

DO BIPOLAR PATIENTS LACK MIND READING; AN ATTEMPT TO ASSESS THROUGH PICTURE SEQUENCING TASK

Anant K Rath^{1*} Sandeep Sharma^{2*} Kamal K Verma³ Divya Bishnoi⁴

¹Assistant Professor, Department of Psychiatry, S. P. Medical College, Bikaner.

^{2,4}Resident, Department of Psychiatry, S. P. Medical College, Bikaner.

³Senior Professor, Department of Psychiatry, S. P. Medical College, Bikaner.

Article Info: Received 14 April 2020; Accepted 08 May 2020

DOI: <https://doi.org/10.32553/ijmbs.v4i5.1097>

Corresponding author: Dr. Anant Kumar Rath

Conflict of interest: No conflict of interest.

Abstract

Background: This paper reports the performance of ICD-10 diagnosed Bipolar affective disorder (BPAD) patients on a well recognised measure of theory of mind (ToM) that commonly elicits group related differences in schizophrenia research.

Aims: (1) To assess Theory of mind in patients of Bipolar Affective Disorder.

(2) To examine effect of mood on Theory of Mind.

Method: Three groups were formed namely Control, BPAD (M) and BPAD (D). Each group was socio-demographically suitably matched and had 30 participants. Active symptomatology was assessed by using YMRS and MADRS in BPAD(M) and BPAD(D) cases respectively. Theory of mind was calculated using Landon and Cloheart (1999) Picture Sequencing Task.

Results: Relative to controls, bipolar patients performed significantly worse on the ToM relevant false belief script in picture sequencing task but not on other types of task stories. No significant difference was observed in the ToM performance between the phase of bipolarity.

Conclusion: The results support previous evidence of ToM deficit in BPAD and indicate a potential endophenotypic overlap in the phenomenology of both Schizophrenia and BPAD.

Keywords: Theory of Mind, YMRS, MADRS, Picture Sequence Task

Introduction

'Theory of Mind (ToM) is the cognitive ability to impute mental states to the self and to others^[1], to predict and to explain behaviours in terms of mental states. Other names for the same capacity include "common sense psychology," "naïve psychology," "folk psychology," "mind reading" and "mentalizing."

It underlies the ability to comprehend and predict the behaviour of other people and to interpret the actions of others as meaningful and intentional.^[2] Mental attributions are commonly made in both verbal and non-verbal forms. Virtually all language communities, it seems, have words or phrases to describe mental states, including perceptions, bodily feelings, emotional states, and propositional attitudes (beliefs, desires, hopes, and intentions). People engaged in social life have many thoughts and beliefs about others' (and their own) mental states, even when they don't verbalize them. Theory of mind allows one to attribute mental states to others, to understand that other people may hold and act upon beliefs different from one's own. This appreciation of alternate perspectives is crucial for successful social interaction, communication, adaptation and functioning.

There is good empirical evidence for ToM deficits in schizophrenia and that many psychotic symptoms may

best be understood in light of a disturbed capacity in patients to relate their own intentions to executing behaviour and to monitor others' intentions.^[3] It is well known fact that Theory of Mind in individuals with schizophrenia is compromised because of their failure to monitor their own and other persons' mental states and behaviour, which may account for many positive and negative symptoms in schizophrenic disorders.^[4]

Indeed, a recent meta-analysis estimated impairments in the disorder to be of moderate effect size for both basic and complex forms of ToM.^[5] These impairments have been evidenced across a variety of measures, including those that index patients' capacity to understand false beliefs or interpret complex social cues.^[6,7]

Akin to schizophrenia, theories of mind deficits were documented in bipolar affective disorder during episodes and during remission add to mounting academic argument that common causative mechanisms may contribute to bipolar affective disorder and schizophrenia.^[8] As it is becoming increasingly recognised that schizophrenia and bipolar affective disorder share genetic and phenotypic overlap, the use of common measures to assess and compare ToM across these disorders is necessary to enable greater understanding of possible endophenotypic features common to the two.

Over the past three decades, several tasks or tests for the assessment of Theory of Mind have been developed. Their methodology widely varies depending on their differing theoretical backdrop. Picture Sequencing Task (PST) is a relatively novel experimental task. Although the psychometric properties of this task have not yet been evaluated in depth yet it is considered to be the most appropriate test for ToM. The discriminant validity and construct validity of PST has been demonstrated in studies of Theory of Mind functioning in schizophrenia.^[9]

It is important that the picture sequencing task -

- (a) has multiple internal controls that examine different aspects of functioning with the same type of stimuli,
- (b) Is a commonly used measure of ToM in schizophrenia research that consistently elicits patient deficits in comparison to healthy controls^[10,11,12,13]
- (c) Moreover, examination of tasks that incorporate control conditions as an integral aspect, are necessary for understanding the precise nature of any potential deficit in ToM.

There is limited research on ToM in bipolar affective disorder. ToM research in mood disorders awards enthralling etiological and therapeutic implications. The emergent literature from both behavioural and imaging paradigms does appear to indicate patient (relative to control) abnormalities that occur regardless of mood state.^[14, 15, 16, 17, 18] In light of this, we aimed to examine ToM performance on the picture sequencing task in a well characterised sample of bipolar affective disorder patients to determine whether impairments commonly elicited by it in schizophrenia, extend to bipolar affective disorder as well.

Aim & Objectives

- (1) To assess Theory of mind in patients of Bipolar Affective Disorder.
- (2) To examine effect of mood on Theory of Mind.

HYPOTHESIS

There is no deficit of Theory of Mind in Bipolar affective disorder cases in comparison to healthy controls.

Method

The study was conducted at a tertiary care level hospital of Rajasthan. First of all approval was taken from ethical review board of the medical college to conduct the study. Purposive sampling was done till the desired sample size of 30 cases of Bipolar affective disorder current episode manic [BPAD(M)], 30 cases of Bipolar affective disorder current episode depression [BPAD(D)] and 30 healthy controls was obtained. 78 cases of bipolar affective disorder were screened on inclusion and exclusion

criteria to achieve the desired sample size. 30 suitably matched healthy relatives were also included as controls in the study. Study information sheet was provided to each participant and written informed consent was obtained before the study began.

Inclusion criteria:

- 1. Age > 18 Years and willing to give informed consent.
- 2. Established case of Bipolar affective disorder as per ICD-10 having active symptomatology (either manic or depressive).
- 3. Literate enough to understand the questionnaires.

Exclusion criteria:

- 1. Patients with visual impairments, neurological disorder and/or a history of substance use or dependence during the past six months (except nicotine).
- 2. Established case of Bipolar affective disorder currently in remission phase.

All the participants fulfilling the inclusion and exclusion criteria were further assessed on following tools.

- 1. Semi-structured proforma: It was used to collect socio-demographic details including variables such as age, gender, occupation etc.
- 2. Picture Sequencing Task (PST) : This test was adapted with the permission and the guidance of Dr. Robyn Langdon, cognitive psychologist, Macquarie University, Sydney, who developed and extensively used the original version in her Theory of Mind research endeavours^[19]. It measures the Theory of Mind by assessing false belief reasoning and general sequencing ability. It employs 18 sequences which include two practice, four false belief, four mechanical, four capture and four social script sequences. Each sequence is made up of a series of four pictures made up of black and white sketches. These sequences are presented to all subjects in a same prefixed order. The pictures within a sequence are shuffled without the knowledge of the subject and they are asked to reorganize them in a meaningful order. The reorganised order is recorded. If the subject places the first or the last pictures in their correct position, he/ she receive two points each. One point each is awarded for placing the middle ones in their correct position and hence a total of six points are given for correctly reorganized sequence. There are no points for the first two practice sequences.

PST ToM deficit is calculated by averaging scores on control conditions (social script, Mechanical sequence and Capture sequence) and subtracting the score of the false belief sequence from this mean, as follows:

PST ToM Deficit= [(Social script +Mechanical +Capture) /3] - False belief

The resulting score indicates the size of the difference between ToM and control conditions. The rationale for creating this novel variable is to obtain a single task measure indicative of a “pure” ToM deficit.

PST is considered to be the most appropriate test for this study as:

- It places less demand on general language ability and working memory, which are known confounders in any Theory of Mind assessment.
- Selective accuracy measure of Theory of Mind ability obtained from PST, is disentangled from the general sequencing ability and has more conceptual authenticity.
- It provides an objective outcome of Theory of Mind ability as a single continuous numerical variable so can be utilised as a biological marker (endophenotype).

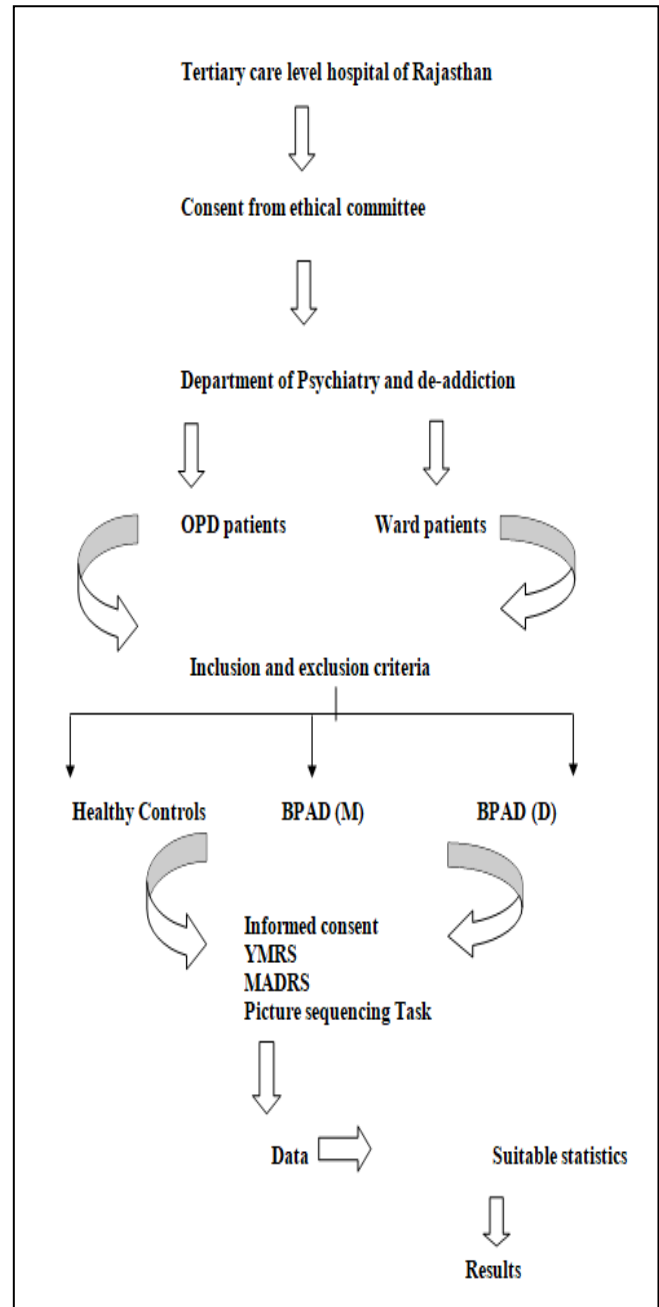
PST uses simple sketches, which lack exquisite details, and appears culturally fair also for Indian population.

3. The Young Mania Rating Scale (YMRS): Developed by Vincent E Ziegler^[20] and popularized by Robert Young is one of the most frequently utilised rating scales to assess manic symptoms. The scale is generally done by clinician and it takes 15-30 minutes to complete. The scale has 11 items and is based on the patient’s subjective report of his or her clinical condition over the previous 48 hours. There are four items that are graded on a 0 to 8 scale (irritability, speech, thought content and disruptive/aggressive behavior) while the remaining seven items are graded on a 0 to 4 scale. These four items are given twice the weight of the others to compensate for poor cooperation from severely ill patients. The YMRS total score ranges from 0 - 60 where higher score indicates more severe mania. A score <12 is considered as in remission phase of the disorder.

4. Montgomery Asberg Depression Rating Scale (MADRS): It was designed by British and Swedish researchers (Montgomery & Asberg, 1979)^[21] to measure the severity of depressive episodes in patients with mood disorder. The MADRS is relatively quick to administer and unlike the HAM -D does not focus predominantly on the somatic symptoms of the patients but rather address core mood symptoms. It is a ten-item diagnostic questionnaire used by a psychiatrist and each item is scored from 0-6 on likert scale (0=no abnormality, 6=severe). Higher MADRS score indicates more severe depression. The questionnaire addresses symptoms such as sadness, tension, reduced sleep & appetite, concentration difficulties, lassitude, inability to feel, pessimistic and suicidal thoughts. Time taken to complete the scale is 15-20 minutes and cutoff points are:

- 0 to 6 – normal /symptom absent

- 7 to 19 – mild depression
- 20 to 34 – moderate depression
- >34 – severe depression.



Result

The study consisted of 90 subjects forming three groups namely Control, Bipolar affective disorder current episode manic with or without psychotic symptoms [BPAD(M)] and Bipolar affective disorder current episode depression mild/moderate/severe depression with or without psychotic features [BPAD(D)] as per ICD-10 criteria.

Table 1: Socio-demographic details of sample.

Profile of Participants	Control (n=30)	BPAD(M) (n=30)	BPAD(D) (n=30)	p value	
Gender	Male	14 (46.67)	19 (63.33)	0.16	
	Female	16 (53.33)	11 (36.67)		
Age (Mean±SD)	Age	34±5	32.09±9.8	34±11.45	0.65
Employment status	Employed	22 (73.33)	19(63.33)	23 (76.67)	0.61
	Unemployed	6 (20)	9 (30)	4 (13.33)	
	Pensioner	2 (6.67)	2(6.67)	3 (10)	

*Figures in parenthesis shows percentage value.

Table 1 shows socio-demographic data of the participants. Out of 30 healthy controls 46.67% were male and rests were female having mean age of 34±5 years. Most of them (73.33%) were employed; while 20% controls were unemployed and rest were pensioner.

Out of 30 BPAD(M) patients, 63.33% were male and rest were females having mean age of 32.09±9.8 years. Mostly (63.33%) were employed, 30% patients were unemployed and remaining were pensioners.

30 BPAD(D) patients group consisted of 70% males and 30% females having mean age of 34±11.5 years. More than three fourth (76.67%) were employed, 13.33% were unemployed and 10% were pensioners.

All the three groups were comparable as no statically significant difference was observed among the group.

Table 2: Mean accuracy score and group comparisons for the picture sequencing task.

	Control (N=30) Mean±SD	Mania (N=30) Mean±SD	Depression (N=30) Mean±SD	p value
Social Script	22.56±1.38	22.53±1.40	21.8±2.40	0.29
Mechanical Task	22.06±1.09	21.06±3.01	21.13±2.87	0.27
Capture Task	16.53±3.07	15.00±3.35	15.76±3.01	0.17
False Belief Script	18.5±1.88	15.10±4.14	15.73±3.27	<0.01

Table 2 depicts the mean accuracy score of Picture sequencing task in three groups. Mean accuracy score for social script was 22.56 ± 1.38 for control group, 22.53 ± 1.40 in BPAD(M) and 21.8 ± 2.40 was for BPAD(D). This difference in mean accuracy score of PST was not found to be statistically significant.

Similarly mean accuracy score for mechanical task was 22.06 ± 1.09 in control group, 21.06 ± 3.01 in BPAD(M) group and 21.13 ± 2.87 in BPAD(D) group. The difference in these three groups was also found not to be statistically significant.

Mean accuracy score for capture task was 16.53 ± 3.07 in controls, 15.00 ± 3.35 in BPAD(M) and 15.76 ± 3.01 in

BPAD(D) group. This difference was also found to be statistically insignificant.

While when mean score for false belief script was assessed in control group it was found to be 18.50 ± 1.88, 15.10 ± 4.14 in BPAD(M) and 15.73 ± 3.27 in BPAD(D) and this difference in these three groups was found to be statistically highly significant. (p<0.01)

When post-hoc analysis was run there was no significant difference in false belief script between BPAD(M) and BPAD(D) group (Diff= -0.63, 95% CI = -1.36 to 2.62, p value = 0.73). A significant difference was found between control and BPAD(M) group (Diff= -3.40, 95% CI = -5.39 to -1.40, p value < 0.01). Similarly significant difference was found between control and BPAD(D) group (Diff= -2.77, 95% CI = -4.76 to -0.77, p value < 0.01).

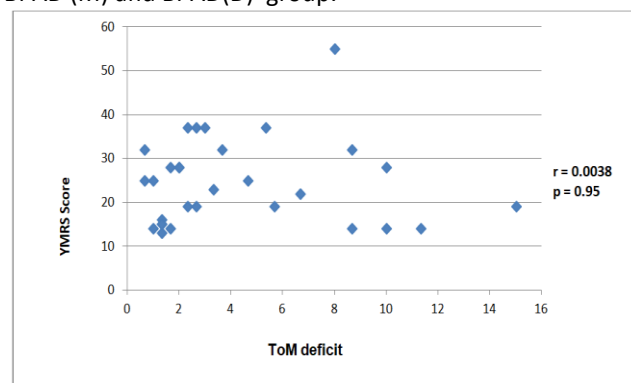
Table 3: Comparison of PST ToM deficit in three groups.

	Control	Mania	Depression	F	p value
ToM Deficit	1.89 ± 1.99	4.32 ± 3.77	3.84 ± 3.08	5.38	<0.01

Mean score for ToM deficit in control group was 1.89± 1.99, 4.32± 3.77 was forBPAD(M) and was 3.84± 3.08 for BPAD(D). This difference in ToM deficit was found to be statistically significant.

When post-hoc analysis was run there was no significant difference in ToM deficit between BPAD(M) and BPAD(D) group (Diff= -0.48, 95% CI = -2.34 to 1.38, p value = 0.81). A significant difference was found between control and BPAD (M) group (Diff= 2.43, 95% CI = 0.56 to 4.29, p value < 0.01). Similarly significant difference was found between control and BPAD (D) group (Diff= 1.95, 95% CI = 0.08 to 3.81, p value < 0.01).

To better understand the effect of mood on various ToM task performance, we calculated the relation between ToM deficit and YMRS score and MADRS score respectively for BPAD (M) and BPAD(D) group.

**Figure 2:** Pearson correlation between Theory of mind deficit and YMRS score.

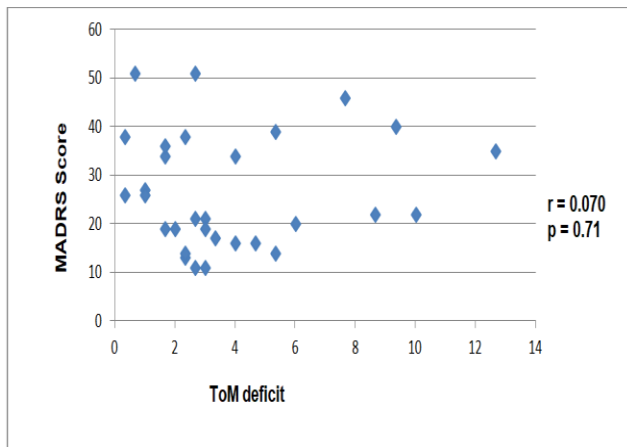


Figure 3: Pearson correlation between Theory of mind deficit and MADRS score.

The Pearson correlation coefficient (r) between Theory of mind deficit and YMRS score was 0.0038 and p value was 0.9481 while between Theory of mind deficit and MADRS score it was 0.070 and p value was 0.71 suggestive of no significant relation in phase of bipolarity and Theory of mind deficit.

Discussion

To address our first objective, this study has assessed the Theory of Mind ability in bipolar patients in both subtypes (mania and depression). It has demonstrated that there were no group related differences on the social script, mechanical task and capture control stories but bipolar patients did perform significantly worse than controls while sequencing false-belief stories. With an effects size difference in the medium range, this finding supports previous evidence of ToM impairments in Bipolar affective Disorder, and particularly on similar measures referencing a false-belief component.

Kerr *et al.* (2003) demonstrated that Bipolar patients of both type (mania and depression) exhibit the ToM deficit in symptomatic Bipolar patients. Inoue *et al.* (2004) also observed the impairment in ToM in Bipolar patients and found that there was no improvement in ToM ability even after symptomatic remission. Van Rheenen *et al.* in 2013 also found that patient performs poorly on false belief task of PST. Importantly, this data is also supportive of recent meta-analytic findings in the Bipolar affective disorder conducted by Samame *et al.* in 2012.

The pattern of findings presented here are unlikely to be a result of sensitivity to increased task difficulty, given that no group differences were evident on the most difficult story type (i.e. capture stories).

Moreover, as we found no significant differences in ToM performance between patients of mania and depression but manic patients perform worse than depressive patients

ToM deficit (4.32 ± 3.77 v/s 3.84 ± 3.08). Thus, the results suggest that patients with Bipolar affective disorder demonstrate a selective ToM deficit that cannot be accounted for by poor social script knowledge, executive control or an inability to understand causal connexions and active symptomatology.

The present study examined ToM performance on a picture sequencing task in patients with Bipolar affective disorder, with a view to assessing the use of this task as a common and sufficient measure of ToM across both schizophrenia and bipolar disorder. This study specifically aimed to enable greater understanding of possible endophenotypic features common to the two disorders, and to advance the Bipolar affective disorder ToM literature by examining performance on a never (very few) before tested task in Bipolar affective disorder research that is capable of parceling out the effects of different types of non-ToM cognitive reasoning.

Observation of current study suggests that patient impairment for false belief inferences may represent a stable, trait-like feature in Bipolar affective disorder. The results of the present study also mirror some prior evidence of selective false-belief impairments on the picture sequencing task in schizophrenia patients^[13] and are supportive of past studies indicating trait-like ToM deficits in Bipolar affective disorder itself^[6,17]. Thus, impairment on the task may represent potential overlap in the phenomenology and possibly genetic etiology of schizophrenia and Bipolar affective disorder. Use of the task in endophenotype studies that aim to examine social-cognition on the bipolar-schizophrenia spectrum could therefore be valuable.

Implications of the study:

1. Cognitive impairment is always taken care while assessment and treatment of a schizophrenic patient but largely ignored in patient of Bipolar affective disorder. So this study emphasize the need for assessment of cognitive symptoms as well in Bipolar affective disorder being a key factor for patient's optimum work efficiency.
2. Strategies based on improving basic ToM reasoning could be incorporated into current therapeutic interventions for mood disorder to provide better social adjustment.

Limitations:

1. This study employed convenient purposive sampling, which was prone for inherent bias.
2. As group size were small, data suggesting trait like deficit in ToM should be interpreted with caution.
3. We did not take account of duration of illness, which might be a confounding factor.
4. Role of medications was not assessed in the study.

References

1. Premack D, Woodruff G. Does the chimpanzee have a theory of mind?. *Behavioral and brain sciences*. 1978 Dec;1(4):515-26.
2. Rowe AD, Bullock PR, Polkey CE, Morris RG. Theory of mind impairments and their relationship to executive functioning following frontal lobe excisions. *Brain*. 2001 Mar 1;124(3):600-16.
3. Brüne M. "Theory of mind" in schizophrenia: a review of the literature. *Schizophrenia bulletin*. 2005 Jan 1;31(1):21-42.
4. Corcoran R, Mercer G, Frith CD. Schizophrenia, symptomatology and social inference: investigating "theory of mind" in people with schizophrenia. *Schizophrenia research*. 1995 Sep 1;17(1):5-13.
5. Samamé C, Martino DJ, Strejilevich SA. Social cognition in euthymic bipolar disorder: systematic review and metaanalytic approach. *Acta Psychiatrica Scandinavica*. 2012 Apr;125(4):266-80.
6. Bora E, Vahip S, Gonul AS, Akdeniz F, Alkan M, Ogut M, Eryavuz A. Evidence for theory of mind deficits in euthymic patients with bipolar disorder. *Acta Psychiatrica Scandinavica*. 2005 Aug;112(2):110-6.
7. Inoue Y, Tonooka Y, Yamada K, Kanba S. Deficiency of theory of mind in patients with remitted mood disorder. *Journal of affective disorders*. 2004 Nov 1;82(3):403-9.
8. Kerr N, Dunbar RI, Bentall RP. Theory of mind deficits in bipolar affective disorder. *Journal of affective disorders*. 2003 Feb 1;73(3):253-9.
9. Harrington L, Siegert R, McClure J. Theory of mind in schizophrenia: a critical review. *Cognitive neuropsychiatry*. 2005 Aug 1;10(4):249-86.
10. Gavilán JM, García-Albea JE. Theory of mind and language comprehension in schizophrenia: Poor mindreading affects figurative language comprehension beyond intelligence deficits. *Journal of Neurolinguistics*. 2011 Jan 1;24(1):54-69.
11. Langdon R, Coltheart M, Ward PB, Catts SV. Disturbed communication in schizophrenia: the role of poor pragmatics and poor mind-reading. *Psychological medicine*. 2002 Oct;32(7):1273-84.
12. Langdon R, Davies M, Coltheart M. Understanding minds and understanding communicated meanings in schizophrenia. *Mind & Language*. 2002;17(12):68-104.
13. Langdon R, Coltheart M, Ward P. Empathetic perspective-taking is impaired in schizophrenia: Evidence from a study of emotion attribution and theory of mind. *Cognitive Neuropsychiatry*. 2006 Mar 1;11(2):133-55.
14. Cusi AM, Nazarov A, Holshausen K, MacQueen GM, McKinnon MC. Systematic review of the neural basis of social cognition in patients with mood disorders. *Journal of Psychiatry & Neuroscience*. 2012 May.
15. Donohoe G, Duignan A, Hargreaves A, Morris DW, Rose E, Robertson D, Cummings E, Moore S, Gill M, Corvin A. Social cognition in bipolar disorder versus schizophrenia: comparability in mental state decoding deficits. *Bipolar disorders*. 2012 Nov;14(7):743-8.
16. McKinnon MC, Cusi AM, MacQueen GM. Impaired theory of mind performance in patients with recurrent bipolar disorder: moderating effect of cognitive load. *Psychiatry Research*. 2010 May 15;177(1-2):261-2.
17. Olley AL, Malhi GS, Bachelor J, Cahill CM, Mitchell PB, Berk M. Executive functioning and theory of mind in euthymic bipolar disorder. *Bipolar disorders*. 2005 Dec;7:43-52.
18. Rossell SL, Van Rheenen TE. Theory of mind performance using a story comprehension task in bipolar mania compared to schizophrenia and healthy controls. *Cognitive Neuropsychiatry*. 2013 Sep 1;18(5):409-21.
19. Langdon R, Coltheart M. Mentalising, schizotypy, and schizophrenia. *Cognition*. 1999 May 3;71(1):43-71.
20. Young RC, Biggs JT, Ziegler VE, Meyer DA. A rating scale for mania: reliability, validity and sensitivity. *The British Journal of Psychiatry*. 1978 Nov;133(5):429-35.
21. Montgomery SA, Åsberg MA. A new depression scale designed to be sensitive to change. *The British journal of psychiatry*. 1979 Apr;134(4):382-9.