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Self-reported cognitive problems predict employment trajectory in patients with bipolar I disorder

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Abstract

Background—Cognitive impairment in bipolar disorder has been associated with poor functional outcomes. We examined the relation of self-reported cognitive problems to employment trajectory in patients diagnosed with bipolar I disorder.

Methods—154 bipolar I disorder patients were followed for 15–43 months at the Bipolar Disorders Center for Pennsylvanians. Using a multinomial logistic regression we examined predictors of employment group including self-reported cognitive problems, mood symptoms, education and age. Cognitive functioning was measured via 4 self-report items assessing memory/concentration at baseline and termination. Employment status was recorded at baseline and termination. Employment was categorized as working (full-time, part-time, homemaker, volunteer) or not working (leave of absence, disability, unemployed, no longer volunteering) at each time point. Patients were categorized as good stable, improving, worsening and poor stable.

Results—Baseline self-reported concentration problems and years of education significantly predicted employment trajectory.

Limitations—Post-hoc analyses of existing clinical data

Conclusions—Self-reported concentration problems assessed in the context of specific areas of functioning may serve as a sensitive predictor of functional outcome in patients diagnosed with bipolar I disorder.

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Contributors: Dr. Kupfer, Dr. Frank and Dr. Fagioli designed the study and wrote the protocol. Dr. Gilbert managed the literature searches. Mr. Curet managed the data collection. Dr. Gilbert, Dr. Olin and Ms. Houck collaborated on the statistical analyses, and Dr. Gilbert wrote the first draft of the manuscript. All authors contributed and have approved the final manuscript.

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Keywords

Bipolar Disorder; cognitive function; functional outcome; employment

1. Introduction

Bipolar disorder is a chronic and severe mental illness with a lifetime prevalence of .3–1.5% (Bipolar I = .08%, Bipolar II = .5%) (Jacobson et al., 2008). Bipolar disorder has a substantial impact on psychosocial functioning and functional outcomes (Dean et al., 2004; Tohen et al., 2000; MacQueen et al., 2001). Approximately 55% of bipolar patients are unemployed despite an average of 13 years of education (Wingo et al., 2009).

A growing literature in bipolar disorder suggests that functional outcomes may be related to neuropsychological functioning (Wingo et al., 2009). There is increasing evidence that persistent, mood-independent, neuropsychological deficits exist in this clinical population (Gruber et al., 2007; Robinson et al., 2006). Specifically, patients with bipolar disorder exhibit poor performance on a variety of neuropsychological tests assessing executive function (i.e., working memory, inhibition and set-shifting), verbal and non-verbal memory, and attention (Clark et al., 2002; Malhi et al., 2004; Quarashi and Frangou, 2002; Sweeney et al., 2000). These cognitive deficits have been associated with a decline in work performance, employment status, global functioning and a longer clinical course (Dickerson et al., 2004; Gruber, et al., 2008; Martinez-Aran et al., 2004; Tabares-Seisdedos et al., 2008). A recent review revealed that only 12 published studies assess adequate patient samples and use appropriate methods to evaluate the relationship between cognitive function and functional outcomes (Wingo et al., 2009). Furthermore, these studies often fail to examine subsyndromal mood symptoms that account for a large portion of time spent ill (Judd et al., 2002; Post et al., 2003).

Our aim is to add to the few existing studies on cognitive function and functional outcome by using an innovative and sensitive method for assessing cognitive function in order to predict employment trajectory. Post-hoc, we examined self-reported cognitive problems using individual items from a mood questionnaire that assesses threshold level symptoms of unipolar and bipolar disorder. Patients were recruited from an existing population of bipolar patients openly treated for 15–43 months at the Bipolar Disorders Center of Pennsylvania (BDCP). We hypothesized that individuals who work consistently will report the fewest cognitive problems relative to those who work inconsistently or who are not working.

2. Methods

2.1 Participants

Participants included 154 adults meeting DSM-IV criteria for bipolar I disorder and openly treated for 15–43 months at the BDCP. The BDCP is a longitudinal, multi-center effectiveness treatment trial for patients with bipolar disorder. Inclusion criteria were age ≥ 18 years and DSM-IV diagnosis of bipolar I disorder on the Structured Clinical Interview for DSM-IV. Exclusion criteria were IQ < 70 as determined by clinical evaluation, current substance or alcohol dependence, organic mental disorder, and unstable or severe medical illness or other medical contradiction to treatment with mood stabilizers, antidepressants or antipsychotics, including pregnancy or breast feeding. Participants were prescribed psychotropic medications as part of their treatment. Medication classes included mood stabilizers, typical and atypical antipsychotics, antidepressants, benzodiazepines and stimulants.

The Institutional Review Board at the University of Pittsburgh reviewed and approved all study procedures. All participants provided written informed consent prior to their participation.

2.2 Procedures

Participants completed demographic information and mood symptom self-report questionnaires at study baseline and termination. For cases where mood data were not available at baseline or termination, information was supplemented with data most proximal to those time points. Medication and physician ratings of mood symptom severity were recorded at study baseline and termination.

Mood spectrum self-report questionnaire—The mood spectrum (MOOD-SR) is a 161-item self-report assessment (Fagiolini et al., 1999). The MOOD-SR uses a dimensional approach to assess threshold level symptoms of unipolar and bipolar disorder and atypical, temperamental and behavioral characteristics over the lifetime and the past month. Categorical responses (yes, no) from each of the following four items (q88, q90, q91, q92; (Cronbach's $\alpha = .85$)) were used to assess cognitive function in relation to daily functioning:

In the past week you have had periods of at least 3 days in which 88) you had problems with your memory such as finding the right word or remembering things that should have been easy to remember (not due to medications or physical illness); 90) you had difficulty making even minor decisions (such as what shirt to wear, what household tasks to do first); 91) you had a lot of trouble thinking or concentrating, such as taking part in a discussion, reading, writing, doing math, following a television program; and 92) you felt mentally dull or confused (not due to medications or physical illness).

Bipolar Disorder Visit Form—The BDVF is a structured clinical interview used by psychiatrists to evaluate: 1) existence of DSM-IV criteria symptoms of bipolar disorder in the week prior to the clinic visit; 2) physical symptoms and/or medication side effects; 3) current mental status; 4) Clinical Global Impression (CGI) of manic, depressed and overall severity ranging from well ($CGI \leq 2$) to severely ill ($CGI \geq 5$); and 5) Global Assessment of Functioning (GAF).

From the BDVF we gathered assessments of memory and concentration, CGI scores, and ratings of clinical status [recovered/recovering from a mood episode or non-recovered (subthreshold manic, manic, subthreshold mixed, mixed, subthreshold depressed, depressed)].

Demographic Characteristics—Education at study baseline was incorporated as a quasi-continuous measure and classified as less than high school, high school, some college/technical, college, and graduate. Age at study baseline and age of onset of mania and depression were recorded.

Medication Load—We attempted to control for the effects of medication using an existing measure of “medication load” (Versace et al., 2008). Medication load was developed to account for the number and dose of different medications for a participant. We used the *Physicians Desk Reference* each medication. The following values were used: 0= not taking, PRN; 1= less than or equal to the maximum dose; 2 = greater than the maximum dose. Medication load was the sum of all medication values for each participant.

2.3 Statistical Analyses

We categorized employment trajectory as working (full-time, part-time, homemaker, volunteer) or not working (leave of absence, disability, unemployed, no longer volunteering) at study baseline and study termination. Retired patients were excluded from analyses. We used these categories to create four groups intended to capture level of functioning 1) Good Stable (GS); 2) Poor Stable (PS); 3) Improving (IM); 4) Worsening (WO). The GS group was working at study baseline and termination, the PS group was not working at study baseline and

termination; the IM group was not working at study baseline and working at termination; the WO group was working at study baseline and not working at termination.

Multinomial logistic regression models were examined with this four-level variable as the dependent variables and GS as the reference category. We initially examined multinomial regression models with one independent variable at a time and then ran a second model including all independent variables significantly associated with employment status. Number of participants varied from 154–150 depending on missing data. The second model and final results included 148 participants because of missing data on 6 patients.

3. Results

A total of 69 (46.6%) patients were in the Good stable (GS) group and were employed at study baseline and termination, 45 (30.4%) patients were in the Poor stable (PS) group and were not working at study baseline and termination, 21 (14.2%) patients were in the Improving (IM) group and were not working at study baseline and working at termination, and 13 (8.8%) patients were in the Worsening (WO) group and were working at study baseline and not at termination. Age (mean = 44.14, SD = 11.97) age of onset of mania (mean = 25.77, SD = 11.37; $n=132$ as a result of missing data) and age of onset of depression (mean = 20.60, SD = 9.07; $n=140$ as a result of missing data) did not differ between groups (Kruskal-Wallis test; $X^2 < 7.06, p > .05$) (see Table 1).

Independent variables included in our regression model had a significant relationship ($p < .05$) with employment group in any group contrast: MOOD-SR item 91 at baseline, education, and age. The following variables were not included in the regression model: physician-rated memory and concentration, clinical status, CGI (mania, depression, overall), medication load¹, age of onset and gender.

Regression analyses (Table 2) determined that baseline self-reported cognitive problems were more often reported in PS versus GS groups [(OR = 2.51, CI = 1.12 – 5.68; $p = .03$; WO versus GS and IM versus GS ($p > .05$)]. Level of education was also a significant predictor of employment group; more educated patients were less likely to belong to the PS versus GS groups [(OR = 0.55, CI = 0.37–0.83; $p = .004$; WO versus GS and IM versus GS ($p > .05$)]. Age of onset of manic and depressive episodes was not significantly correlated with level of education ($r < 0.10, p > .05$).²

Interestingly, baseline self-reported cognitive problems but not baseline physician-rated concentration and memory problems predicted employment group despite a significant correlation between these variables ($r = .30, p = .001$). This result may suggest that MOOD-SR is a more sensitive measure because it examines cognitive function in the context of functional impairment. Alternatively, informant and self-report assessments may produce only weak correlations because they have differential validity.

4. Discussion

In order to contribute to the limited literature on cognitive function and functional outcomes in bipolar disorder, post-hoc we examined self-reported cognitive problems among patients

¹Since medication may have a significant impact on cognitive function we included medication load in our model as an additional check for relation with employment group. Medication load was not significantly related to employment group (OR = .80, CI = .59–1.30; $p > .10$).

²When participants above the retirement age (> 65 year old; $n=4$) were excluded we obtained similar results in our regression [MOOD-SR: PS versus GS groups (OR = 2.42, CI: 1.07–5.48; $p = .03$); Education: (OR = 0.54, CI: 0.36 – 0.81; $p = .003$)] and correlation analyses ($r < .07, p > .05$).

with bipolar disorder treated in an existing outpatient clinic. We used a sensitive self-report instrument to assess the presence or absence of threshold cognitive problems. We found that both a specific self-report item assessing cognitive problems at baseline and level of education significantly predict the likelihood of a good stable versus poor stable employment trajectory. The ability to predict employment trajectory using a specific item from the MOOD-SR points to the sensitivity of this measure and may suggest that cognitive problems are more likely to predict employment trajectory if assessed in the context of specific limitations in functioning. Since the nature of occupational functioning among full-time homemakers is unclear our report may under/over-estimate the association between MOOD-SR and employment trajectory. Age and age of onset were not significant predictors of functional outcome, suggesting that cognitive decline associated with normal aging and illness chronicity do not account for these results. We did not find a significant relationship between mood state and employment trajectory. Related research has found that depressed mood state accounts for a larger number of lost work days per ill worker annually among patients with bipolar versus unipolar depression (Kessler et al., 2006). Other literature has also focused on depressed state as an important factor contributing to employment status (Rosa et al., 2009). Our inability to detect a significant relationship between mood state and functional outcome may be because we did not consider duration of mood symptoms along with symptom severity.

Our results are consistent with prior work suggesting a relationship between cognitive function and employment (Altshuler et al., 2007; Dickerson et al., 2004; Mur et al., 2008; Wingo et al., 2009). While the majority of the literature relating cognitive function and functional outcomes in bipolar patients has employed objective neuropsychological measures, a subset of work has examined self-reported cognitive problems. Recent work found that subjective cognitive complaints were associated with longer duration of bipolar illness and number of mood episodes. Patients with more complaints also had poorer neuropsychological and occupational functioning (Martinez-Aran et al., 2005). In contrast, another study found that self-reported cognitive problems were not correlated with objective cognitive measures (Burdick et al., 2005). Findings may differ because of the nature of the items used to examine self-reported cognitive problems. Items assessing cognition in the context of specific areas of functioning may be better predictors of functional outcome. Although findings vary, subjective cognitive problems may be an important indicator of treatment seeking and treatment adherence, thus affecting functional outcomes.

Future research examining objective and subjective cognitive and functional measures across syndromal and subsyndromal mood states in patients with bipolar disorder is warranted.

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Table 1

Demographics

Employment Group	Good Stable	Improving	Worsening	Poor Stable	Chi-square	df	p-value
Gender (M,F)	24,45	4,17	4,9	23,22	3.04	3	0.39
Age (mean (SD); range)	45.7(12.5); 21–78	42.4(10.5); 19–59	47.0(8.4); 31–61	41.6(12.3); 19–59	7.05	3	0.07
Onset Depression (mean (SD); range)	26.4(12.4); 12–76	25.8(9.8); 13–49	23.4(8.8); 17–43	25.4(11.4); 13.53	1.56	3	0.67
Onset Mania (mean (SD); range)	20.4(8.3); 6–39	19.8(10.3); 7–47	21.3(8.5); 14–44	21.0(10.0); 10–53	1.07	3	0.79

Table 2

Multinomial Logistic Regression

Employment Group (n=148)	Good Stable (n=69)	Improving (n=21)	Worsening (n=13)	Poor Stable (n=45)	Group Contrast	Odds Ratio	CI	p-value
Education								
Less than High School (n)	0	0	0	3	PS vs GS	0.55	0.37–0.83	0.004*
Some High School (n)	12	5	2	13	IM vs GS	0.98	0.94–1.02	0.23
College/Technical School (n)	17	7	6	17	WO vs GS	0.78	0.43–1.42	0.42
College (n)	25	7	3	8				
Graduate (n)	15	2	2	4				
MOOD-SR item 91 (yes, no)								
yes (n)	43	14	8	19	PS vs GS	2.51	1.12–5.68	0.03*
no (n)	23	17	5	26	IM vs GS	0.98	.342–2.80	0.97
					WO vs GS	1.21	.353–4.13	0.76

Abbreviations: GS=Good Stable, IM=Improved, WO=Worsened; PS=Poor Stable; *p < 0.05