Patients with bipolar disorder show impaired performance on complex tests of social cognition

Andrée M. Cusi [a,b], Glenda M. MacQueen [c], Margaret C. McKinnon [a,b,d],[*]

[a] Department of Psychiatry and Behavioural Neurosciences, McMaster University, Hamilton, Ontario, Canada
[b] Mood Disorders Program, St. Joseph's Healthcare Hamilton, Ontario, Canada
[c] Department of Psychiatry, University of Calgary, Calgary, Alberta, Canada
[d] Kunin-Lunenfeld Applied Research Unit, Baycrest, Toronto, Ontario, Canada

ARTICLE INFO

ABSTRACT

The literature concerning social cognitive performance in people with bipolar disorder (BD) reveals a mixed pattern of findings. We compared performance between patients with BD and matched controls on two social cognitive tasks that involved: (i) the decoding of mental states from pictures of eyes (Reading the Mind in the Eyes Test), and (ii) a video-based test that requires participants to discriminate social cues to make interpersonal judgments (Interpersonal Perception Task-15; IPT-15). We also sought to evaluate the association between symptom severity, social functioning, and social cognitive ability in patients with BD. Relative to controls, patients with BD were impaired at discriminating mental states from pictures of eyes and in making complex social judgments. Impaired responding on the IPT-15 was also associated with reduced psychosocial functioning. These results provide evidence of impaired performance on complex tests of social cognition in patients with BD. Impairments in social cognition may be associated with well-documented declines in the frequency of social interactions and development of interpersonal relationships found in this patient population.

© 2012 Published by Elsevier Ireland Ltd.

1. Introduction

Bipolar disorder (BD) is characterized by impairment in multiple domains, including interpersonal and social functioning (Elgie and Morselli, 2007; Depp et al., 2010). Recently, there has been increased interest in utilizing a social cognitive framework to understand the mechanisms underlying social impairment among patients with neuropsychiatric disorders (Bora et al., 2005; Olley et al., 2005; Lahera et al., 2008). Social cognition refers to the ability to perceive, understand, and respond to the intentions, behaviors, and dispositions of others (Brothers, 1990; Adolphs, 2001; Green et al., 2008). Social cognition encompasses a broad range of domains, including social perception, emotion recognition, theory of mind, and empathy. Recent theoretical models propose that this construct draws on both cognitive and affective processing resources (Leslie et al., 2004; McKinnon and Moscovitch, 2007). Indeed, emerging evidence suggests that cognitive processes such as executive functioning and affective components such as emotion recognition contribute to social cognitive performance (e.g., Bora et al., 2005; Brüne, 2005; Henry et al., 2006; Sabbagh et al.,

2006). Given that patients with BD demonstrate well-documented deficits on cognitive and affective tasks that tap these same central processing resources (Kurtz and Gerraty, 2009; Kohler et al., 2011), it appears likely that patients with BD will show performance deficits on measures of social cognition.

Here, we examined the performance of patients with BD on tests of theory of mind (ToM) and social perception. ToM is defined as the ability to infer the mental states of others, including their beliefs, emotions, and intentions in order to explain or predict their behavior (Premack and Woodruff, 1978). A significant component of ToM involves accurately decoding mental states from available perceptual social information such as a person's facial expressions, tone of voice, or gestures (Stone et al., 1998; Sabbagh, 2004). Social perception is an aspect of social cognition that involves identifying "social roles, societal rules, and social context" (Green et al., 2008, p. 1212). During social perception tasks, individuals must process and decode social cues (e.g., facial expressions, tone of voice, body language) to make inferences about complex social situations such as kinship and status (Green et al., 2008; Vaskinn et al., 2009). Taken together, these theoretical definitions reveal significant overlap, as well as distinct processes, involved in these key components of social cognition.

The majority of social cognition studies in BD to date have focused on facial emotion recognition tasks, which evaluate the accuracy of emotion perception conveyed in human faces (see

* Corresponding author at: Mood Disorders Program, St. Joseph's Healthcare, 100 West 5th Street, Box 585, Hamilton, ON, Canada L8N 3K7.
Tel.: +1 905 522 1155x35438; fax: +1 905 381 5610.
E-mail address: mmckinno@stjosham.on.ca (M.C. McKinnon).

Kohler et al. (2011) for a recent review). The results of these studies are not entirely consistent; with some studies reporting performance deficits (e.g., Yurgelun-Todd et al., 2000; Summers et al., 2006; Schenkel et al., 2007), and others demonstrating equivalent (Addington and Addington, 1998; Edwards et al., 2001; Lembke and Ketter, 2002; Venn et al., 2004; Malhi et al., 2007b; Vaskinn et al., 2007), and even enhanced facial emotion recognition performance in patients with BD relative to controls (Harmer et al., 2002). For example, a mood congruent bias in the appraisal of emotional facial expressions has been identified among patients with active depressive and manic symptoms (Gur et al., 1992; Lembke and Ketter, 2002; Lennox et al., 2004; Almeida et al., 2010; Douglas and Porter, 2010; Versace et al., 2010). Euthymic patients with BD also show generalized facial emotion recognition deficits (McClure et al., 2005), and emotion-specific impairments in recognizing fearful (Yurgelun-Todd et al., 2000) and surprised faces (Summers et al., 2006). Several studies report, however, that BD patients are equally as accurate as controls in identifying facial emotion (Addington and Addington, 1998; Edwards et al., 2001; Lembke and Ketter, 2002; Venn et al., 2004; Malhi et al., 2007b; Vaskinn et al., 2007). Affective prosody recognition among patients with BD has been also been shown to be impaired (Bozikas et al., 2007) and intact (Vaskinn et al., 2007). Preliminary evidence of altered empathic responding, defined as the ability to understand and respond to another's mental state (Decety and Jackson, 2004), has also been reported in patients with BD (Shamay-Tsoory et al., 2009; Cusi et al., 2010).

Research examining theory of mind (ToM) reveals similarly mixed findings. One study reported deficits in a combined sample of remitted patients with unipolar and bipolar depression on cognitively challenging ToM tasks that involve integrating and understanding the perspective of two characters simultaneously (i.e., second-order false-belief questions) but not on less challenging ToM tests that involve inferring the perspective of a single character (i.e., first-order false-belief question; Inoue et al., 2004). In patients with subsyndromal illness, however, deficits emerge on both first-order and second-order ToM questions; notably the magnitude of deficit observed here is greater for the more cognitively challenging second-order ToM tasks (McKinnon et al., 2010). Kerr et al. (2003) also reported deficits on both first- and second-order ToM tests in BD patients who were actively depressed or manic; remitted patients, however, were unimpaired. Recent reports also point towards performance deficits on cognitively demanding tests of mental state attribution (e.g., interpreting double bluffs, deception, and persuasions, and faux pas) among euthymic patients with BD (Olley et al., 2005; Lahera et al., 2008; Shamay-Tsoory et al., 2009). These particular tasks are considered cognitively challenging because they involve integrating and holding in mind the mental states of two or more characters. For example, detecting a faux pas (when someone says something they should not have said, not realizing their mistake is) requires the representation of both the person who committed the faux pas and the listener's mental state, as well as an understanding of the listener's feelings or emotional response to the faux pas (Brüne and Brüne-Cohrs, 2006). Taken together, these results suggest that ToM performance among patients with BD is likely moderated by a number of key variables, with more severe deficits emerging in patients with heightened illness severity and for ToM tasks of greater cognitive complexity.

In line with these findings, Bora et al. (2005) reported that, relative to matched controls, euthymic patients with BD showed impaired mental state discrimination on the Reading the Mind in the Eyes Task (RMET; Baron-Cohen et al., 2001), an advanced ToM task that involves inferring the mental state of a person from their eye gaze, and thus decoding the mental state depicted by the eyes' expression. Although the RMET limits the demands it places on

central processing resources because participants are not asked to retain information as it is a self-paced task, it is considered an advanced measure of ToM ability for several reasons: first, the RMET only includes complex mental states such as 'contemplative' and 'caution' to increase variability in performance. Second, participants must choose the correct mental state from one of four response options, increasing the ability to detect individual differences in performance. Third, the mental state distractor terms (response options) are matched closely in emotional valence to the target word, making it possible to detect subtle differences in performance (Baron-Cohen et al., 2001). In contrast to Bora et al.'s (2005) study, however, Shamay-Tsoory et al. (2009) reported that euthymic patients showed intact recognition of both basic and complex emotions depicted in sets of eyes. Importantly, Shamay-Tsoory et al.'s (2009) task may not have been as cognitively challenging for the patient sample, as participants were required to choose the most accurate mental state from one of two mental state descriptors, rather than four mental state words that are found in the original RMET task (Baron-Cohen et al., 2001). The performance of patients with BD in mood states other than euthymia on the RMET task is unknown.

Research examining the performance of BD patients on paradigms that are ecologically valid and that approximate real-world social cognition are widely lacking. One study by Montag et al. (2010) found that relative to controls, euthymic BD patients demonstrated impaired performance on the Movie for Assessment of Social Cognition, a test that requires participants to ascribe mental states to actors in everyday social situations. In a recent study, manic but not depressed patients showed significant deficits on another naturalistic video-based task involving the attribution of intentions to movie actors (Bazin et al., 2009). The Interpersonal Perception Task-15 (IPT-15) is an example of a measure that allows investigators to examine social perception in an ecologically valid and complex manner (Costanzo and Archer, 1993; Vaskinn et al., 2009). The IPT-15 assesses the participant's ability to accurately perceive diverse verbal and nonverbal cues (e.g., voice tone, gestures, haptics, posture, and facial expressions) in order to judge varied aspects of social situations, including kinship, intimacy, deception, competition, and social status (Costanzo and Archer, 1993; Vaskinn et al., 2009). The Kinship subscale assesses the participant's ability to determine the nature of the relationship between characters depicted on-screen (e.g., What is the relationship between the man and woman?). The Intimacy subscale involves assessing the level of intimacy between characters depicted on-screen (e.g., How long have they been dating, 2 weeks or 2 years?). The Status subscale involves determining the social status of the portrayed characters (e.g., Which person is the other person's boss?). The Deception subscale involves determining the veracity of the statements made by a single character (e.g., Which is the lie and which is the truth?). This subscale appears to overlap with the construct of ToM, given that accurate performance on this measure relies heavily on identification of the feeling state and thought processes of the depicted characters in order to detect deception. Moreover, the detection of deception is widely considered to be one aspect of ToM ability (e.g., Happe, 1994). The Competition subscale assesses the ability to determine who won a sporting match (e.g., Who won the racquetball game?). The IPT-15 Competition subscale also appears to tap constructs similar to ToM, since one must decode non-verbal and verbal cues to interpret that one individual feels "positive" towards winning and the other "negative" towards the loss.

Taken together, the literature concerning social cognitive performance in BD reveals a conflicting pattern of findings, highlighting the need for further investigation. The primary goal of the present study was to examine aspects of social cognition in