

The effect of quality of sleep and mood on

emotional processing and emotional memory in bipolar disorder and healthy controls

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1. Introduction

- Bipolar disorder (BD) is a mental disorder characterised by two dysfunctional mood states: Depression and mania¹.
- Cognitive impairment has been found in these patients, including deficits in emotional processing and memory that seems to persist during episodes of normal mood (euthymia)².
- There is a hypothesis that sleep plays a role in the difficulties in emotional processing in BD, which coincides with the prevalence of sleep and circadian rhythm disturbances in BD³.

Aim

- This study aimed to investigate differences in performance on emotional processing and emotional memory tasks in bipolar patients and healthy controls.
- An additional aim was to examine the correlation between emotional processing and memory with mood and sleep quality.

Hypotheses

- Bipolar patients will recognise fewer faces on the FERT, particularly positive expressions.
- Bipolar patients will remember fewer words in total in the verbal learning task, and there will be less positive words remembered.
- There will be a correlation between the results from the cognitive tasks and the scores on the sleep and mood questionnaires.

2. Methods

- 46 controls (mean age 46.5 years, std. deviation 11.1) and 47 BD patients (mean age 42.4 years, std. deviation 11.5).
- Sleep and mood questionnaires:
 - Hamilton Rating Scale for depression (HAMD) assesses sleep and mood.
 - Beck Depression Inventory (BDI) assesses mood.
 - State and Trait Anxiety Inventory assesses anxiety.
- Facial Expression Recognition Task (FERT)
 - Neutral, angry, disgusted, fearful, happy, sad or surprised faces flash up on a screen for 500ms, morphed in 10% steps from neutral (see figure below).
 - Subjects are asked to identify them as fast and accurately as possible.
- Verbal Learning
 - 30 words to memorise, some neutral and some positively or negatively valenced. Total amount of words remembered immediately after is recorded, as well as number of neutral, positive or negative words.
 - 1 hour later: 30 new words are added to the original list. Subjects are asked to identify the ones that were on the original list. Delayed error total, foil error (incorrectly claim the word was on the list), target error total (incorrectly claim it was not on the list) as well as neutral, positive and negative errors are recorded.
- For the statistical analysis we used repeated measures ANOVA, followed by post-hoc t-tests using SPSS.



3. Results

Facial expression recognition task

- Patients have higher RTs across all emotions ($F(1,84)=10.66$; $p=0.002$), but there is no interaction with emotion.
- No group difference in misclassifications, but there was a trend for a group x emotion interaction ($F(2,168)=3.01$; $p=0.079$) due to patients making more negative and fewer neutral misclassifications.
- Reaction times were slower for bipolar patients in the recognition of neutral, angry, happy ($p<0.01$) and disgusted faces ($p<0.05$), see fig. 1.
- Bipolar patients showed more misclassifications of happy and sad faces ($p<0.05$), see fig. 2.
- There were no significant correlations with the sleep and mood questionnaires.

Verbal learning:

- There was a main effect of group $F(1,86)=5.75$; $p=0.019$ due to patients being poorer. There was no group x emotion interaction.
- Bipolar patients remembered fewer words in total and less total positive words (both $p<0.01$), see fig 3.
- They also had more foil errors and positive errors compared to controls ($p<0.05$), see fig. 4.
- There were correlations between middle insomnia and immediate memory total ($r=-0.375$, $p<0.05$) and delayed memory ($r=0.387$, $p<0.05$).

Figure 1: Reaction times.

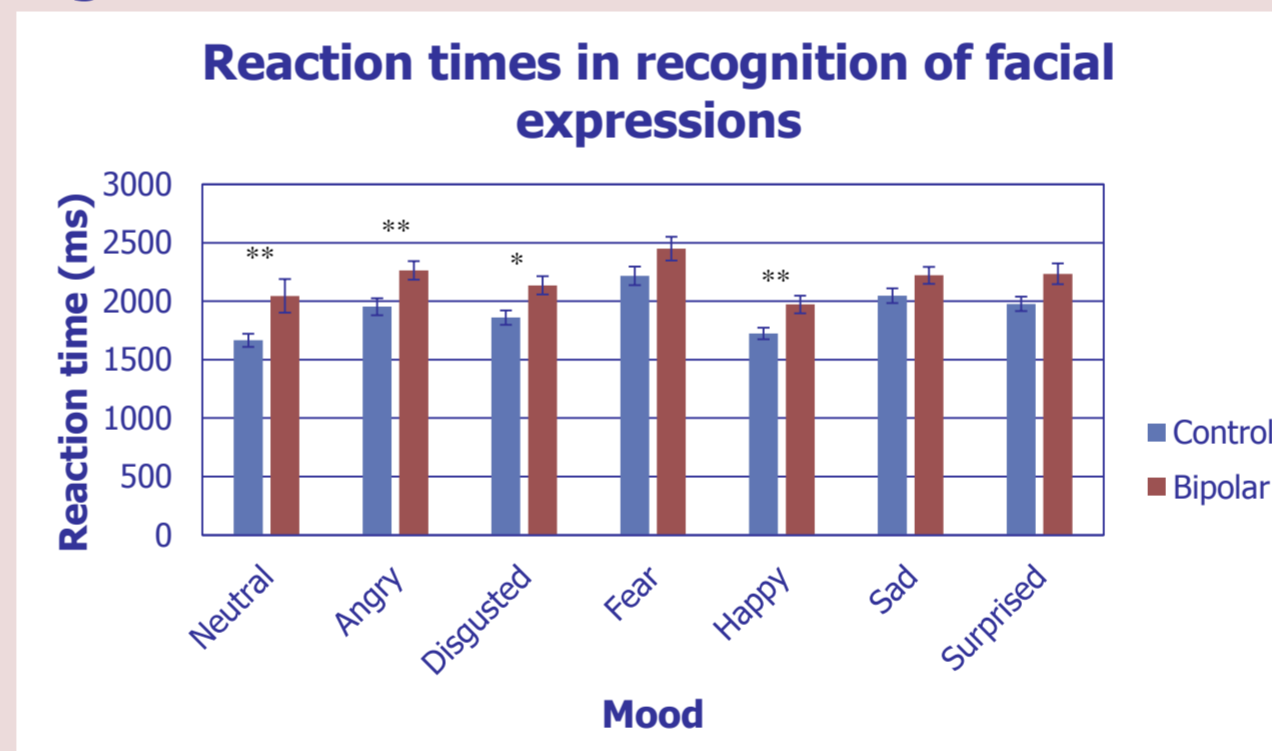


Figure 1 shows the RTs of patients and controls in FERT. * indicates $p<0.05$, ** indicates $p<0.01$.

Figure 4: Verbal learning delayed

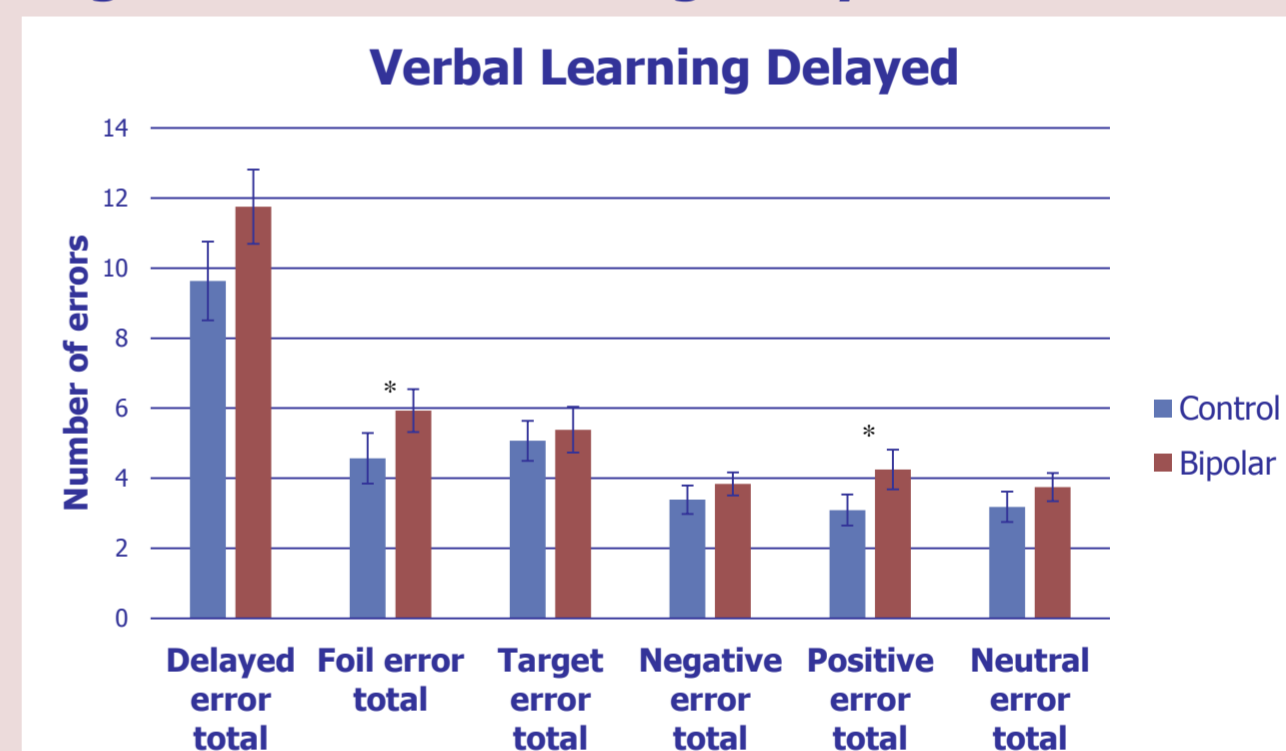


Figure 3 shows the delayed errors in the verbal learning task. * indicates $p<0.05$.

Figure 2: Misclassifications

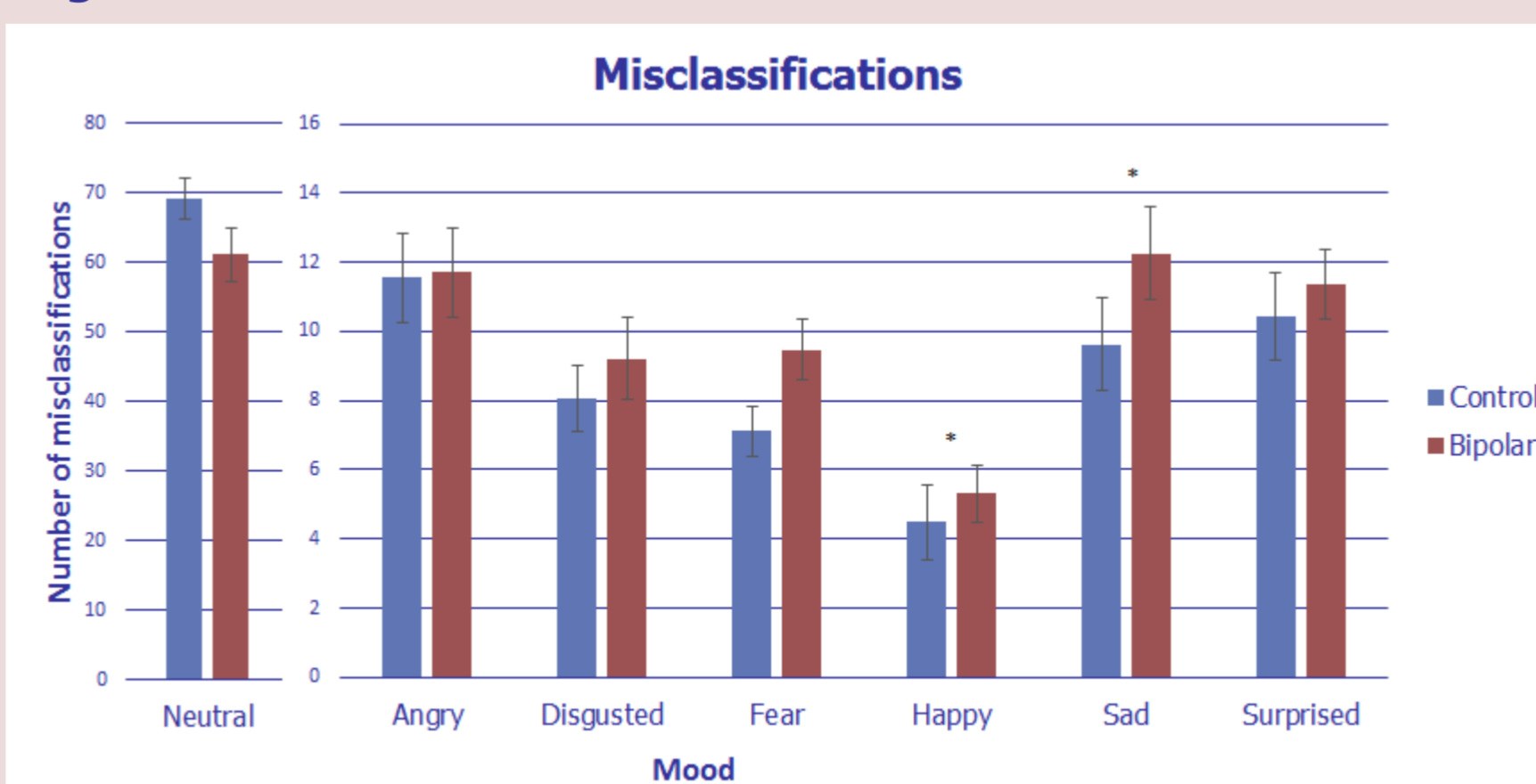


Figure 2 shows the misclassifications of facial expressions in FERT. * indicates $p<0.05$.

Figure 3: Verbal learning Immediate

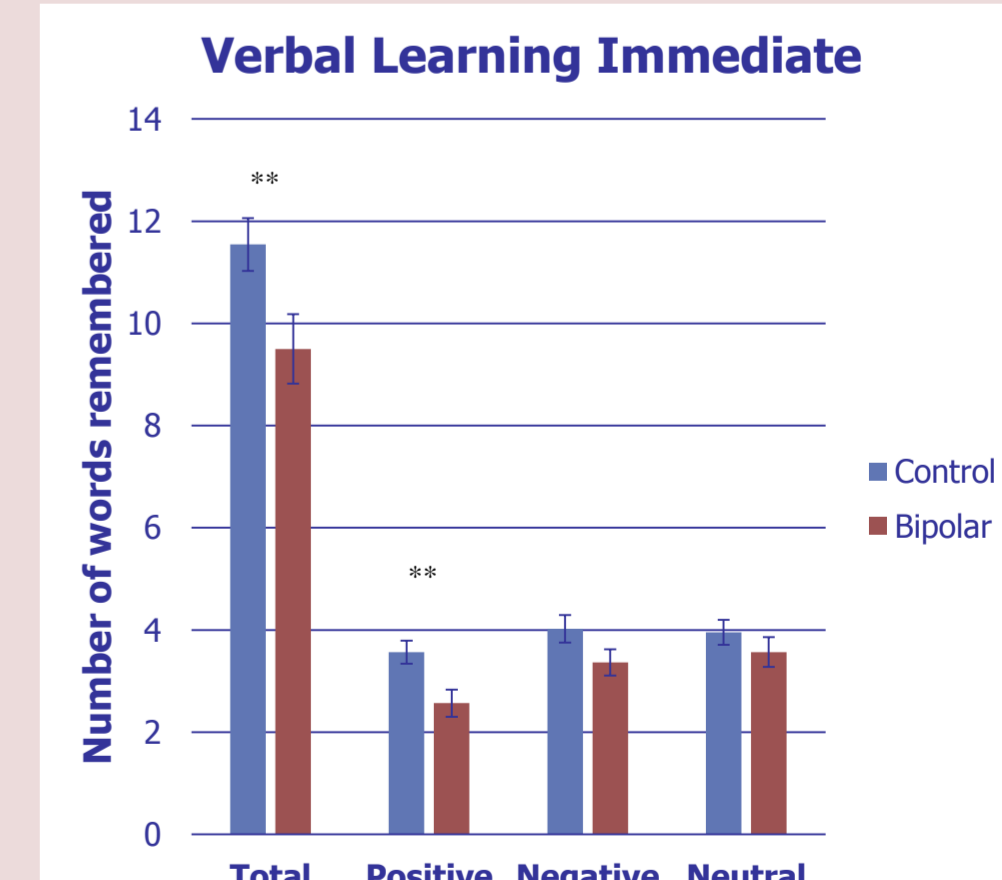


Figure 4 shows the number of words remembered immediately after the task. ** indicates $p<0.01$.

4. Discussion and conclusion

- BD patients had a slower reaction time on the recognition of several facial expressions, and also more misclassifications than healthy controls
- There were no significant correlations between the FERT results and the sleep and mood questionnaires.
- BD patients remembered fewer words in total and less positively valenced words than healthy controls.
- Middle insomnia correlated with immediate and delayed memory.
- Preferentially remembering negative events or forgetting positive ones, as well as misjudging social situations, may contribute to maintaining depression in bipolar disorder. This knowledge could therefore be a target of intervention to improve the lives of BD patients.

5. References

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