Journal of Affective Disorders 148 (2013) 400–405

Contents lists available at SciVerse ScienceDirect

Journal of Affective Disorders

journal homepage: www.elsevier.com/locate/jad

Research report

Does risk for bipolar disorder heighten the disconnect between objective and subjective appraisals of cognition?

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ARTICLE INFO

Article history:
Received 6 June 2012
Received in revised form
13 June 2012
Accepted 20 June 2012
Available online 9 August 2012

Keywords:
Bipolar
Self-appraisal
Cognition
Working memory

ABSTRACT

Background: Deficits in cognitive functioning have been associated with bipolar disorder during episodes of depression and mania, as well as during periods of symptomatic remission. Separate evidence suggests that patients may lack awareness of these deficits and may even be overly confident with self-appraisals. The extent to which these separately or together represent prodromes of the disorder versus a consequence of the disorder remains unclear. The present study sought to test whether risk for bipolar disorder in a younger, college-aged cohort of individuals would be associated with lower performance in cognitive ability yet higher self-appraisal of cognitive functioning.
Method: Participants ($N=128$) completed an objective measure of working memory, a self-report measure of everyday cognitive deficits, and a measure associated with risk for bipolar disorder.
Results: Contrary to expectation, risk for bipolar disorder did not significantly predict poorer working memory. However, a person's risk for bipolar disorder was associated with higher self-appraisal of cognitive functioning relative to those with lower risk despite there being no indication of a difference in ability on the working memory task.
Limitations: Participant recruitment relied on an analog sample; moreover, assessment of cognitive functioning was limited to working memory.
Conclusions: Results add to a growing body of evidence indicating that overconfidence may be part of the cognitive profile of individuals at risk for bipolar disorder.

1. Background

Bipolar disorder has consistently been ranked among the leading causes of disability worldwide (Ayuso-Mateos et al., 2006; Murray and Lopez, 1997). Episodes of depression and mania can cause serious disruption, but functional impairments occur even during periods of symptomatic remission (Dean et al., 2004; Tohen et al., 2000; Zarate et al., 2000).

Associated with such impairments are deficits in cognitive functioning, particularly during episodes of depression and mania (Martinez-Aran et al., 2004). During depressive periods, cognitive deficits have been found in attention (Burdick et al., 2009; Jongen et al., 2007; Tavares et al., 2003), executive functioning (Maalouf et al., 2010), working memory (Ali et al., 2000; Martinez-Aran et al., 2004), psychomotor functioning (Burdick et al., 2009), and memory (Fossati et al., 2004). Similar cognitive difficulties have been identified during manic phases of bipolar disorder (Bulbena and Berrios, 1993; Martinez-Aran et al., 2004; Murphy and Sahakian, 2001). Cognitive impairments tend to alleviate between episodes (Tohen et al., 2000), but may not entirely disappear (Dittmann et al., 2008; Maalouf et al., 2010; Rubinsztein et al., 2000; Torres et al., 2010; Yates et al., 2011).

The existence of cognitive impairments outside of episodes in people with bipolar disorder has led some to argue that they may represent endophenotypes for the disorder (Arts et al., 2008). A meta-analysis by Bora et al. (2009) found a series of cognitive impairments that could potentially represent cognitive endophenotypes, with impaired response inhibition being among the more prominent impairments. Other studies have found similar cognitive deficits in family members of individuals diagnosed with bipolar disorder (Christensen et al., 2006; Glahn et al., 2010), supporting the argument that they may be linked to a vulnerability to the disorder. The degree to which such deficits represent prodromes appearing early in the course of the disorder has been less studied.

Despite evidence that cognitive deficits occur in individuals with bipolar disorder during all phases of the illness, a parallel literature suggests that patients may lack awareness of these deficits. Burdick et al. (2005) found that patients with severe symptoms of bipolar disorder had difficulties in verbal learning and memory tasks, yet

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http://dx.doi.org/10.1016/j.jad.2012.06.029

their self-rating of these deficits was uncorrelated with their actual performance. van der Werf-Eldering et al. (2011) looked at the association between cognitive performance in multiple domains and cognitive complaints about their performance in 108 patients with bipolar disorder experiencing different phases of the illness. They found no association between self-report complaints and objective performance.

Findings of a disconnect between perceived functioning and actual performance may be part of a broader profile among individuals at risk for bipolar disorder in which self-appraisals may at times be overly optimistic. Johnson et al. (2005, 2009) have argued that individuals at risk for bipolar disorder intermittently set excessively high goals for themselves and overestimate their ability to achieve them. Several studies have found exaggerated expectancies of success among individuals at risk for bipolar disorder in the presence of reward (Johnson et al., 2005; Stern and Berrenberg, 1979).

These two literatures, one noting cognitive impairments and the other indicating unrealistic self-appraisals, have not been tested simultaneously in younger individuals at risk for the disorder. The latter is important: it can help to clarify the extent to which this profile represents a prodromal marker for the disorder versus a consequence of it. The present study, therefore, sought to test whether risk for bipolar disorder in a younger cohort of individuals would be associated with this twin profile (i.e., lower performance on an objective measure of cognitive ability, yet higher self-appraisal of cognitive functioning).

For the present study, risk for bipolar disorder was assessed using the Hypomanic Personality Scale (HPS; Eckblad and Chapman, 1986), a self-report measure shown to have predictive validity with respect to the development of bipolar disorder (Kwapil et al., 2000). With respect to cognition, multiple domains have been proposed to be linked to bipolar disorder, but the present study focused on potential deficits in working memory, which has been implicated in numerous studies of bipolar disorder (Barrett and Russell, 1998; Diwadkar et al., 2011; Gourovitch et al., 1999; MacQueen et al., 2005; Pan et al., 2011). We sought to compare the objective measure of working memory with a more subjective self-appraisal of cognitive functioning as reflected on the Cognitive Failures Questionnaire (CFQ; Broadbent et al.,1982), which asks individuals to rate errors in their everyday cognitive functioning including their memory.

Two specific hypotheses were tested: the first hypothesis was that risk for bipolar disorder as measured by the HPS would be associated with lower working memory scores, consistent with the claim that deficits in some cognitive functioning might represent endophenotypic markers for the disorder. The second hypothesis was that despite being associated with lower working memory scores, risk for bipolar disorder would be associated with over-estimation on self-appraisal of cognitive abilities as seen on the CFQ. Finding either effect in a younger, college-aged cohort would provide indirect support for the argument that these characteristics may represent a prodrome for the disorder.

2. Methods

2.1. Participants

One hundred and twenty-eight undergraduates from a large public university participated in the study for course credit. Participants were primarily female (65.6%) and young (M_{age}= 21.28 years, SD=4.93). The majority (51.6%) were Caucasian, although a significant number of participants were African-American (14.8%) or Asian (13.3%), as well as Hispanic (15.6%).

Participants met individually with an experimenter, who obtained written informed consent. Participants then completed the working memory tasks described below in a counter balanced order. They then completed the self-report measures. All procedures were reviewed and approved by the university's institutional review board.

2.2. Measures

2.2.1. Hypomanic Personality Scale (HPS)

The HPS (Eckblad and Chapman, 1986) is a 48-item self-report measure designed to identify individuals at risk of developing a manic episode. The instrument has good reliability (α=.87; test–retest reliability r=.81), good convergent validity with other measures of bipolar disorder and good discriminant validity with measures of social desirability (Eckblad and Chapman, 1986). Previous studies have found that high scores on the HPS were associated with increased risk of having had a hypomanic episode, with over 75% of scorers in the top 95th percentile meeting criteria for a bipolar spectrum disorder (Eckblad and Chapman, 1986). Moreover, HPS scores could predict onset of manic symptoms across a 10-year period (Kwapil et al., 2000).

More recent work has suggested that the HPS measures multiple dimensions (Schalet et al., 2011). Among them, the dimension of mood volatility, comprising 14 of the 48 original items, has been found to be most associated with psychopathology (Schalet et al., 2011). Items from this dimension measure negative emotion and hypomanic cognitions, including mood swings, irritability and racing thoughts and may be the most indicative of a risk for affective episodes.

2.2.2. Cognitive Failures Questionnaire (CFQ; Broadbent et al., 1982)

The CFQ is a 25-item questionnaire that measures the self-reported tendency of making cognitive errors in everyday life. Participants respond to each question by indicating how often they make an error for that item on a 5-point Likert scale, from 0 (never) to 4 (often). The CFQ is scored by summing the ratings for the 25 items, so that a higher score indicates a higher self-reported incidence of cognitive failures. The CFQ has been shown to have high internal consistency (α=.91) and is reliable over time (test–retest reliability r=.82; Wallace et al., 2002). High internal consistency was found in the current sample (α=.92). Disagreement exists over whether the CFQ is best analyzed as a single dimension (Broadbent et al., 1982; Merckelbach et al., 1996) or as composed of several distinct factors of cognitive failures (Rast et al., 2009; Wallace, 2004; Wallace et al., 2002). For the current study, the total score of the measure was used as a proxy for self-appraisal of everyday cognitive functioning.

2.2.3. Working memory capacity (WMC)

Two automated tasks, the Automated Operation Span Task (AOSPAN, Unsworth et al., 2005) and the Automated Reading Span Task (RSPAN, Daneman and Carpenter, 1980), were used to measure working memory capacity (WMC). Both tasks have been widely used and shown to have good psychometric properties. The AOSPAN has been shown to have high test–retest reliability (r=.83) and internal consistency (α=.78; Unsworth et al., 2005). The Automated RSPAN has been shown to have high test–retest reliability (r=.82; Redick et al. (2011)). The tasks required participants to maintain memory of a series of letters while completing a secondary task. In the AOSPAN task participants are required to verify the correctness of the solution to a simple mathematical equation (i.e., $(3\times2)+1=6$). In the RSPAN task participants are required to verify the meaningfulness of sentences (i.e., "The ship sailed across the dishwasher"). In the AOSPAN and the RSPAN,