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# The psychoeducational impact on cognitive inhibition among euthymic bipolar patients

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Across all mood phases of bipolar disorder emotional dysregulation, attentional and cognitive control deficits are being consistently observed. Despite the efficacy of psychoeducational (PE) approaches in stabilising and preventing mood episodes in bipolar disorder, no published studies directly examined the impact of psychosocial interventions on cognition of bipolar patients. Our aim was twofold: to assess the impact of PE intervention on cognitive inhibition measures and to examine emotionally modulated attentional bias and cognitive control processes in remitted bipolar patients. Fifty six euthymic bipolar patients and 31 healthy controls were assigned either to the intervention or to the control group depending on the PE enrolment. The Emotional Stroop and the Emotional Go/NoGo tasks were administered to the intervention group before and after attendance at a group PE, and to control group in a comparable time interval. Results revealed insignificant PE effects on the emotionally modulated cognitive inhibition measures. Compared to healthy controls, the bipolar patients' performance on both tasks was affected by emotional stimuli to a greater degree, suggesting more pronounced cognitive-emotional interference persistent also in interepisodic bipolar disorder. While a relationship between PE and clinical outcome measures has been convincingly demonstrated, a beneficial impact of PE on cognitive deficits in bipolar disorder remains to be determined.

*Key words*: cognitive inhibition, euthymic bipolar disorder, psychoeducation

Bipolar disorder is characterized by recurrent episodes of mania, depression and intermittent periods of euthymia. Emotional dysregulation and impaired aspects of executive functions are variably persistent across all mood states (Nordenson, Gruber, & Yurgelun-Todd, 2004). As both functions rely on reciprocal connections between limbic structures, the prefrontal cortex and striatum (Savitz, Solms, & Ramesar, 2005), cognitive-emotional interference is attributed to diminished cognitive control mechanisms with a possibly compromised attentional capacity (Burdick, Braga, Goldberg, & Malhotra, 2007). Studies using emotional Stroop and Go/NoGo tasks found mood-congruent attentional biases and altered emotional modulation of cognitive control in both manic and depressed bipolar patients, though behavioural data remain inconclusive regarding euthymic patients (Wessa, Houenou, Paillère-Martinot, Berthoz, & Artiges, 2007; Lex, Meyer, Marquart, & Thau, 2008).

As a consequence of inadequacy of pharmacotherapy to fully remit neuropsychological deficits, psychosocial interventions (Weber Rouget & Aubry, 2007) have proven in numerous randomized controlled trials to be an effective adjunct to pharmacotherapy in stabilisation and prevention of mood episodes (Miklowitz, 2008; Zaretsky, 2003). The manualized, reproducible, time-limited and empirically supported approach aimed at the improvement of medication compliance, symptom recognition, residual affective symptoms and psychosocial functioning, differs these psychosocial interventions from long-term psychotherapies (Zaretsky, 2003). Psychoeducation (PE) is either integrated in psychosocial approaches or delivered as an independent intervention and can be applied individually or in groups (Weber Rouget & Aubry, 2007). Didactic, information-oriented approach of PE has demonstrated its effectiveness on a wide range of clinical outcome variables (Miklowitz, 2008). Psychosocial interventions contribute to increased affective stabilisation and consequently to improved psychosocial functioning in real life possibly through regained self-regulation which is associated with remitted cognitive-emotional processes (Nordenson et al., 2004). However, there are to our knowledge no systematic studies evaluating the impact of a particular form of psychosocial intervention on cognition in relation to everyday functioning in bipolar disorder (Burdick et al., 2007).

Based on the previous findings on pronounced cognitive-emotional interference in bipolar disorder, we hypothesized greater attentional bias and diminished cognitive control under the influence of emotional stimuli in remitted bipolar patients relative to the healthy controls. We also pre-

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dicted a beneficial impact of group PE on assessed domains in euthymic patients.

## METHODS

### *Participants*

Participants were 56 medicated euthymic bipolar outpatients and 31 healthy controls. Bipolar and healthy comparison groups were split further regarding their participation in the PE. 55 participants pertained to the PE group and 31 individuals to the control group without PE intervention.

Healthy controls were closely matched to the bipolar patients' gender and age, but bipolar patients without PE had significantly lower level of education than healthy controls with ($t(29)= -3.03$, $p< .05$) and without PE ($t(29)= -2.84$, $p< .05$). Bipolar patients participating in the PE did not differ significantly from their counterparts in the control group on the length of illness ($t(47) = -0.12$, $p>.05$) or on the number of affective episodes ($t(47)= -0.62$, $p>.05$). There were no statistically significant gender differences among the compared groups regarding PE enrolment. Demographic and clinical characteristics are shown in Table 1.

Euthymia in bipolar patients was defined by a Hamilton Depression Rating Scale (Hamilton, 1960) score <12 and a Young Mania Rating Scale score <10 (Young, Biggs, Ziegler, & Meyer, 1978).

### *Measures*

Emotional Stroop task is a preattentive measure of emotional bias and includes blocks of coloured emotional words.

*Table 1*
Demographic and clinical characteristics of 56 euthymic bipolar patients and 31 healthy controls

| | Psychoeducation condition | | | | Control condition | | | |
|---|---|---|---|---|---|---|---|---|
| | Bipolar patients (*N*= 41) | | Healthy controls (*N*= 15) | | Bipolar patients (*N*= 15) | | Healthy controls (*N*= 16) | |
| | % | | % | | % | | % | |
| Gender (Male:Female) | 53:49 | | 33:67 | | 27:73 | | 38:63 | |
| | *M* | *SD* | *M* | *SD* | *M* | *SD* | *M* | *SD* |
| Age (years) | 40.48 | 11.56 | 35.06 | 13.29 | 42.27 | 10.71 | 38.13 | 10.20 |
| Education (years) | 14.34 | 2.27 | 15.50 | 2.42 | 12.60 | 2.99 | 15.59 | 2.96 |
| Illness duration (years) | 5.30 | 10.20 | | | 5.70 | 5.66 | | |
| Number of affective episodes | 8.75 | 7.11 | | | 11,00 | 1.83 | | |

The instructions were to name the colour of the word while ignoring the word's content. The duration taken to name the colour of emotional words compared to neutral words indicates the extent of emotional bias. Mean reaction times and correct responses were recorded.

The emotional Go/NoGo task is designed to simultaneously assess behavioural inhibition and emotional processing (Murphy et al., 1999). The task comprises six blocks of paired emotional stimuli in the alternating combinations of positive, negative and neutral pictures taken from the International Affective Picture System (Lang, Bradley, & Cuthbert, 1998). In each block, participants must either respond to a particular Go (target) stimulus and withhold response to a NoGo stimulus (distractor). Mean reaction times to correct Go stimuli and error rates in Go and NoGo trials (omission and commission errors) were recorded.

### *Procedure*

After signed informed consent, participants completed computerised emotional Stroop and emotional Go/NoGo tasks. Patients and their relatives interested in participating in PE were assigned to the PE group. Patients assigned to the control group did not receive any specific intervention. The group PE was delivered in six weekly sessions. The sessions were led by a trained psychiatrist and followed a structured format: definitions and descriptions of bipolar disorder (1. session), illness course of bipolar disorder, causal and triggering factors, drug abuse (2. session), medication compliance (3. session), early detection of depressive and (hypo)manic episodes and associated cognitive- behavioural interventions with an emphasis on early detection of warning symptoms (4. and 5. session), summary of relapse prevention techniques: life style regularity, problem-solving techniques (6. session).

Both groups were assessed twice with the same neuropsychological tests, the PE group before and after received intervention, and the control group during a 6- to 8 week time interval.

Repeated-measures ANOVAs with the group and enrolment in the PE as between-subject factors, and the emotional valence of stimuli (negative, positive, neutral) and the assessment time (baseline, after two months) as within-subject factors were conducted on the task performance data.

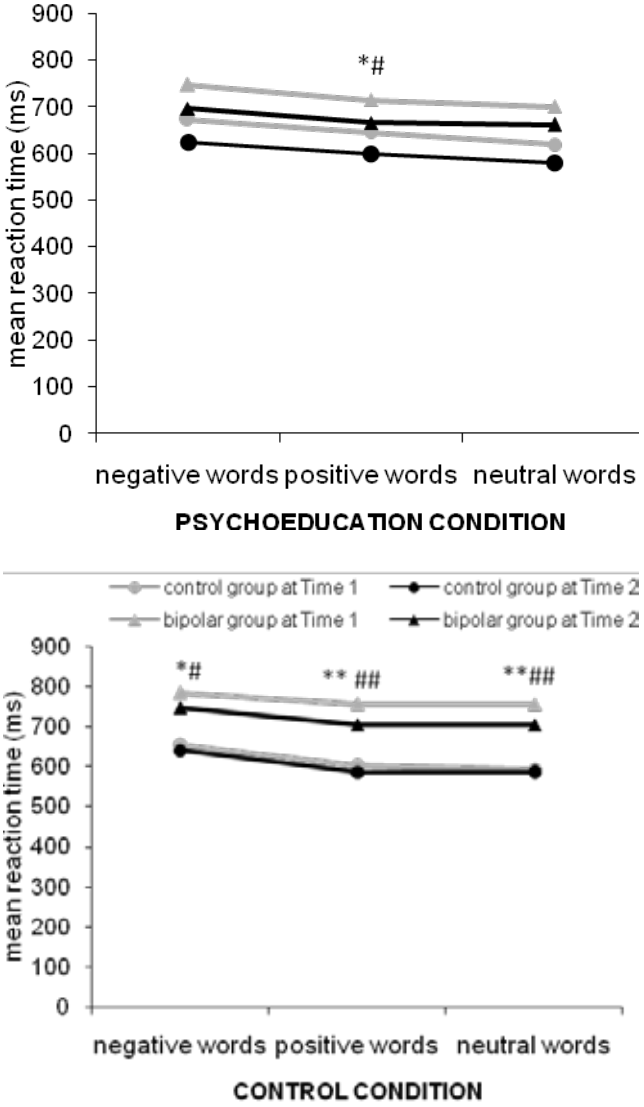
## RESULTS

On the Emotional Stroop task, bipolar patients and healthy controls differed significantly on reaction times to emotional words ($F(1,83)= 10.90$, $p<.05$), indicating slower responding of bipolar patients to all emotional words in the control group and longer reaction times to positive words in the PE group (Figure 1). A significant main effect of PE ($F(1,83)= 4.79$, $p<.05$) on the Stroop emotional interference

measure emerged, suggesting that reaction times of participants with PE ($M_{\text{PE group}}$= 6.15, $SD_{\text{PE group}}$= 4.19) were less influenced by emotional valence compared to the control group ($M_{\text{CONTROL group}}$= 20.52, $SD_{\text{CONTROL group}}$= 5.06). However, there was no significant interaction between time and PE enrolment ($F(1,83)$= 0.65, $p$>.05).

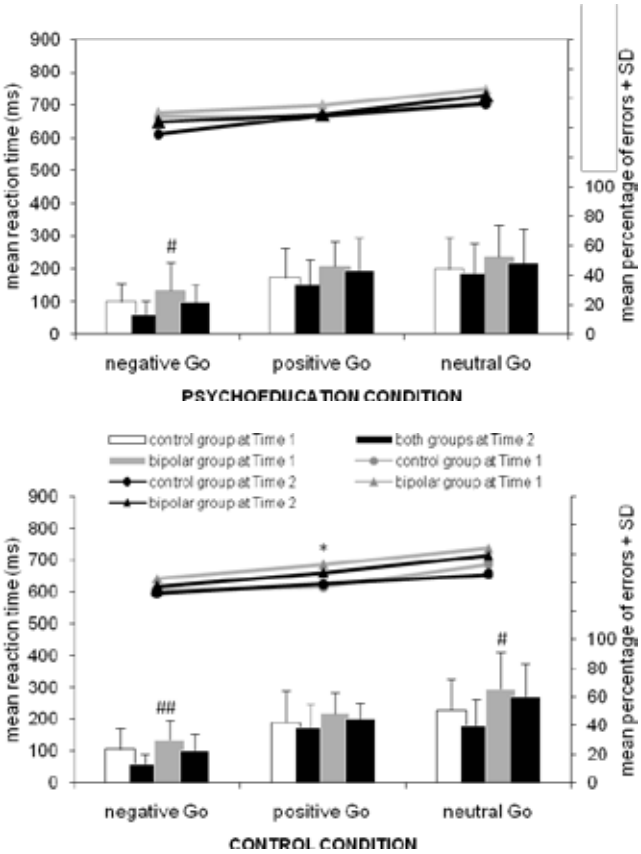
On the emotional Go/NoGo task, differences were found with respect to both errors to emotional targets ($F(1,83)$= 9.74, $p$<.05) and errors to emotional distractors ($F(1,83)$= 9,77, $p$ <.05) and to reaction times to emotional targets ($F(1,83)$= 3.72, $p$<.05). Between group comparisons showed that bipolar patients regardless of inclusion in PE made more errors to negative targets at the reassessment compared to baseline than healthy controls (Figure 2), while bipolar patients in the control group demonstrated significant difficulties inhibiting emotional stimuli in terms of longer reaction times and higher error rate at both assessments (Figure 3).

For all performance data with the exception of emotional interference measure, there were significant main effects of time and valence indicating greater improvement in psychomotor speed and accuracy of response to emotional stimuli at the reassessment compared to baseline in both groups. There were no baseline differences in the performance within the bipolar and control group with regard to PE participation.



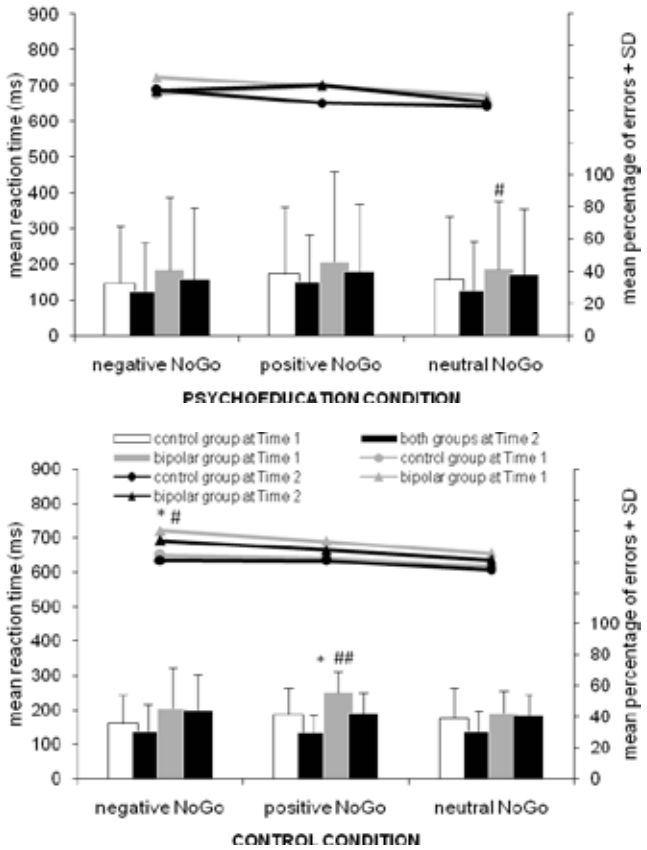

*$p$< .05 for between-group differences at Time 1
**$p$ < .01 for between-group differences at Time 1
#$p$< .05 for between-group differences at Time 2
##$p$< .01 for between-group differences at Time 2

*Figure 1.* Between-group differences in mean reaction times to emotional words on the emotional Stroop task with regard to participation in PE at Time 1 (baseline) and Time 2 (at the reassessment)




*$p$< .05 -for between-group differences at Time 1
#$p$< .05 for between-group differences at Time 2
##$p$< .01 for between-group differences at Time 2

*Figure 2.* Between-group differences in mean reaction times and error rates in Go trials on the emotional Go/NoGo task with regard to participation in PE at Time 1 (baseline) and Time 2 (at the reassessment)




* $p < .05$ for between-group differences at Time 1
\# $p < .05$ for between-group differences at Time 2
\#\# $p < .01$ for between-group differences at Time 2

*Figure 3.* Between- group differences in mean reaction times and error rates in NoGo trials on the emotional Go/NoGo task with regard to participation in PE at Time 1 (baseline) and Time 2 (at the reassessment)

## DISCUSSION

In the present study, we examined the influence of PE on emotional biases in cognitive processing among euthymic bipolar patients. Results confirmed the hypothesis of poorer emotional cognitive control processes in bipolar patients, as their performance on both tasks was influenced to a greater degree by emotional stimuli compared to the performance of healthy controls. It can be assumed that the observed attentional bias was related to altered emotional cognitive control found in bipolar patients (Burdick et al., 2007).

Given the similarities between the findings from our sample of bipolar patients and those from the emotional Stroop studies (Kerr, Scott, & Phillips, 2005) in euthymic patients, our data support the interpretation of detected cognitive deficits in euthymic phase as possible trait-markers of bipolar disorder (Nordenson et al., 2004).

PE did not contribute to a marked improvement on attention and cognitive control measures neither in euthymic bipolar patients nor in healthy controls. Since solely significant PE effect was observed on the emotional Stroop interference measure without interaction or main effect of time, we cannot conclude that completed intervention contributed to a minor emotional interference in the PE group relative to the interference of the control group.

Yet results are to be interpreted with caution, as they may be affected by methodological constraints regarding unbalanced sample of healthy controls in terms of sample size and education level compared to bipolar patients, sampling bias in the experimental groups based on motivational preferences to PE participation, and by the lack of a follow-up period to assess the longevity of the PE effects.

Alternatively, PE effects on cognitive measures may become noticeable with the passing of time. In support to this notion, Colom and colleagues (Colom et al., 2009) demonstrated long lasting prophylactic effects of a group PE on a range of clinical outcome variables in the euthymic bipolar patients. In the authors' opinion, group PE proved to be the first time-limited psychological intervention showing such a long-term maintained efficacy and even augmented effects on behavioural and attitudinal changes over years.

When evaluating PE effects, it is difficult to disentangle therapeutic effects due solely to PE from the effects of other psychosocial approaches. PE is often incorporated in psychosocial interventions; and even when delivered alone, PE may also entail other therapeutic elements (Weber Rouget & Aubry, 2007). Although no particular form of psychosocial interventions emerged as superior to others, it is important to identify treatment mediators (Miklowitz, 2008) in order to more efficiently tailor interventions to specific cognitive impairment profiles pertaining to particular mood episode. Yet psychosocial strategies should also serve to counteract enduring deficits in memory, attention and executive functions associated with bipolar disorder (Savitz et al., 2005).

To date, there are no studies addressing directly the association between cognitive impairment and PE effects in bipolar disorder. Nevertheless, a recent study (Deckersbach et al., 2009) demonstrated a beneficial impact of a cognitive remediation technique on deficits in executive functioning in relatively remitted bipolar patients.

There is accumulating evidence that increased behavioural resilience brought about by PE intervention (Colom et al., 2009) might share the same neurobiological substrate of prefrontal cortices, amygdala and anterior cingulate (Savitz et al., 2005) with the cognitive-emotional impairment observed in bipolar disorder. Behavioural resilience is probably achieved through improved knowledge and diminished stigma which in turn lessens burden on the individual and the caregivers (Colom et al., 2009). As these are the precise treatment mechanisms of PE, psychosocial approaches merit further investigation in clarifying the relationship between cognitive improvement and functional outcome of disorder.

## CONCLUSIONS

This is one of the first studies directly assessing PE impact on cognitive-emotional processes in euthymic bipolar disorder. Results revealed insignificant PE impact on attentional and cognitive control measures in bipolar patients. Some methodological shortcomings related to the characteristics of the sample and design may have affected the results. Studies on cognitive remediation in bipolar disorder are starting to emerge. In future, PE might become recognized as one of the cognitive remediation techniques, as it presumably shares a common neurobiological background with cognitive deficits observed in bipolar disorder.

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