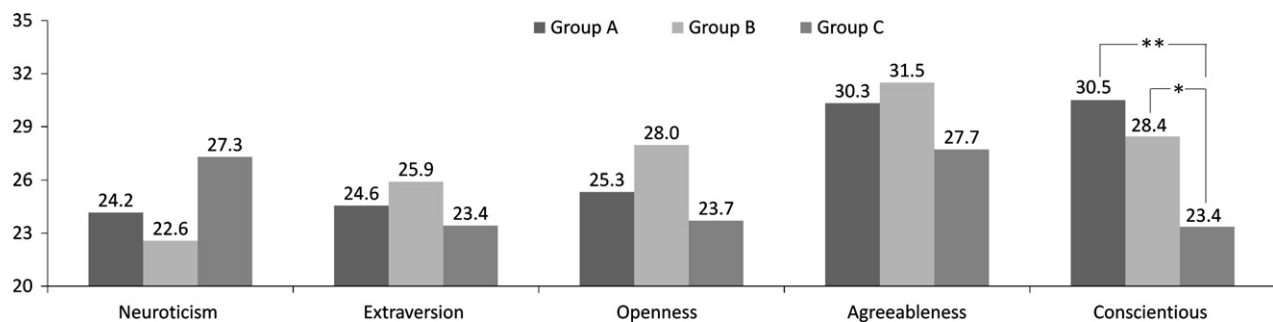


Fig. 3. Difference of personality traits among three groups classified by Z-total score. Group A includes subjects with Z-score below than -1 SD of Z-total score distribution; Group B includes subjects with Z-score within ± 1 SD of Z-total score distribution; Group C includes subjects with Z-score above than 1 SD of Z-total score distribution. Mean conscientious temperament score of Group C was significantly different from Group A or B ($*p < 0.05$, $**p < 0.005$).

who were depressed at the time the research was conducted. Thus, the lower level of correlation found in this study was somewhat inconsistent with earlier findings, and the difference may be attributable to differences in the samples in terms of age, ethnicity, and major diagnosis and in the instruments used in each study (Moller, 2000; Uher et al., 2008). To better understand relationships between mood status (severity of illness) and discrepancies between self- and observer-rated depressive symptoms, long-term prospective research in homogenous populations is needed.

4.2. Relationship between intelligence and over- or under-reporting of depressive symptoms

One notable finding of this study is the association between lower IQ and the over-reporting of symptoms by patients relative to clinicians. Indeed, previous studies have not discussed the possible relationship between intelligence and self-report of depressive symptoms that were higher than those given by observers. A previous study reported that subjective complaints of depression were related to low premorbid intelligence in elderly patients of primary care physicians, although no objective assessments were administered (Evans and Katona, 1993). Additionally, it has been suggested that lower IQ is a pre-trauma predictor of self-reports of more post-traumatic stress symptoms (Macklin et al., 1998; Orr et al., 2012). Greater intellectual ability, as indicated by IQ scores, was associated with more cognitive resources for managing negative emotional responses (Macklin et al., 1998), whereas lower intelligence was associated with more limited cognitive resources for coping with negative emotions (Orr et al., 2012). This suggests a possible explanation of our result showing that apparent over-reporting was significantly greater in individuals with lower intelligence than in other subjects.

4.3. Relationship between personality trait and over- or under-reporting of depressive symptoms

We also found a strong association between lower levels of conscientiousness and the reporting of more symptoms of depression on the self-reported BDI relative to on the observer-rated HAMD. The items included in the conscientiousness domain of the NEO-FFI refer to participants' orientation toward order, duty, achievement striving, and self-discipline. Previous studies have reported that conscientiousness includes diverse traits such as impulse control, goal-directedness and planfulness, ability to delay gratification, and inclination to follow norms and rules (John and Srivastava, 1999), more specifically, it addresses the lower-order structure including orderliness, decisiveness, reliability, impulse control, and industriousness (Roberts et al., 2004). Conscientiousness has been shown to be significantly associated with the ability to regulate affect in the general population. In particular, the achievement facet of conscientiousness was strongly correlated with positive affect in general (Watson and Clark, 1992). Consistent with this finding, among patients with bipolar disorder, high levels of conscientiousness were related to increased manic symptoms, and high scores on achievement striving predicted significant increases in mania over the course of illness after controlling for baseline symptoms (Lozano and Johnson, 2001). Given that lower levels of conscientiousness were related to lower levels of positive affects, our finding of a correlation between lower conscientiousness and greater self-reported compared with clinician-rated depressive symptoms in patients in a euthymic mood state is consistent with those of previous studies. Most previous studies have found that other personality domains of the NEO-FFI are associated with discrepancies between self- and observer-rated depressive symptoms. Enns et al. (2000) reported that higher levels of neuroticism and lower levels of extraversion and agreeableness were associated

with higher BDI relative to HAMD scores. A more recent study found that high neuroticism and low openness were associated with high ratios of self-reported to observer-rated affective symptoms (Duberstein and Heisel, 2007). Several potential explanations of discrepancies between previous results and our findings can be proposed. Enns et al. (2000) evaluated patients with major depressive disorder (mean HAMD score, 23.1 [SD=4.5]) aged 43 years and found that some subjects met criteria for co-morbid disorders; 22.3% had social phobia and 24.5% had dysthymia. Duberstein and Heisel (2007) studied a sample of patients who were suspected to suffer from depression, who were diagnosed primarily with major depressive disorder, who had a mean age of 60 years, and who had multiple co-morbid conditions (e.g., anxiety disorders, alcohol or substance abuse or dependence). Unlike previous studies, 72% of patients in our study had a diagnosis of bipolar disorder, and 28% had a diagnosis of major depressive disorder without any co-morbid Axis I disorders. Additionally, the mean age of subjects in this study was relatively young, 33 years. Depressed mood and co-morbid conditions such as anxiety disorders may bias self-described personality traits, rendering the state-dependence of some aspects of self-reported personality traits impossible to ignore (Lozano and Johnson, 2001). For instance, higher neuroticism has been consistently associated with over-reporting of depressive symptoms (Domken et al., 1994; Duberstein and Heisel, 2007; Enns et al., 2000; Paykel and Prusoff, 1973). Neuroticism has been described as general tendency to experience negative affect, including fear, sadness, embarrassment, anger, guilt, and disgust (Costa and McCrae, 1992), and has also been reported to be correlated with the severity of depressive symptoms (Duberstein and Heisel, 2007; Hirschfeld et al., 2003; Lozano and Johnson, 2001). Additionally, neuroticism has been related to the risk for depression in several populations (Duberstein et al., 2008). Taken together, these data suggest that the neurotic aspect of personality associated with negative affect may have a strong influence on self-perceptions about depressive symptoms among those in a depressed state and thereby lead to over-reporting of symptoms relative to those reported by observers. On the other hand, the aspect of conscientious personality that is related to affect regulation may contribute to the self-description of depressive symptoms given by patients with mood disorders who are currently experiencing a euthymic state.

4.4. Relationship between temperament and over- or under-reporting of depressive symptoms

Our study also found significant relationships of impulsivity and anxious temperament with discrepancies between self- and observer-rated depressive symptoms according to the TEMPS-A and BIS, respectively. Patients who were anxious and impulsive were more likely to self-report severe depressive symptoms than their clinicians were to attribute such symptoms to these patients. Interestingly, anxious temperament and impulsivity overlapped with the neuroticism domain of the NEO-FFI. Neuroticism consists of multiple interrelated facets including anxiety, hostility, depression, self-consciousness, impulsiveness, and vulnerability to stress (Costa and McCrae, 1992) and has been conceptualized as a multidimensional construct or a global measure of general distress that qualitatively differs from the sum of its parts (Endler and Speer, 1998). Although neuroticism, as a global measure of distress and negative affect, was not a significant predictor of the apparent over-reporting of depressive symptom by euthymic patients, impulsivity seems to have a certain degree of influence on subjectively rated depressive symptoms. This is further supported by the status of impulse control as one of the factors in conscientious (Roberts et al., 2004).

4.5. Limitations

The generalizability of our study is limited in terms of ethnicity and cultural difference. Nevertheless, this study was remarkable for controlling the potential influence of mood state on assessments of personality and temperament and for excluding co-morbid Axis I disorders. Furthermore, this study is the first to show that intelligence is significantly associated with the discrepancy between self- and observer-rated depressive symptoms and that subjective over-reporting of depressive symptoms may be influenced by aspects of personality and temperament as a function of current mood state.

4.6. Clinical implications and future directions

Given the increasing need for the use of self-report instruments for screening and epidemiological research related to mood disorders (Duberstein and Heisel, 2007), the findings of our study provide information that can contribute to the interpretation of data obtained via this approach. Self-rated and observer-rated scales should be considered complementary clinical and research tools that can contribute to a comprehensive picture of depressive symptoms (Rane et al., 2010). Clinicians need to address patients' self-perceptions of depressive symptoms, particularly when patients are less intelligent, less conscientious, more impulsive, or anxious. Furthermore, diverse treatment modalities, such as cognitive therapy, would be helpful for decreasing the subjective distress of these patients, an area deserving of clinical attention even when a clinician has judged that patients are in a euthymic state. Additional research is necessary to investigate relationships of discrepancies between self- and clinician-rated symptoms among patients in a euthymic state with clinical outcomes such as relapse or the effects of treatment modification.

5. Conclusions

The current study among patients with mood disorders who were in a euthymic state found that subjects who rated themselves as less conscientious and who had lower IQs were likely to self-report more severe depressive symptoms than clinicians assigned to them. An anxious temperament and impulsivity were observed in patients who were likely to perceive their symptoms as more serious than did clinicians. Clinicians should consider the subjective aspects of depressive symptoms when working with patients with these characteristics.

Role of funding source

This study was supported by a grant (2009-0077030) of the National Research Foundation of Korea funded by the Korean Government and by a grant (0520070010) from the Seoul National University Hospital Research Fund, Republic of Korea.

Conflict of interest

Dr Ahn has received research grants or served as a lecturer for Janssen, Pfizer, Otsuka, GlaxoSmithKline, Servier, Lundbeck, Eli Lilly, Lundbeck and AstraZeneca. Dr Yong Sik Kim has received grants, research support, and/or honoraria from Novartis, Janssen, Eli Lilly, Pfizer, Sanofi-Aventis, Otsuka, AstraZeneca, Organon, GlaxoSmithKline, and Servier. All other authors have no conflicts of interest.

Acknowledgements

None.

References

- Akiskal, H.S., Akiskal, K.K., Haykal, R.F., Manning, J.S., Connor, P.D., 2005. TEMPS-A: progress towards validation of a self-rated clinical version of the temperament evaluation of the Memphis, Pisa, Paris, and San Diego autoquestionnaire. *Journal of Affective Disorders* 85, 3–16.
- Bailey, J., Coppen, A., 1976. A comparison between the Hamilton rating scale and the Beck Inventory in the measurement of depression. *The British Journal of Psychiatry* 128, 486–489.
- Beck, A.T., Steer, R.A., Garbin, M.G., 1988. Psychometric properties of the Beck Depression Inventory—25 years of evaluation. *Clinical Psychology Review* 8, 77–100.
- Beck, A.T., Ward, C.H., Mendelson, M., Mock, J., Erbaugh, J., 1961. An inventory for measuring depression. *Archives of General Psychiatry*, 561–571.
- Beck, P., 1992. Symptoms and assessment of depression. In: Paykel, E.S. (Ed.), *Handbook of Affective Disorders*. Churchill Livingstone, London, pp. 3–14.
- Carter, J.D., Frampton, C.M., Mulder, R.T., Luty, S.E., Joyce, P.R., 2010. The relationship of demographic, clinical, cognitive and personality variables to the discrepancy between self and clinician rated depression. *Journal of Affective Disorders* 124, 202–206.
- Cassidy, F., Ahearn, E., Carroll, B.J., 2009. Concordance of self-rated and observer-rated dysphoric symptoms in mania. *Journal of Affective Disorders* 114, 294–298.
- Corruble, E., Benyamini, A., Bayle, F., Falissard, B., Hardy, P., 2003. Understanding impulsivity in severe depression? A psychometrical contribution. *Progress in Neuro-Psychopharmacology & Biological Psychiatry* 27, 829–833.
- Corruble, E., Legrand, J.M., Zvenigorowski, H., Duret, C., Gueffi, J.D., 1999. Concordance between self-report and clinician's assessment of depression. *Journal of Psychiatric Research* 33, 457–465.
- Costa Jr., P.T., McCrae, R.R., 1985. *The NEO Personality Inventory Manual*. Psychological Assessment Resources, Odessa, FL.
- Costa Jr., P.T., McCrae, R.R., 1989. *The NEO-PI/NEO-FFI Manual Supplement*. Psychological Assessment Resources, Odessa, FL.
- Costa Jr., P.T., McCrae, R.R., 1992. *Revised NEO Personality Inventory (NEO-PI-R) and NEO Five-Factor Inventory (FFI) Professional Manual*. Psychological Assessment Resources, Odessa, FL.
- Digman, J.M., 1990. Personality structure: emergence of the five-factor model. *Annual Review of Psychology* 41, 417–440.
- Domken, M., Scott, J., Kelly, P., 1994. What factors predict discrepancies between self and observer ratings of depression? *Journal of Affective Disorders* 31, 253–259.
- Duberstein, P.R., Heisel, M.J., 2007. Personality traits and the reporting of affective disorder symptoms in depressed patients. *Journal of Affective Disorders* 103, 165–171.
- Duberstein, P.R., Palsson, S.P., Waern, M., Skoog, I., 2008. Personality and risk for depression in a birth cohort of 70-year-olds followed for 15 years. *Psychological Medicine* 38, 663–671.
- Endler, N.S., Speer, R.L., 1998. Personality psychology: research trends for 1993–1995. *Journal of Personality* 66, 621–669.
- Enns, M.W., Larsen, D.K., Cox, B.J., 2000. Discrepancies between self and observer ratings of depression. The relationship to demographic, clinical and personality variables. *Journal of Affective Disorders* 60, 33–41.
- Evans, S., Katona, C., 1993. Epidemiology of depressive symptoms in elderly primary care attenders. *Dementia* 4, 327–333.
- Hahn, H.M., Yum, T.H., Shin, Y.W., Kim, K.H., Yoon, D.J., Chung, K.J., 1986. A standardization study of Beck Depression Inventory in Korea. *Journal of Korean Neuropsychiatric Association* 25, 487–500.
- Hamilton, M., 1960. A rating scale for depression. *Journal of Neurology, Neurosurgery & Psychiatry* 23, 56–62.
- Hamilton, M., 1976. Comparative value of rating scales. *British Journal of Clinical Pharmacology* 3, 58–60.
- Hirschfeld, R.M., Holzer, C., Calabrese, J.R., Weissman, M., Reed, M., Davies, M., Frye, M.A., Keck, P., McElroy, S., Lewis, L., Tierce, J., Wagner, K.D., Hazard, E., 2003. Validity of the mood disorder questionnaire: a general population study. *American Journal of Psychiatry* 160, 178–180.
- John, O.P., Srivastava, S., 1999. The Big Five trait taxonomy: history, measurement, and theoretical perspectives. In: Pervin, L.A., John, O.P. (Eds.), *Handbook of Personality: Theory and Research*, 2 ed. Guilford Press, New York, pp. 102–138.
- Joo, E.J., Joo, Y.H., Hong, J.P., Hwang, S., Maeng, S.J., Han, J.H., Yang, B.H., Lee, Y.S., Kim, Y.S., 2004. Korean version of the diagnostic interview for genetic studies: validity and reliability. *Comprehensive Psychiatry* 45, 225–229.
- Jung, H.Y., Cho, H.S., Joo, Y.H., Shin, H.K., Yi, J.S., Hwang, S., Kim, Y.S., 2003. A validation study of the Korean-Version of the young mania rating scale. *Journal of Korean Neuropsychiatric Association* 42, 263–269.
- Kim, J.K., Yum, T.H., Oh, K.J., Park, Y.S., Lee, Y.H., 1992. Item analysis of K-WAIS standardization data. *Korean Journal of Clinical Psychology* 11, 1–10.
- Lewis, M., Scott, J., Frangou, S., 2009. Impulsivity, personality and bipolar disorder. *European Psychiatry* 24, 464–469.
- Lozano, B.E., Johnson, S.L., 2001. Can personality traits predict increases in manic and depressive symptoms? *Journal of Affective Disorders* 63, 103–111.
- Macklin, M.L., Metzger, L.J., Litz, B.T., McNally, R.J., Lasko, N.B., Orr, S.P., Pitman, R.K., 1998. Lower precombat intelligence is a risk factor for posttraumatic stress disorder. *Journal of Consulting and Clinical Psychology* 66, 323–326.
- Martinez-Aran, A., Vieta, E., Reinares, M., Colom, F., Torrent, C., Sanchez-Moreno, J., Benabarre, A., Goikolea, J.M., Comes, M., Salameiro, M., 2004. Cognitive function across manic or hypomanic, depressed, and euthymic states in bipolar disorder. *The American Journal of Psychiatry* 161, 262–270.
- McCabe, R., Saidi, M., Priebe, S., 2007. Patient-reported outcomes in schizophrenia. *The British Journal of Psychiatry Supplement* 50, s21–28.
- Moller, H.J., 1991. Outcome criteria in antidepressant drug trials: self-rating versus observer-rating scales. *Pharmacopsychiatry* 24, 71–75.
- Moller, H.J., 2000. Rating depressed patients: observer- vs self-assessment. *European Psychiatry* 15, 160–172.
- Moller, H.J., von Zerssen, D., 1995. Self-rating procedures in the evaluation of antidepressants. *Psychopathology* 28, 291–306.
- Orr, S.P., Lasko, N.B., Macklin, M.L., Pineles, S.L., Chang, Y., Pitman, R.K., 2012. Predicting post-trauma stress symptoms from pre-trauma psychophysiological reactivity, personality traits and measures of psychopathology. *Biology of Mood & Anxiety Disorders* 2, 8.
- Patton, J.M., Stanford, M.S., Barratt, E.S., 1995. Factor structure of the Barratt Impulsiveness Scale. *Journal of Clinical Psychology* 51, 768–774.
- Paykel, E.S., Prusoff, B.A., 1973. Relationships between personality dimensions: neuroticism and extraversion against obsessive, hysterical and oral personality. *British Journal of Social & Clinical Psychology* 12, 309–318.
- Paykel, E.S., Ramana, R., Cooper, Z., Hayhurst, H., Kerr, J., Barocka, A., 1995. Residual symptoms after partial remission: an important outcome in depression. *Psychological Medicine* 25, 1171–1180.
- Prusoff, B.A., Klerman, G.L., Paykel, E.S., 1972. Concordance between clinical assessments and patients' self-report in depression. *Archives of General Psychiatry* 26, 546–552.
- Rane, L.J., Fekadu, A., Wooderson, S., Poon, L., Markopoulou, K., Cleare, A.J., 2010. Discrepancy between subjective and objective severity in treatment-resistant depression: prediction of treatment outcome. *Journal of Psychiatric Research* 44, 1082–1087.
- Rhee, M.K., Lee, Y.H., Park, S.H., Sohn, C.H., Chung, Y.C., Hong, S.K., Lee, B.K., Chang, P., Yoon, A.R., 1995. A standardization study of Beck Depression Inventory I—Korean Version (K-BDI): reliability and factor analysis. *The Korean Journal of Psychopathology* 4, 77–95.
- Richter, P., Werner, J., Heerlein, A., Kraus, A., Sauer, H., 1998. On the validity of the Beck Depression Inventory. A review. *Psychopathology* 31, 160–168.
- Roberts, B.W., Bogg, T., Walton, K.E., Chernyshenko, O.S., Stark, S.E., 2004. A lexical investigation of the lower-order structure of conscientiousness. *Journal of Research in Personality* 38, 164–178.
- Rush, A.J., Hiser, W., Giles, D.E., 1987. A comparison of self-reported versus clinician-related symptoms in depression. *Journal of Clinical Psychiatry* 48, 246–248.
- Sayer, N.A., Sackeim, H.A., Moeller, J.R., Prudic, J., Devanand, D.P., Coleman, E.A., Kiershy, J.E., 1993. The relations between observer rating and self-report of depressive symptomatology. *Psychological Assessment* 5, 350–360.
- Stanley, B., Wilson, S.T., 2006. Heightened subjective experience of depression in borderline personality disorder. *Journal of Personality Disorders* 20, 307–318.
- Uher, R., Farmer, A., Maier, W., Rietschel, M., Hauser, J., Marusic, M., Mors, O., Elkin, A., Williamson, R.J., Schmael, C., Henigsberg, N., Perez, J., Mendlewicz, J., Janzing, J.G., Zobel, A., Skibinska, M., Kozel, D., Stamp, A.S., Bajs, M., Placentino, A., Barreto, M., McGuffin, P., Aitchison, K.J., 2008. Measuring depression: comparison and integration of three scales in the GENDEP study. *Psychological Medicine* 38, 289–300.
- Watson, D., Clark, L.A., 1992. On traits and temperament: general and specific factors of emotional experience and their relation to the five-factor model. *Journal of Personality* 60, 441–476.
- Wechsler, E., 1981. *WAIS-R Manual*. The Psychological Corporation, New York.
- Yi, J.S., Bae, S.O., Ahn, Y.M., Park, D.B., Noh, K.S., Shin, H.K., Woo, H.W., Lee, H.S., Han, S.I., Kim, Y.S., 2004. Validity and reliability of the Korean Version of the Hamilton Depression Rating Scale (K-HDRS). *Journal of Korean Neuropsychiatric Association* 44, 456–465.
- Young, R.C., Biggs, J.T., Ziegler, V.E., Meyer, D.A., 1978. A rating scale for mania: reliability, validity and sensitivity. *The British Journal of Psychiatry* 133, 429–435.
- Yum, T.H., Park, Y.S., Oh, K.J., Kim, J.G., Lee, H.Y., 1992. *The Manual of Korean-Wechsler Adult Intelligence Scale*. Korean Guidance Press, Seoul.
- Zimmerman, M., Martinez, J., Attiullah, N., Friedman, M., Toba, C., Boerescu, D.A., 2012. Symptom differences between depressed outpatients who are in remission according to the Hamilton Depression Rating Scale who do and do not consider themselves to be in remission. *Journal of Affective Disorders* 142, 77–81.