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Perceived Emotional Intelligence is Impaired and Associated with Poor Community Functioning in Schizophrenia and Bipolar Disorder

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Abstract

Schizophrenia and bipolar disorder have been associated with shared and distinct emotion processing abnormalities. Initial findings indicate that these disorders differ with respect to the domain of emotional intelligence (EI). Individuals with schizophrenia display deficits on performance measures of EI, whereas those with bipolar disorder do not. However, no research has examined patients' subjective beliefs about their own EI (referred to as "perceived EI"). This study examined perceived EI, assessed with the Trait Meta-Mood Scale (TMMS), and its clinical and functional correlates in outpatients with schizophrenia (n = 35) or bipolar disorder I (n = 38) and matched healthy controls (n = 35). The TMMS includes three subscales that assess beliefs about one's ability to attend to (Attention to Feelings), understand (Clarity of Feelings), and repair emotions (Mood Repair). Participants in the clinical groups also completed community functioning and symptom assessments. Both clinical groups reported significantly lower perceived EI than controls, but did not differ from each other. Higher total TMMS correlated with higher levels of independent living in the schizophrenia group (r = .36) and better social functioning in the bipolar group (r = .61). In addition, although higher Attention to Feelings scores correlated with greater psychiatric symptoms in the schizophrenia group, higher scores across all subscales

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Contributors

All authors contributed to the conceptualization of the study. Statistical analyses and writing of the first draft of the manuscript were performed by Dr. Tabak. Dr. Horan assisted with the literature review and statistical analyses. All authors contributed to and have approved the final manuscript.

Conflict of Interest

Dr. Green reports consulting for AbbVie, DSP, Forum, Mnemosyne (scientific board), and Roche. He has received research support from Amgen. The rest of the authors report no biomedical financial interests or potential conflicts of interest.

correlated with less manic symptoms in the bipolar group. The findings suggest that perceived EI is impaired and related to community functioning in both disorders.

Keywords

schizophrenia; bipolar disorder; emotion; emotional intelligence

1. Introduction

Research from an affective science perspective has begun to specify differences and similarities in the emotion processing abnormalities associated with schizophrenia and bipolar disorder. On one hand, these disorders are associated with different patterns of in-the-moment responses to emotionally evocative stimuli. While schizophrenia patients demonstrate normal emotional responses to evocative stimuli (Kring and Elis, 2013), bipolar patients demonstrate prolonged positive emotion during emotion-eliciting laboratory tasks (Gruber, 2011). However, both clinical groups show deficits in emotion regulation, including difficulty modulating neural responses to unpleasant stimuli through cognitive reappraisal in schizophrenia (Horan et al., 2013) and, in bipolar disorder, using more emotion regulation strategies, but with less success, than healthy people (Gruber et al., 2012). Examining other aspects of emotion processing can further illuminate differences and similarities across these disorders. For example, an aspect of emotion processing that has received research attention in major mental illness is emotional intelligence (EI). Mayer and Salovey (2008) define EI as the capacity to process one's own and others' emotions (i.e. perceive, access, generate, and reflectively regulate emotions) to guide thinking about behavior. Accordingly, EI is viewed as a unique set of abilities that plays a critical role in adaptive socio-emotional functioning.

To date, nearly all research on EI in mental illness has focused on performance-based measures, particularly the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT; Mayer et al., 2002). The MSCEIT assesses four "branches" of EI: emotion perception, using emotions, understanding, and managing emotions. Patients with schizophrenia demonstrate impairments on this measure across all four domains, and lower MSCEIT scores are related to greater positive and negative symptoms, low functional capacity, and poor functional outcome (Eack et al., 2010; Kee et al., 2009; Lin et al., 2012). We are aware of only two studies that used the MSCEIT in bipolar disorder and both found that performance was normal (Burdick et al., 2011; Lee et al., 2013).

In addition to performance-based measures, affective scientists have assessed self-reported or "perceived EI." While the MSCEIT measures one's ability to identify and understand emotions in oneself and others, perceived EI measures the meta-experience of emotion, or one's subjective beliefs about his or her emotional abilities. The most commonly-used measure of perceived EI is the Trait-Meta Mood Scale (TMMS; Salovey et al., 1995). It contains three subscales: (1) Attention to Feelings (Attention): the tendency to notice and value emotions; (2) Clarity of Feelings (Clarity): the tendency to experience and name feelings clearly; and (3) Mood Repair (Repair): one's belief in his or her ability to repair

negative emotions by fostering positive feelings. In healthy samples, TMMS scores are not strongly related to performance-based measures, such as the MSCEIT (Mayer et al., 2004), yet both are associated with mental and physical health and better social functioning (Schutte et al., 2007). Studies have demonstrated incremental validity for TMMS for outcomes; in healthy individuals, the TMMS predicts subjective well-being and adaptive functioning above and beyond factors such as current mood state, personality traits, and general intelligence (Extremera and Fernández-Berrocal, 2005; Fernandez Berrocal and Extremera, 2008; Palmer et al., 2002).

Higher scores on Clarity and Repair are consistently associated with positive outcomes, such as greater life satisfaction, interpersonal satisfaction, and less social anxiety and depression (Palmer et al., 2002; Salguero et al., 2012; Salovey et al., 2002). Higher scores on the third subscale, Attention, are sometimes associated with positive outcomes, such as empathy, self-esteem, and adaptive physiological responses to acute stress (Salovey et al., 2002), but have also been associated with greater anxiety and depression (Salguero et al., 2012; Salovey et al., 1995).

We are unaware of any studies of perceived EI in schizophrenia or bipolar disorder using the TMMS. Research has been conducted on concepts related to perceived EI, such as mindfulness and alexithymia (related to the Attention and Clarity subscales) and emotion regulation (related to Repair). Schizophrenia patients display low levels of dispositional mindfulness (Chadwick et al., 2008), while bipolar patients and healthy controls do not differ on mindfulness (Perich et al., 2011). Also, schizophrenia patients report increased alexithymia (van't Wout et al., 2007), which has been associated with increased positive (Serper and Berenbaum, 2008) and negative symptoms (van't Wout et al., 2007). Individuals with schizophrenia additionally report abnormal emotion regulation styles and show impairment on performance-based and neurophysiological tasks (Horan et al., 2013; Kee et al., 2009; Kimhy et al., 2012). Although individuals with bipolar disorder also report abnormal emotion regulation styles (Gruber et al., 2012; Wolkenstein et al., 2014), they do not consistently show impairments on performance-based assessments (Burdick et al., 2011; Gruber et al., 2014; Lee et al., 2013).

There were three objectives for the current study. The first was to compare levels of perceived EI across schizophrenia, bipolar, and control participants. Based on prior research, we expected schizophrenia patients to report lower scores on all TMMS subscales, but we did not have clear directional predictions for the bipolar group. The second objective was to examine the correlations among perceived EI, characteristic symptoms for the two disorders (positive and negative symptoms, mania, and depression), and community functioning within each clinical group. The third objective was to determine whether perceived EI accounted for unique variance in functional outcome for each clinical group, above and beyond any contribution of symptoms.

2. Methods

2.1 Participants

Participants were 73 outpatients with schizophrenia (n=35) or bipolar disorder (n=38) and 35 healthy control subjects. Patients were recruited from outpatient clinics at University of California, Los Angeles (UCLA), the Veterans Affairs Greater Los Angeles Healthcare System (VAGLAHS), and from local clinics and board and care facilities. Patients met criteria for schizophrenia or bipolar I disorder based on the Structured Clinical Interview for DSM-IV (SCID) Axis I Disorders (First et al., 1996). Most of the bipolar patients (n=28) had a history of psychotic symptoms and the majority of bipolar patients were euthymic at the time of the study (n=29). Following consensus nomenclature, participants were considered euthymic if they had a score of <7 on the Young Mania Rating Scale (Tohen et al., 2009). Patients were excluded if they had substance dependence in the past six months, substance abuse in the past month, or IQ < 70. All patients were clinically stable as defined by: no mood episodes in the past month, no hospitalizations in the past 3 months, no changes in living situation in the past 2 months, and no medication changes in the past 6 weeks. Thirty-three of the schizophrenia patients and twenty-three of the bipolar patients were taking antipsychotic medications. Twelve bipolar patients were taking lithium.

Control participants were recruited through advertisements posted on websites. Controls were excluded if they had a history of schizophrenia, other psychotic disorder, bipolar disorder, recurrent major depressive disorder, substance dependence disorder, or substance abuse in the past month based on the SCID. Controls were also administered portions of the SCID for Axis II Disorders (First et al., 1994) and excluded if they met criteria for avoidant, paranoid, schizoid, schizotypal, or borderline personality disorder. They were also excluded for family history of psychotic or bipolar disorders among first-degree relatives. Additional exclusion criteria for all participants were: history of loss of consciousness for more than one hour, significant neurological disorder, or insufficient fluency in English.

All interviewers were trained through the Treatment Unit of the VA VISN 22 Mental Illness Research, Education, and Clinical Center. Interviewers were trained to a minimum kappa of 0.75 for key psychotic and mood items on the SCID and to a minimum kappa of 0.75–0.80 for other symptom measures (Ventura et al., 1998). All participants had the capacity to give informed consent and provided written informed consent after procedures were fully explained, in line with procedures approved by the institutional review board at VAGLAHS.

2.2 Measures

2.2.1 Perceived emotional intelligence—All participants completed the TMMS, a 30-item self-report measure comprised of three subscales. The Attention subscale includes 13 items that measure the amount of attention one pays to subjective feelings (e.g. “I often think about my feelings”). The Clarity subscale includes 11 items that measure one’s ability to understand and differentiate between feelings (e.g. “I am rarely confused about what my feelings are”). The Repair subscale includes six items that measure one’s ability to regulate mood by repairing negative feelings (e.g. “I try to think good thoughts no matter how badly I feel”). Each item is rated on a scale from one (strongly disagree) to five (strongly agree).

The TMMS has demonstrated good internal reliability and convergent and discriminant validity in healthy samples (Salovey et al., 1995). Although few studies have utilized the TMMS in clinical populations, the scale has demonstrated good reliability in samples of individuals at clinical and genetic high risk for schizophrenia (Lee et al., 2008). In the current study, the Total score and three subscale scores demonstrated acceptable to good reliability (Cronbach's alpha) in all three groups (Supplementary Table 1). Scores for each scale range from 30–150 (Total), 13–65 (Attention), 11–55 (Clarity), and 6–30 (Repair).

2.2.2 Symptom ratings—All three groups completed the Clinical Assessment Interview for Negative Symptoms (CAINS; Kring et al., 2013), which is comprised of two subscales. The Motivation and Pleasure (MAP) subscale includes nine items based on motivation, interest, and reported engagement in relevant social, vocational, and recreational activities over the past week. The Expression (EXP) subscale includes four items based on interviewer ratings of affective and verbal expression. Raters completed didactic training and co-rated sessions with one of the scale developers (WPH) and achieved acceptable reliability (ICC < . 80) using tapes with gold-standard ratings.

The two patient groups also received the Brief Psychiatric Rating Scale (BPRS) for positive symptoms and general psychiatric symptoms (Total score) (Kopelowicz et al., 2008; Ventura et al., 1993). For the patient groups, mania and depression were assessed using the Young Mania Rating Scale (YMRS; Young et al., 1978) and the Hamilton Depression Rating Scale (HAM-D; Hamilton, 1960). The BPRS, YMRS, and HAM-D were administered by raters who were trained to inter-rater reliability criteria and who participated in a continuous quality assurance program (Ventura et al., 1993).

2.2.3 Community functioning ratings—To assess current functioning, we administered the Role Functioning Scale (RFS) (McPheeters, 1984), which includes separate ratings for different domains of functioning (rated on a scale from 1–7). As in prior studies (Rassovsky et al., 2011; Sergi et al., 2006), we included ratings for Working Productivity, Independent Living, and Social Network Relationships.

2.3 Statistical analysis

For demographics, symptoms, and functioning, group differences on continuous variables were evaluated with independent samples *t*-tests for measures administered to only the two patient groups, and one-way analyses of variance (ANOVAs) for measures administered to all three groups. Group differences in sex, race, and ethnicity were evaluated with chi-square tests.

For the TMMS, group differences were evaluated with ANOVAs and followed up with post-hoc analyses with Bonferroni corrections. Exploratory analyses were then conducted to examine associations between the TMMS and key symptoms and functional variables. We consider these analyses exploratory due to the lack of directional hypotheses for this aspect of the analyses. Relationships between the TMMS, symptoms, and functioning were evaluated separately within the schizophrenia and bipolar groups using Pearson correlation coefficients. Finally, The TMMS subscales and symptoms that correlated significantly with functioning were entered into multiple regression analyses. These analyses examined

whether subscales accounted for significant incremental variance (R^2) in functioning after accounting for clinical symptoms.

3. Results

3.1 Demographics, symptoms, and functioning

The three groups did not differ on sex, age, race, ethnicity, or parental education (Table 1). There were group differences on personal education; schizophrenia patients had lower education levels compared to bipolar and control participants.

On the CAINS, schizophrenia patients demonstrated higher MAP and EXP negative symptoms than the other two groups. Bipolar patients also demonstrated higher MAP symptoms compared to controls, though these groups did not differ on EXP symptoms. In addition, schizophrenia patients had higher BPRS total and positive symptoms compared to bipolar patients. The groups did not differ on ratings of mania or depression. For role functioning, schizophrenia patients demonstrated poorer functioning on all three components of the RFS compared to the bipolar group.

In addition, due to the heterogeneity of the bipolar participants, we conducted further between-group comparisons within this sample. We compared TMMS scores in the following three subgroups: 1) with (n=27) vs. without (n=10) history of psychosis, 2) euthymic (n=29) vs. not euthymic (n=8), and 3) on antipsychotic (n=23) vs. not on antipsychotic medication (n=14). There were no differences on perceived EI for bipolar patients based on history of psychosis or medication status. However, euthymic patients reported significantly higher scores on TMMS Total and Attention than patients who were not characterized as euthymic.

3.2 Group differences on perceived EI

Healthy controls reported higher scores on TMMS Total, Clarity, and Repair than both clinical groups (Table 2). On the Attention scale, control participants reported higher scores than schizophrenia patients only. The two patient groups did not differ significantly on any TMMS subscale. All of the significant between-group effect sizes were large (Table 2).

3.3 Correlations among perceived EI, clinical symptoms, and functioning

For schizophrenia patients (Table 3), higher Attention significantly correlated with higher psychiatric symptoms (BPRS Total). Higher Total and Clarity scores were related to greater RFS Independent Living. For bipolar patients (Table 4), higher TMMS Total and Clarity were associated with lower psychiatric symptoms (BPRS Total), and higher scores on all TMMS scales were related to lower symptoms of mania (YMRS). In terms of functioning, higher scores on all TMMS scales were associated with better RFS Social, and higher Repair was associated with greater RFS Independent Living.

We additionally examined whether the correlations in the schizophrenia patients and in the bipolar patients for TMMS and RFS subscales were significantly different from each other. The correlations between RFS Social and TMMS Total ($z = -2.86$, $p < .01$), Attention ($z =$

−3.01, $p < .01$), and Repair ($z = -2.50$, $p < .05$) were all significantly larger in the bipolar group.

We additionally considered correlations between symptoms and functioning (Tables 3–4). In both groups, higher MAP negative symptoms correlated with poorer RFS Social. For bipolar patients, there were additional significant correlations: higher MAP symptoms correlated with poorer RFS Work and total psychiatric symptoms correlated with poorer RFS Social.

3.4 Regression analyses

In the schizophrenia group, the TMMS was related to RFS Independent Living. However, because none of the clinical symptoms correlated significantly with this outcome domain, we did not need to consider incremental validity beyond symptoms.

For the bipolar group, the strongest associations were between the TMMS and RFS Social. We conducted four hierarchical regressions (one for each TMMS index) to examine whether the TMMS accounted for unique variance in RFS Social, beyond the clinical symptoms that also correlated with this outcome. In all four models, BPRS Total, YMRS, and CAINS MAP scores were entered in Step 1, as these all showed bivariate correlations with RFS Social. In step 2, one of the four TMMS scores was added. Two TMMS scores accounted for significant incremental variance in RFS Social (Table 5). TMMS Total explained an additional 8%, and Attention explained an additional 6%, of the variance in social functioning. Other TMMS scales did not explain significant unique variance. We also observed a significant correlation between Repair and RFS Independent Living in the bipolar group, but this outcome domain did not have any significant clinical symptom correlates, so we did not conduct a regression analysis.

4. Discussion

In this study, schizophrenia patients reported lower perceived EI than healthy controls across all TMMS subscales. Bipolar patients also reported lower Clarity, Repair, and Total perceived EI compared to healthy controls, and the two clinical groups did not significantly differ on any TMMS subscales. Perceived EI showed significant relationships to different clinical symptoms and aspects of functioning within each clinical group, and correlations were robust between TMMS, manic symptoms, and social functioning in the bipolar group. These findings provide initial support for the clinical and functional relevance of the subjective beliefs that individuals with schizophrenia and bipolar disorder have concerning their ability to identify, understand, and manage their emotions.

4.1 Group differences on perceived EI

The lower perceived EI reported by the schizophrenia group is consistent with prior research examining self-report measures of related constructs, including mindfulness, alexithymia, and emotion regulation (Chadwick et al., 2005; Kimhy et al., 2012; van't Wout et al., 2007). The findings also converge with research on individuals at clinical high-risk for schizophrenia who report lower Clarity and Repair than healthy controls (Lee et al., 2008). Furthermore, the schizophrenia patients' diminished perceived EI corresponds to prior findings of impairments on performance-based EI (Eack et al., 2010; Kee et al., 2009).

Overall, this pattern of findings suggests that self-perceived emotion processing limitations match the emotion processing impairments displayed on performance measures.

Except for the Attention subscale, the bipolar group also reported lower perceived EI than controls, though differences were less pronounced than in schizophrenia. Despite showing relatively intact EI on performance measures (Burdick et al., 2011; Lee et al., 2013), bipolar patients report considerable difficulty attending to, understanding, and repairing emotions. These individuals may have persistent difficulty enacting these skills effectively due to repeatedly experiencing unregulated emotions in the course of their daily lives (Gruber et al., 2013). Hence, the reasons for the low perceived EI in schizophrenia may stem from emotion processing skill deficits, whereas the low perceived EI in bipolar disorder may accurately reflect difficulty in using these skills in an emotionally tumultuous life. In addition, while perceived EI was not affected by history of psychosis or medication status, euthymic bipolar patients reported higher scores on TMMS Total and Attention than patients with elevated mood. While the subgroups for these comparisons were small, results suggest that stable mood may be associated with greater perceived EI.

4.2 Correlations and regression analyses

There were several notable differences in the clinical and functional correlates of perceived EI in the two clinical groups. Higher Attention was associated with *higher* psychiatric symptoms among schizophrenia patients. This finding converges with prior research indicating that, paying greater attention to one's feelings is sometimes associated with higher levels of depression, anxiety, positive schizotypy, and more severe delusions (Berenbaum et al., 2006; Kerns, 2005; Salovey et al., 1995; Serper and Berenbaum, 2008). Perhaps patients who are highly aware of emotions but do not fully differentiate or manage them effectively become overwhelmed by emotions and experience higher levels of psychiatric symptoms. Alternatively, schizophrenia patients with higher Attention scores may have better insight and be more accurate reporters of their symptoms and internal emotional experiences. In this view, greater Attention may actually be therapeutically beneficial because attending to feelings is a prerequisite for developing skills to clarify and repair them.

Regarding functional correlates, in the schizophrenia group, higher TMMS scores (Total and Clarity) were associated only with better community functioning for independent living. In the bipolar group, higher perceived EI on all scales was related to lower manic symptoms and better social functioning. In addition, all TMMS subscales showed significantly stronger correlations with social functioning in the bipolar group than in the schizophrenia group, and Total and Attention scores explained additional variance in social functioning, after accounting for symptom correlates. Hence, perceived EI shows a strong and distinctive association with social functioning in bipolar disorder.

This was the first study to examine negative symptoms in bipolar disorder and healthy control participants using the CAINS, a recently developed interview-based assessment of experiential and expressive negative symptoms. A few prior studies using other scales have suggested that overall negative symptoms are elevated in bipolar disorder (Ameen and Ram, 2007; Di Nicola et al., 2013; Toomey et al., 1998). The current study indicates that

elevations primarily reflect disturbances in the experiential sub-domain (MAP subscale). MAP scores related to functioning significantly and at comparable levels in both patient groups. Although the TMMS showed only small to medium correlations with negative symptoms in the schizophrenia (Table 3) and bipolar (Table 4) groups, its relationships with negative symptoms were quite strong (>0.60 for several TMMS subscales) for healthy controls (Supplementary Table 2). The current findings suggest that negative symptoms, which are typically associated with schizophrenia, are elevated and related to functioning in bipolar disorder.

4.3 Limitations and treatment implications

The current study had some limitations. First, we did not examine performance-based EI. While prior research indicates that the MSCEIT is not strongly related to perceived EI in healthy samples (Mayer et al., 2004), it would be important to examine this issue in patient groups. Second, we did not include other relevant measures for functioning, such as neurocognition or social cognition. Third, the correlational analyses were not corrected for multiple comparisons and would not survive a stringent Bonferroni correction. It will therefore be important to replicate the current findings. In addition, correlations with functional outcome are cross-sectional. While impairments in perceived EI may lead to poorer functional outcome, it is also possible that poor functioning leads to more challenges in attending to, understanding, and repairing emotions. Finally, our sample included chronic outpatients who were all taking psychoactive medications at clinically-determined dosages. Our results may not generalize to patients who are unmedicated or during the early phases of illness.

Our results have somewhat different implications for recovery-oriented interventions for schizophrenia and bipolar disorder. Individuals with schizophrenia show impairments on performance-based EI and corresponding disturbances in perceived EI. Efforts to enhance functioning in individuals with schizophrenia would be most productively accomplished by initially focusing on skill development. Recent interventions designed to improve aspects of emotion processing (e.g., identification, differentiation) show promise (e.g., Horan et al., 2011; Penn et al., 2007). As skill development progresses, it will be important to address beliefs about one's ability to use these skills in real-life situations. Interventions targeting beliefs associated with engaging in productive activities and bridging skill training to daily life activities are also emerging (Grant and Beck, 2009; Keefe et al., 2012).

For individuals with bipolar disorder who report perceived EI disturbances despite relatively intact EI skills, interventions may be most productively focused on developing new ways of understanding intensely fluctuating emotions. In addition to cognitive-behavioral interventions aimed at modifying emotional experiences (e.g., through emotion regulation strategies), newer mindfulness and acceptance-based approaches seek to modify one's relationship to emotions (e.g., learning to observe and detach from emotions) so they are not so overwhelming (Hayes et al., 2011). These approaches have yielded encouraging initial results in bipolar disorder (Stange et al., 2011; Van Dijk et al., 2013), and schizophrenia (Khoury et al., 2013; Tai and Turkington, 2009).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Demographic and Clinical Characteristics

	Schizophrenia (N = 35)	Bipolar (N = 38)	Control (N = 35)	Statistic
Sex (% male)	60	57.9	68.6	$\chi^2(2, 108)= 0.97$
Age (SD)	47.06 (9.79)	43.47 (11.38)	47.17 (6.53)	$F(2, 105)= 1.81$
Race (%)				$\chi^2(6, 108)= 4.80$
White	60.0	68.4	77.1	
African American	17.1	15.8	14.3	
Asian	14.3	5.3	2.9	
Other	8.6	10.5	5.7	
Ethnicity (% Hispanic)	20.0	18.4	14.3	$\chi^2(4, 108)= 2.31$
Education (SD)	12.97 (1.81)[a]	14.47 (2.05)[b]	14.83 (1.86)[b]	$F(2, 105)= 9.37^{**}$
Parental Education (SD)	13.57 (2.85)	15.25 (3.11)	14.32 (2.42)	$F(2, 97)= 2.97$
Age of onset (SD)	21.34 (6.77)	20.87 (6.38)		$t(71)= -0.31$
BPRS Positive	1.85 (0.73)	1.26 (0.26)		$t(70)= -4.53^{**}$
BPRS Total	39.31 (10.49)	32.70 (6.51)		$t(70)= -3.23^{**}$
YMRS Total	4.06 (4.32)	3.87 (4.84)		$t(71)= -0.18$
HAM-D Total	8.83 (6.87)	6.16 (5.83)		$t(71)= -1.80$
CAINS-MAP	14.29 (5.19)[a]	10.47 (6.78)[b]	4.91 (4.96)[c]	$F(2,101)=23.13^{**}$
CAINS-EXP	5.38 (3.65)[a]	2.11 (2.75)[b]	1.00 (1.72)[b]	$F(2,101)=22.24^{**}$
RFS Work	2.74 (1.60)	4.50 (1.77)		$t(69)= 4.40^{**}$
RFS Living	4.63 (1.29)	6.03 (1.16)		$t(69)= 4.82^{**}$
RFS Social	4.43 (1.67)	5.75 (1.70)		$t(69)= 3.31^{**}$

Notes: BPRS = Brief Psychiatric Rating Scale; YMRS = Young Mania Rating Scale; HAM-D = Hamilton Depression Rating Scale; CAINS = Clinical Assessment Interview for Negative Symptoms; MAP = Experiential negative symptoms; EXP = Expressive negative symptoms; RFS = Role Functioning Scale;

$^{*}p < 0 .05$,

$^{**}p < 0.01$;

for comparisons among all three groups, values with different superscripts are statistically different from each other.

Table 2

Group Differences on Perceived EI

TMMS	Schizophrenia (N = 35)	Bipolar (N = 38)	Control (N = 35)	*F*	Post-hoc *t*-tests			Effect sizes (Cohen's d)		
					SZ v. HC	SZ v. BP	BP v. HC	SZ v. HC	SZ v. BP	BP v. HC
Total (SD)	103.09 (14.58)	110.05 (15.66)	123.57 (11.70)	19.09**	6.48**	1.95	4.13**	1.55	0.46	0.98
Attention (SD)	46.20 (6.85)	49.51 (8.01)	51.66 (6.49)	5.16**	3.42**	1.88	1.24	0.82	0.44	0.30
Clarity (SD)	35.09 (7.05)	38.00 (7.31)	46.34 (5.86)	26.07**	7.27**	1.72	5.33**	1.74	0.41	1.26
Repair (SD)	21.80 (3.81)	22.54 (4.30)	25.57 (3.39)	9.42**	4.38**	0.77	3.31**	1.05	0.18	0.78

Notes: TMMS = Trait Meta-Mood Scale;

** $p < .01$;

SZ v. HC: a comparison of schizophrenia patients and healthy control participants, SZ v. BP: a comparison of schizophrenia and bipolar patients, BP v. HC: a comparison of bipolar patients and healthy control participants.

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Table 3

Correlations among Perceived EI, Clinical Symptoms, and Functioning: Schizophrenia Patients

	TMMS Total	TMMS Attention	TMMS Clarity	TMMS Repair	RFS Work	RFS Living	RFS Social
BPRS Positive	0.11	0.23	−0.17	0.31	−0.26	−0.23	−0.29
BPRS Total	0.17	0.36*	−0.15	0.29	−0.29	−0.14	−0.06
YMRS Total	0.06	0.25	−0.19	0.13	−0.28	−0.04	−0.26
HAM-D Total	0.15	0.24	−0.06	0.24	−0.30	−0.09	−0.26
CAINS-MAP	0.02	0.27	−0.17	−0.14	−0.24	−0.27	−0.50**
CAINS-EXP	−0.33	−0.31	−0.25	−0.25	−0.18	−0.20	−0.10
RFS Work	−0.05	−0.06	−0.01	−0.06			
RFS Living	0.36*	0.18	0.41*	0.30			
RFS Social	0.01	−0.13	0.19	−0.10			

Notes: TMMS = Trait Meta-Mood Scale; RFS = Role Functioning Scale; BPRS = Brief Psychiatric Rating Scale; YMRS = Young Mania Rating Scale; HAM-D = Hamilton Depression Rating Scale; CAINS = Clinical Assessment Interview for Negative Symptoms; MAP = Experiential negative symptoms; EXP = Expressive negative symptoms;

* $p < .05$,

** $p < .01$

Table 4

Correlations among Perceived EI, Clinical Symptoms, and Functioning: Bipolar Patients

	TMMS Total	TMMS Attention	TMMS Clarity	TMMS Repair	RFS Work	RFS Living	RFS Social
BPRS Positive	−0.12	−0.10	−0.18	0.04	0.29	0.15	−0.11
BPRS Total	−0.32[a]	−0.17	−0.37*	−0.24	0.00	−0.06	−0.62**
YMRS Total	−0.47**	−0.39*	−0.36*	−0.37*	0.16	0.03	−0.32
HAM-D Total	−0.14	0.05	−0.25	−0.17	−0.17	−0.04	−0.32
CAINS-MAP	−0.27	−0.25	−0.16	−0.23	−0.54**	−0.27	−0.55**
CAINS- EXP	−0.08	−0.04	−0.15	0.06	−0.24	−0.01	−0.12
RFS Work	0.15	0.18	0.09	0.06			
RFS Living	0.26	0.29	0.02	0.38*			
RFS Social	0.61**	0.54**	0.45**	0.47**			

Notes: TMMS = Trait Meta-Mood Scale; RFS = Role Functioning Scale; BPRS = Brief Psychiatric Rating Scale; YMRS = Young Mania Rating Scale; HAM-D = Hamilton Depression Rating Scale; CAINS = Clinical Assessment Interview for Negative Symptoms; MAP = Experiential negative symptoms; EXP = Expressive negative symptoms;

[a] $p = .05$,

* $p < .05$,

** $p < .01$

Table 5

Regression analysis for incremental prediction of RFS Social, bipolar patients

Step 1	Step 2	R^2	R^2 change	F change
Models 1–4: BPRS Total YMRS Total CAINS-MAP		0.56	0.56	12.76**
	Model 1: TMMS Total	0.64	0.08	6.25*
	Model 2: TMMS Attention	0.62	0.06	4.74*
	Model 3: TMMS Clarity	0.60	0.04	2.78
	Model 4: TMMS Repair	0.54	0.04	2.61

Notes: RFS = Role Functioning Scale; CAINS = Clinical Assessment Interview for Negative Symptoms; MAP = Experiential negative symptoms; TMMS = Trait Meta-Mood Scale; BPRS = Brief Psychiatric Rating Scale; YMRS = Young Mania Rating Scale;

* $p < .05$,

** $p < .01$