Brief report

Affect recognition across manic and euthymic phases of bipolar disorder in Han-Chinese patients

Yi-Ju Pan [a,b,c,1], Huai-Hsuan Tseng [d,e,1], Shi-Kai Liu [a,e,f,*]

[a] Far Eastern Memorial Hospital, Taipei, Taiwan
[b] Health Service and Population Research Department, Institute of Psychiatry, King's College London, London, United Kingdom
[c] Department of Public Health, School of Medicine, National Yang-Ming University, Taipei, Taiwan
[d] Department of Psychosis Studies, Institute of Psychiatry, King's College London, London, United Kingdom
[e] Department of Psychiatry, National Taiwan University Hospital, Taipei, Taiwan
[f] Centre for Addiction and Mental Health, Toronto, ON, Canada

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ABSTRACT

Patients with bipolar disorder (BD) have affect recognition deficits. Whether affect recognition deficits constitute a state or trait marker of BD has great etiopathological significance. The current study aims to explore the interrelationships between affect recognition and basic neurocognitive functions for patients with BD across different mood states, using the Diagnostic Analysis of Non-Verbal Accuracy-2, Taiwanese version (DANVA-2-TW) as the index measure for affect recognition. To our knowledge, this is the first study examining affect recognition deficits of BPD across mood states in the Han Chinese population.

Twenty-nine manic patients, 16 remitted patients with BD, and 40 control subjects are included in the study. Distinct association patterns between affect recognition and neurocognitive functions are demonstrated for patients with BD and control subjects, implicating alternations in emotion associated neurocognitive processing. Compared to control subjects, manic patients but not remitted subjects perform significantly worse in the recognition of negative emotions as a whole and specifically anger, after adjusting for differences in general intellectual ability and basic neurocognitive functions. Affect recognition deficit may be a relatively independent impairment in BD rather than consequences arising from deficits in other basic neurocognition. The impairments of manic patients in the recognition of negative emotions, specifically anger, may further our understanding of core clinical psychopathology of BD and have implications in treating bipolar patients across distinct mood phases.

1. Introduction

Affect recognition deficits were reported in both manic and euthymic phases in bipolar disorder (BD) (Mercer and Becerra, 2012; Rocca et al., 2009) and considered as a potential trait marker of BD (Langenecker et al., 2010; Versace et al., 2010). Although affect recognition/discrimination is the final output of a series of cascading information processing events, it is predicated on and can be affected by basic neurocognitions important in earlier phases of emotional processing (Nienow et al., 2006): deficits in early visual processing and attention (Herrmann et al., 2004; Shin et al., 2008; Turetsky et al., 2007) can disrupt downstream emotional processing and lead to facial affect recognition

deficits (Wynn et al., 2008); also, spatial perception has been demonstrated to best predict facial emotion identification performance (Chan et al., 2008). Since basic neurocognitive deficits also persist into euthymic phase of BD (Bora et al., 2005; Clark et al., 2002; Pan et al., 2011; Quraishi and Frangou, 2002; Robinson and Ferrier, 2006; Sole et al., 2012), the complex relationships between affect recognition and neurocognition across different mood states need to be disentangled before concluding whether affect recognition deficits constitute an independent trait marker of BD (Rocca et al., 2009).

Previous studies have focused on either manic or remitted state with inconsistent findings (Addington and Addington, 1998; Bozikas et al., 2006; Langenecker et al., 2010; Lembke and Ketter, 2002; Mercer and Becerra, 2012; Venn et al., 2004); studies specifically examining emotion processing deficits of BD across mood states were surprisingly scarce. Many of these studies did not examine the concomitant impacts of basic neuro-cognitive deficits. Furthermore, as individual basic emotion can be processed by distinct neural circuits, failure to recognize specific emotions (Adolphs et al., 1996; Blair et al., 1999), i.e., the

* Corresponding author at: Department of Psychiatry, University of Toronto, Center for Addiction and Mental Health, 1001 Queen Street West, Toronto, Ontario, Canada M6J 1H4. Tel.: +1 416 535 8501x2817, +1 416 886 1159;
fax: +1 416 583 1268.
E-mail addresses: shi-kai_liu@camh.net, formosa@mail.femh.org.tw (S.-K. Liu).
[1] These authors contributed equally to this study.

profile of affect recognition deficits, can provide important clues to possible neural circuitry involved. Current study hence aimed to explore the profile of affect recognition deficits during manic and euthymic phases of BD, while examining the interrelationships between affect recognition and those basic neurocognitions that can affect the earlier parts of emotion information processing, i.e., visuospatial working memory, selective attention, and sustained attention. Considering the cultural context, the Han-Taiwanese facial exhibits from the Taiwanese version of the Diagnostic Analysis of Non-Verbal Accuracy-2 (DANVA-2-TW) (Tseng et al., 2012) were used to address possible influences of culture and ethnicity on emotional recognition and interpretation.

2. Methods

Twenty nine manic and 16 remitted bipolar subjects were recruited from the psychiatric inpatient ward and day program of the National Taiwan University Hospital (NTUH), respectively. Forty age-and-sex-matched non-psychiatric controls were also recruited through advertisements in NTUH. The study was approved by the ethical committee of NTUH and written informed consents were obtained from all participants. The diagnosis of BD was made according to the DSM-IV criteria, using information from the Diagnostic Interview for Genetic Studies (DIGS) (Chen et al., 1998), all available medical reports, and clinical observations during hospitalization. The DIGS interview was also used to screen controls to exclude other Axis I psychiatric disorders. Severity of mood symptoms were indicated by Young's Mania Rating Scale (YMRS) and the 24-item Hamilton Depression Rating Scales (HDRS). Acute patients were tested when clinical conditions stabilized; while the remitted patients were all asymptomatic (YMRS lower than three). Subjects with mental retardations, pervasive developmental disorders, neurological conditions, electroconvulsive therapy during previous 12 months, and substance dependence/abuse during previous 6 months were excluded.

The full-scale intelligence quotient (FIQ) from the Wechsler Adult Intelligence Scale-revised (WAIS-R) was used to indicate general intellectual ability. The facial expression subtest of DANVA-2-TW, which had been demonstrated to have good reliability and discriminating validity in Taiwanese samples (Tseng et al., 2012), was used to assess the accuracy of recognition of the four basic human emotions: happiness, sadness, anger and fear. In DANVA-2-TW, 24 posed emotion photos of Han-Chinese faces, six for each basic emotion, were randomly presented for 500 milliseconds (ms). To restrict excessive cognitive reappraisal, time available for determining emotional category was 5 s. The performance index was the percentage of correct categorization.

The Span of Apprehension Test (SPAN) (Swets, 1973) was used to assess accuracy in early visual processing and iconic read-out. Subjects had to determine whether target numbers appeared among an array of numbers. Three sets of stimuli were used: 3, 6 and 12 number arrays. A total of 64 stimuli, each lasting for 100 ms with an inter-stimulus interval of 1400 ms, were presented in each session.

The visuospatial N-back task (VS-N-back) (Pan et al., 2011) was used to assess visuospatial working memory capacity: stimuli consisting of a pattern of four square blocks in line with one shaded at varying position across stimuli appeared every 300 ms. Subjects had to respond when the position of the shaded block in the current stimulus corresponded to that in the Nth stimulus back. Sixty-four stimuli were presented for each of the four N-back sessions, i.e., 0-back, 1-back, 2-back, and 3-back conditions.

Sustained attention was assessed with the Continuous Performance Test (CPT) (Chen et al., 1998), in which numbers from 0 to 9 were randomly presented for 50 ms each, at a rate of one per second. Subjects had to respond whenever a nine preceded by one appeared. A total of 331 trials, 34 (10%) of which were targets, were presented over 5 min. The sensitivity index d' indicated an individual's ability to discriminate the target stimuli from non-target stimuli.

3. Data analyses

Demographic characteristics, affect recognition and basic neurocognitive performances were compared either by χ^2 tests or analysis of variances (ANOVA). Accuracy in recognition of the four individual basic emotions, negative emotions and total emotions were analyzed separately. Multivariate regression models were conducted to explore the disease group effects on affect recognition performances, controlling for confounding factors identified in univariate analyses.

Correlational analyses were performed separately for the three study groups to explore specific patterns of association between affect recognition and neurocognitive functions in different moods and normal states. Significance level was set at $p=0.05$; all statistical analyses were performed using SPSS version 15.0.

4. Results

There were no significant differences in age and gender distribution. Control subjects had more years of formal education than manic patients (Table 1). Remitted and manic patients both had worse performances than controls in general intellectual ability and visuospatial working memory tasks. Manic patients had the poorest

Table 1
Demographic characteristics, clinical features, and test scores of study samples.[d]

	Manic patients (N=29)	Remitted patients (N=16)	Control subjects (N=40)
N (%) of males	17 (58.60)	8 (50.00)	15 (37.50)
Mean (SD)			
Age (yr)	34.62 (11.77)	37.00 (11.32)	33.75 (10.64)
Education (yr)[a]	12.55 (3.03)	13.63 (3.79)	14.43 (2.67)
WAIS-R full IQ[b]	90.97 (11.03)	95.75 (12.96)	113.75 (14.84)
YMRS[c]	24.19 (8.66)	0.47 (1.12)	N/A
ESRS	1.08 (1.38)	0.53 (.74)	N/A
Affect recognition % correct			
All emotions[a]	65.23 (13.56)	70.31 (10.41)	72.92 (10.67)
Negative emotions[a]	58.05 (16.31)	64.24 (14.62)	68.06 (13.30)
Anger[a]	52.87 (27.48)	69.79 (21.27)	76.67 (20.60)
Happiness	86.78 (13.64)	88.54 (14.55)	87.50 (12.38)
Sadness	66.09 (26.16)	67.71 (17.71)	69.17 (24.91)
Fear	55.17 (21.87)	55.21 (26.33)	58.33 (21.35)
Neurocognitive measures			
N_2_back % correct[b]	31.82 (24.42)	35.94 (25.49)	56.46 (23.94)
SPAN 6 arrays % correct[a]	74.57(20.74)	84.18 (11.55)	86.41 (10.02)
CPT adjusted z score d'[a]	−0.98 (2.44)	−0.32 (0.87)	0.02 (0.80)

Abbreviations: YMRS, Yang's Mania Rating Scale; ESRS, Extrapyramidal Syndrome Rating Scale; WAIS-R full IQ, Wechsler Adult Intelligence Scale-revised full Intelligence Quotient; N_2 Back, N_2_Back Test; SPAN_6, Span of Apprehension Test 6 arrays; and CPT, Continuous Performance Test.

[a] Manic patients < control subjects.
[b] Remitted patients < control subjects; manic patients < control subjects.
[c] Remitted patients < manic patients.
[d] There are no significant differences among study groups for age, male to female ratio, as well as affect recognition performance for happiness, sadness, and fear; there is no significant difference between remitted and manic patients in drug-induced parkinsonism as exemplified by ESRS scores.