BODY IMAGE CONCERNS IN BIPOLAR I AND II DISORDERS: THEIR RELATIONSHIPS WITH PERSONALITY STYLES AND AFFECTIVE STATES

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SUMMARY

Background: Body image concerns are associated with the poor prognosis of bipolar disorder, but it is unknown whether bipolar I (BD I) and II (BD II) types differ in these concerns and their associations with personality styles or affective states.

Subjects and methods: We therefore invited 89 BD I, 91 BD II patients, and 159 healthy volunteers to undergo the tests of the Body Image Concern Scale (BICS), the Mood Disorder Questionnaire, the Hypomania Checklist - 32, the Plutchik - van Praag Depression Inventory, and the Parker Personality Measure.

Results: Both BD I and BD II displayed higher scores of ongoing affective states and of personality disorder functioning styles than healthy controls did. BD II scored higher on all six BICS scales than controls did, and higher on five than BD I did. The depressive measure predicted four, and Dependent style predicted three BICS scales in BD I; and the depressive measure predicted all six BICS scales, hypomanic measure predicted one, and Avoidant style predicted one in BD II.

Conclusions: Body image concerns and their associations with the affective states and personality styles were different in BD I and BD II, suggesting different pathological mechanisms, clinical symptom severities and managements for the two types of bipolar disorder.

Key words: *affective states - Bipolar I and II disorders - Body Image Concern Scale - personality disorder functioning style*

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INTRODUCTION

Body image concerns are a multi-dimensional construct, frequently defined as the degree of satisfaction with oneself in terms of size, shape and general appearance (Cash & Deagle 1997). It is linked to the unnecessary dieting, excessive weight control, serious life and economical costs; more importantly, it causes lower self-esteem (Smink et al. 2012). The preoccupation of body image concerns is also closely linked with the body dysmorphic disorder, which has become an independent diagnosis within the obsessive and compulsive spectrum disorder (American Psychiatric Association 2013).

Body image concerns were positively associated with depression (El Ansari et al. 2014, Phillips et al. 2005, Senín-Calderón et al. 2017). When being comorbid with major depressive disorder, patients with body dysmorphic disorder were more likely to commit suicide (Phillips et al. 2007). Bipolar disorder patients on the other hand, have a greater number of prior affective episodes and psychiatric hospitalizations, more difficulties with antidepressant treatment and more prior suicidal attempts compared to patients with major depressive disorder (Goodwin & Jamison 2007), and their body image concerns might be more exaggerated than those of patients with major depressive disorder.

Further, body image concerns have close relationships with personality especially in clinical conditions. For example, 57% body dysmorphic disorder patients had one or more personality disorders, with most common ones being the avoidant, dependent, obsessive-compulsive, and paranoid types (Phillips & McElroy 2000). The presence of a psychopathological reaction to imagined defects in appearance in individuals pursuing a surgical correction was associated with the schizotypal and paranoid personality disorders (Bellino et al. 2006).

Bipolar disorder has two major types, i.e., bipolar I (BD I) and II (BD II), which display different personality disorder functioning styles. For instance, BD II had more prominent Borderline style than BD I did (Yao et al. 2015). Interestingly, patients comorbid with BD I and narcissistic personality disorder had more positive appearance evaluations (Barahmand et al. 2010). Moreover, BD II had higher frequency of depressive episodes, more obvious psychomotor agitation and guilty feeling (Baek et al. 2011), higher suicidal attempts, and more comorbidity with anxiety disorders than BD I had (American Psychiatric Association 2013). It is again reasonable to look for the difference of body image concerns in BD I and BD II patients since they have different personality disorder functioning styles and affective states.

In the current study, we aimed to figure out the different aspects of body image concerns and their connections with personality styles and affective states in patients with BD I and BD II and in healthy volunteers. In these participants, we used the Body Image Concern Scale (BICS; He et al. 2017), a comprehensive self-report inventory measuring different aspects of the body image concerns; we also used the Parker Personality Measure (PERM, Parker & Hadzi-Pavlovic 2001) to measure the personality disorder functioning styles; and the Mood Disorder Questionnaire (MDQ, Hirschfeld et al. 2000), the Hypomania Checklist-32 (HCL-32, Angst et al. 2005), and the Plutchik-van Praag Depression Inventory (PVP, Plutchik & van Praag 1987) to measure the concurrent affective states. Based on the previous studies, we hypothesized that (1) patients with bipolar disorder display more body image concerns than the healthy volunteers do, and that BD II patients display even more; and (2) the prominent body image concerns in BD I and BD II patients are associated with the personality styles and their concurrent affective states.

SUBJECTS AND METHODS

Subjects

We enrolled 159 healthy volunteers (67 men; mean age, 22.53 years with 3.47 S.D.; age range, 17~43 years) from medical students, medical staff or community, 89 patients with BD I (37 men; mean age, 21.87±5.88; age range 16~44), 91 with BD II (31 men; mean age, 23.04±5.19, range 16~42) from a university hospital clinic and a university psychological consultation clinic. All participants had received more than nine years of education, without any drug or alcohol for at least 72 hours prior to the test. A semi-structured interview was performed with each healthy participant to ensure that they were not suffering from any psychiatric or neurological problems. All patients were diagnosed by two experienced psychiatrists according to the DSM-5 criteria (American Psychiatric Association 2013). The participants had no brain lesions as determined using the computerized tomography or magnetic resonance imaging scans. They were also confirmed to have no schizoaffective disorder, nor schizophrenia, prior history of head injury, alcohol or tobacco abuse, psychoactive substance abuse, central nervous system inflammation, nor other neurocognitive disorders through a semi-structured clinical interview. Their gender (χ^2=1.78, p=0.42) or age (F[2, 339]=1.43, mean square effect (MSE)=31.45, p=0.24) distributions in the three groups were not significantly different. Three co-authors (BP, RY & YY) were available to aid participants (including the hyperactive BD I patients) in the proper filling of the required demographic information, questionnaires and the informed consents, and to ensure corrective feedbacks. A local ethics committee approved the study protocol, and all participants had given their written informed consents (the informed consents of the young adolescents were signed by their guardians).

Measures

Participants completed the following questionnaires in a quiet room. For the sake of brevity, questionnaires are described shortly here: (A) the MDQ, with 13 forced-choice questions assessing the symptoms related to mania or hypomania, which was validated in a recent study with an internal reliability was .79 (Yang et al. 2011a); (B) the HCL-32, with 32 forced-choice questions items assessing the hypomanic symptoms, which was validated in a recent study with an internal reliability of .88 (Yang et al. 2011b); (C) the PVP, with 34 items scaling at 0, 1, or 2, assessing the increasing depressive levels, which was validated in a recent study with an internal reliability of .94 (Wang et al. 2002); (D) the PERM, with 92 items measuring 11 functioning styles of personality disorder, which was validated in a recent study (Wang et al. 2003); and (E) the BICS, with 24 items measuring the body image concerns, which was validated in a Chinese sample (He et al. 2017). The 5-point Likert scale (1 - very unlike me, 2 - moderately unlike me, 3 - somewhat unlike and like me, 4 – moderately like me, and 5 - very like me) was used for questionnaires (D) and (E).

Statistical Analyses

One-way AVOVA was employed to detect the scale scores of MDQ, HCL-32 and PVP in the three groups. Those of PERM and BICS in the three groups were submitted to two-way ANOVA. Once a significant main effect was found, the post hoc Bonferroni test was performed for further analyses. We also applied the multiple linear regression analysis (stepwise method) to search for the relationships between the BICS, PERM styles, MDQ, HCL-32 and PVP scales, taking the PERM styles, MDQ, HCL-32 and PVP scales as potential predictors (independent variables) for the BICS scales (dependent variables). A p values inferior than 0.05 was for group comparisons and p<0.01 for predictions were considered as significant. In order to reduce the risk of Type I error, we took a |beta| ≥0.20 as significant regarding predictions.

RESULTS

Mean MDQ scores were significantly different among the three groups (F[2, 337]=157.68, MSE=994.99, p<0.001) with that in BD I higher than those in BD II (p<0.001, 95% confidence interval (CI): 2.39~4.20) and controls (p<0.001, 95% CI: 5.10~6.70), and with that in BD II higher than in controls (p<0.001, 95% CI: 1.81~3.40). The mean HCL-32 scores were significantly different among the three groups (F [2, 338]=145.53, MSE=3124.05, p<0.001), with those in BD I (p<0.001, 95% CI: 8.09~11.05) and BD II (p<0.001, 95% CI: 5.94~8.89) higher than that in controls, and with that in BD I higher than in BD II (p<0.001, 95% CI: 0.49~3.83). The mean PVP scores were also significantly different among the three groups (F [2, 338]=48.80, MSE=4815.31,

$p<0.001$), with that in BD II higher than those in BD I ($p<0.001$, 95% CI: 4.64~11.78) and controls ($p<0.001$, 95% CI: 9.76~16.04), and with that in BD I higher than in controls ($p<0.001$, 95% CI: 1.51~7.86) (Table 1).

Further, the mean PERM style scores were significantly different among the three groups (F [2, 336] =39.50, MSE=7346.32, $p<0.001$). Post-hoc analyses showed that BD I scored higher than controls did on Paranoid ($p<0.001$, 95% CI: 3.01~7.75), Schizotypal ($p<0.001$, 95% CI: 0.81~3.11), Antisocial ($p<0.001$, 95% CI: 2.04~5.72), Borderline ($p<0.001$, 95% CI: 2.53~6.91), Histrionic ($p<0.001$, 95% CI: 2.28~4.82), Narcissistic ($p<0.001$, 95% CI: 3.00~6.33), Avoidant ($p<0.001$, 95% CI: 0.55~5.23), Dependent ($p<0.001$, 95% CI:0.60~4.64), Obsessive-compulsive ($p<0.001$, 95% CI: 0.62~3.22), and Passive-aggressive ($p<0.001$, 95% CI: 1.40~4.94) styles. BD II scored higher than controls did on Paranoid ($p<0.001$, 95% CI: 5.09~9.79), Schizotypal ($p<0.001$, 95% CI: 2.00~4.29), Antisocial ($p<0.001$, 95% CI: 3.53~7.18), Borderline ($p<0.001$, 95% CI: 5.63~9.98), Histrionic ($p<0.001$, 95% CI: 2.52~5.04), Narcissistic ($p<0.001$, 95% CI: 3.06~6.37), Avoidant ($p<0.001$, 95% CI: 2.72~7.37), Dependent ($p<0.001$, 95% CI: 2.88~6.89), Obsessive-compulsive ($p<0.001$, 95% CI: 0.40~2.98) and Passive-aggressive ($p<0.001$, 95% CI: 2.980~6.49) styles. BD II also scored significantly higher than BD I did on Borderline style ($p<0.01$, 95% CI: 0.62~5.56) (also see Table 1).

The mean BICS scale scores were significantly different among the three groups (F [2, 336]=22.04, MSE=1205.34, $p<0.001$). Post-hoc analysis showed that BD I scored significantly higher than controls did on Social Avoidance ($p<0.01$, 95% CI: 0.34~2.42), while BD II scored higher than the controls did on all scales: Social Avoidance ($p<0.001$, 95% CI: 1.38~3.64), Appearance Dissatisfaction ($p<0.001$, 95% CI: 1.38~4.11), Preoccupation with Reassurance ($p<0.001$, 95% CI: 2.40~5.48), Perceived Distress/Discrimination ($p<0.001$, 95% CI: 1.78~4.15), Defect Hiding ($p<0.001$, 95% CI: 0.95~3.43), and Embarrassment in Public ($p<0.001$, 95% CI: 0.58~1.95). In addition, BD II scored significantly higher than BD I did on Appearance Dissatisfaction ($p=0.001$, 95% CI: 0.73~3.83), Preoccupation with Reassurance ($p<0.001$, 95% CI: 1.64~5.14), Perceived Distress/Discrimination ($p=0.001$, 95% CI: 0.69~3.39), Defect Hiding ($p<0.001$, 95% CI: 1.09~3.91), and Embarrassment in Public ($p<0.001$, 95% CI: 0.72~2.26) (Table 2).

Table 1. Scale scores (mean±S.D.) of the Parker Personality Measure, the Plutchik - van Praag Depression Inventory, the Hypomania Checklist-32 and the Mood Disorder Questionnaire in the healthy volunteers (controls, n=159), and patients with bipolar I (BD I, n=89) and II (BD II, n=91) disorders

	Controls	BD I	BD II
Mood Disorder Questionnaire	2.48±2.32	8.39±2.67[a]	5.09±2.62[a,b]
Hypomania Checklist-32	11.25±4.73	20.82±4.11[a]	8.66±4.93[a,b]
Plutchik - van Praag Depression Inventory	5.94±8.87	13.61±10.85[a]	21.82±12.77[a,b]
The Parker Personality Measure			
Paranoid	19.46±6.82	24.84±7.00[a]	26.90±8.78[a]
Schizoid	19.41±4.18	19.37±4.64	20.60±3.86
Schizotypal	9.01±3.28	10.97±3.49[a]	12.15±4.28[a]
Antisocial	17.84±5.54	21.74±5.28[a]	23.22±6.58[a]
Borderline	18.74±5.59	23.46±6.83[a]	26.55±8.74[a,b]
Histrionic	11.53±3.58	15.08±4.08[a]	15.31±4.56[a]
Narcissistic	15.03±4.65	19.70±5.66[a]	19.75±5.75[a]
Avoidant	24.79±7.44	27.67±6.16[a]	29.84±8.23[a]
Dependent	21.54±6.02	24.16±5.78[a]	26.43±7.32[a]
Obsessive-compulsive	16.35±3.83	18.27±4.06[a]	18.04±4.53[a]
Passive-aggressive	19.16±5.45	18.27±4.06[a]	23.89±6.31[a]

Note: [a] $p<0.05$ vs. controls; [b] $p<0.05$ vs. BD I

Table 2. Scale scores (mean±S.D.) of the Body Image Concern Scale in the healthy volunteers (controls, n=159), and patients with bipolar I (BD I, n=89) and II (BD II, n=91) disorders

	Controls	BD I	BD II
Social Avoidance	5.78±2.44	7.16±3.76[a]	8.19±3.92[a]
Appearance Dissatisfaction	9.44±3.94	9.91±4.60	12.19±4.66[a,b]
Preoccupation with Reassurance	10.61±3.94	11.16±5.33	14.55±5.80[a,b]
Perceived Distress/ Discrimination	8.22±3.25	9.15±3.96	11.19±4.34[a,b]
Defect Hiding	9.03±3.55	8.72±4.32	11.22±4.13[a,b]
Embarrassment in Public	3.96±1.91	3.73±2.22	5.22±2.47[a,b]

Note: [a] $p<0.05$ vs. controls; [b] $p<0.05$ vs. BD I

Table 3. Prediction of the Body Image Concern Scale (BICS) by the Plutchik-van Praag Depression Inventory (PVP), the Hypomanic Checklist-32 (HCL-32), the Mood Disorder Questionnaire (MDQ) and the Parker Personality Measure in the healthy volunteers (controls, n=159), and patients with bipolar I (BD I, n=89) and II (BD II, n=91) disorders

BICS	Controls		BD I		BD II	
	Adj-R^2	beta (B, SE), predictor	Adj-R^2	beta (B, SE), predictor	Adj-R^2	beta (B, SE), predictor
Social Avoidance	0.20	0.46 (0.15, 0.02) Avoidant	0.31	0.44 (0.15, 0.03) PVP 0.37 (0.24, 0.06) Dependent	0.25	0.48 (0.15, 0.03) PVP
Appearance Dissatisfaction	0.19	0.44 (0.23, 0.04) Avoidant			0.27	0.40 (0.15, 0.03) PVP 0.39 (0.22, 0.07) Avoidant
Preoccupation with Reassurance	0.17	0.42 (0.22, 0.04) Avoidant	0.12	0.29 (0.14, 0.05) PVP	0.24	0.30 (0.14, 0.04) PVP 0.30 (0.35, 0.11) HCL-32
Perceived Distress/ Discrimination	0.16	0.29 (0.13, 0.04) Avoidant	0.10	0.34 (0.12, 0.04) PVP	0.19	0.45 (0.15, 0.03) PVP
Defect Hiding	0.15	0.39 (0.19, 0.04) Avoidant	0.20	0.49 (0.37, 0.08) Dependent	0.20	0.45 (0.15, 0.03) PVP
Embarrassment in Public	0.13	0.37 (0.10, 0.02) Avoidant	0.18	0.28 (0.06, 0.02) PVP 0.35 (0.14, 0.04) Dependent	0.13	0.32 (0.06, 0.02) PVP

Note: Adj-R^2, Adjusted R^2

When predicting BICS scales by the PERM styles and affective states, the accounted variances (adjusted R^2s) ranged from 0.10 to 0.31 in BD I, from 0.13 to 0.27 in BD II, and from 0.13 to 0.20 in controls. In BD I, PVP predicted BICS Social Avoidance, Preoccupation with Reassurance, Perceived Distress/Discrimination, and Embarrassment in Public, and Dependent style predicted Social Avoidance, Defect Hiding, and Embarrassment in Public. In BD II, HCL-32 predicted Preoccupation with Reassurance, PVP predicted all BICS scales, and Avoidant style predicted Appearance Dissatisfaction. In controls, Avoidant predicted all BICS scales (Table 3).

DISCUSSION

In the current study, BD I and BD II scored significantly higher on MDQ, HCL-32 and PVP scales, complying with previous studies (Wu et al. 2008; Hirschfeld et al. 2000; Yao et al. 2015). Both patient groups scored higher on all PERM styles (except Schizoid) than the healthy controls did, which were also in line with previous studies that bipolar disorder had higher comorbidity of personality disorders except schizoid (Brieger et al. 2003, Paris et al. 2007, Zimmerman & Morgan 2013, Yao et al. 2015). Meanwhile, BD II scored higher than the healthy controls and BD I did on almost all BICS scales, which confirmed our first hypothesis. Together with depression, Dependent style in BD I, and hypomania and Avoidant style in BD II, predicted some BICS scales, which confirmed our second hypothesis. According to the best of our knowledge, this is the first study of body image concerns and their related personality and affective features in bipolar disorder.

Both BD I and BD II scored higher on BICS Social Avoidance than the healthy controls did, which were in line with that bipolar disorder was overlapped with social anxiety (Fracalanza et al. 2014, Levy et al. 2015), and displayed prominent avoidant tendency or trait (George et al. 2003, Yao et al. 2015). In three groups, all BICS scales are associated with personality and affective factors, which also accorded with previous

documentation that the body image concerns were affected by personality traits and depression (Phillips et al. 2000, Kollei et al. 2012, Keating et al. 2016). For instance, in healthy controls, Avoidant style predicted all BICS scales, which were in accordance with the comorbidity of body dysmorphic disorder and avoidant personality disorder (Phillips & McElroy 2000), and with a retrospective investigation that avoidant personality disorder were predominant in individuals receiving cosmetic surgery (Hundscheid et al. 2014). We also detected that depression predicted four BICS scales in BD I and predicted all six scales in BD II, which were consistent with that depressive patients displayed lower self-esteem and more tendency to develop body dysmorphic disorder (Baykal et al. 2015). Moreover in clinics, dependent personality disorder has an increased comorbid risk of depressive and anxiety disorders, and which are closely related to the body image concerns (American Psychiatric Association 2013). In addition, 15% body dysmorphic disorder patients had dependent personality disorder (Phillips & McElroy 2000). These documentations might help to explain that Dependent style was associated with the Social Avoidance, Defect Hiding, and Embarrassment in Public in BD I.

BD II scored higher on the Borderline style than BD I did, which was in line with that borderline personality disorder was overlapped with BD II (Perugi et al. 2011), and that BD II had higher neuroticism than BD I did (Kim et al. 2012). The higher neuroticism and the higher comorbidity with obsessive and compulsive spectrum disorder (Jeon et al. 2018) might explain that BD II scored higher on all BICS scales than healthy controls did. BD II also scored higher BICS scales than BD I did except Social Avoidance, which might be due to that BD II patients had a more chronic course (Judd et al. 2003) and more frequent depressive episode (Baek et al. 2011). Indeed, BD I scored lower on depression but higher on mania and hypomania than BD II did in our study, together with more implicit self-esteem (Park et al. 2014), more extraversion and less neuroticism (Kirkland et al. 2015), patients with BD I might

have more satisfaction with their body images. These results might also help us to understand that the body image concerns were more prominent in BD II than those in BD I, and explain that depression failed to predict Appearance Dissatisfaction and Defect Hiding in BD I.

In BD II, PVP was associated with all six BICS scales, which were consistent with previous observations. For instance, the emotional distress increased the body image dissatisfaction (Rhondali et al. 2015), the depressive state was strongly associated with the appearance concerns (Ji et al. 2012), and 78.0% body dysmorphic disorder patients had depressive mood (Phillips et al. 2007) and a lifetime suicidal ideation (Phillips et al. 2005, du Roscoät et al. 2016). Another affective measure, the HCL-32 also predicted Preoccupation with Reassurance in our BD II, which accorded with the results showing that individuals with hypomania had a higher rate of body dysmorphic disorder (Perugi et al. 2011). Similar to healthy controls, BD II displayed an association between Avoidant style and the Appearance Dissatisfaction, which was in line with that body dysmorphic disorder patients had excessive worries about and preoccupation with an imagined or minor defect in physical features, and they intended to avoid the attention of others (Phillips & McElroy 2000), and with that the avoidant style or trait was more obvious in BD II (George et al. 2003, Yao et al. 2015).

However, one should bear in mind there were at least two limitations of our current study design. Firstly, we did not include other disease controls such as the body dysmorphic, obsessive-compulsive or personality disorders, or cerebral-lesioned disorders. Secondly, our participants were young and middle-aged individuals, our results cannot be generalized into other aged populations.

CONCLUSION

Bipolar disorder, especially BD II showed more body image concerns; depression and Dependent personality disorder style in BD I, and depression, hypomania, and Avoidant style in BD II were associated with the body image concerns. Future studies might be designed to explore the neurobiochemical or neuroanatomical bases under these differences, and address the different clinical-treatments for the two types of bipolar disorder.

Contribution of individual authors:

Design of the study: Wei Wang.

Data collection: Bing Pan, Bingren Zhang, Huitzong Tsai, Qing Zhang, Rui Yang, Ying Yang, Chu Wang & Yanli Jia.

Literature searches and analyses: Bing Pan, Bingren Zhang & Wei Wang.

Statistical analyses: Bing Pan.

Interpretation of data: Bing Pan, Bingren Zhang & Wei Wang.

First draft: Bing Pan & Wei Wang.

Approval of the final version: Bing Pan, Bingren Zhang, Huitzong Tsai, Qing Zhang, Rui Yang, Ying Yang, Chu Wang, Yanli Jia & Wei Wang.

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