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Evidence of weekly cyclicity in mood and functional impairment in those with a bipolar disorder

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ABSTRACT

A key characteristic of bipolar disorder is fluctuation in mood symptoms and functional capacity, yet assessment of bipolar symptomatology often relies heavily on interval measurement that is unable to capture the full range of daily symptom variability and severity. The current study provides a detailed analysis of the variability in mood symptoms, functional impairment and medication compliance in a large sample of individuals newly diagnosed with bipolar disorder. Individuals diagnosed with bipolar disorder in the previous 12 months ($n=192$) rated their mood, functional impairment, medication compliance and symptom triggers daily over 10 consecutive weeks. High mood, low mood and functional impairment were found to vary on a weekly cycle, independently of medication compliance. Low mood and functional impairment were worse on weekdays, particularly Mondays and Tuesdays, whereas mood was most elevated on Saturdays. Work-related stressors were the most common symptom triggers on weekdays, whereas sleep-related problems and positive social events were the most common triggers on weekends. This study provides evidence that individuals newly diagnosed with bipolar disorder experience fluctuations in mood and functioning that vary according to a weekly cycle. This finding has implications for the assessment and treatment of patients, and for future research.

1. Introduction

The bipolar disorders are chronic conditions with international lifetime prevalence rates quantified by Merikangas et al. (2011) as 0.6% for bipolar I and 0.4% for bipolar II. While having strong genetic origins (Nurnberger and Gershon, 1992), mood symptoms are significantly linked with psychosocial triggers (for reviews see Johnson and Roberts (1995), Proudfoot et al. (2010)).

Studies of bipolar symptomatology often rely on cross-sectional self-report measures and fixed-interval weekly to monthly assessments by clinicians (e.g., Simon et al., 2007). However, bipolar disorder involves multiple systems, such that symptom severity, length and frequency of mood episodes, pattern of polarity and time spent in recovery between episodes differ substantially both within and between individuals (Müller-Oerlinghausen et al., 2002; Judd et al., 2003), and mood symptoms can vary substantially on a daily basis (Gottschalk et al., 1995). Reliance on standard interval measures does not capture the full extent of mood variability, or the way in which symptoms fluctuate in accordance with environmental factors on a day-to-day basis. Indeed, discrepancies between weekly clinician ratings of symptoms and patient daily self-ratings are not uncommon. For example, Denicoff et al. (1997) found that weekly clinician ratings captured only 31.4% of days of depression and 14.1% of days of mania recorded by patients completing daily self-ratings.

Assessment of finer-grained patterns in mood variability can be achieved by daily monitoring of mood and functioning. Paper-based mood charts such as the National Institute of Health's Life Chart Method (Leverich and Post, 1996; Denicoff et al., 1997) and the STEP-BD Mood Chart (Sachs et al., 2003) provide a means for capturing the frequency, duration, polarity and intensity of mood symptoms, and are also helpful for identifying triggers.

The use of mood charts as outcome measures has revealed additional information that has been missed with cross-sectional measures. A modified version of the Life Chart Method – the Patient Mood Chart (PMC; Parker et al., 2007) – was used to measure mood swings in bipolar patients over the course of a 9-month antidepressant trial. Cross sectional measures showed that the severity of depression and hypomania decreased when patients were taking the active drug relative to the placebo,

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however the data captured by the PMC revealed that the active drug also resulted in a reduction in the number of depression episodes, the longest episode of hypomania and the number of days impaired, revealing a more detailed picture of treatment outcome than the cross-sectional measures. The use of daily mood charts as an assessment tool therefore adds a valuable component to treatment studies of bipolar disorder.

Despite the potential benefits, however, few studies have examined patterns of mood variation in individuals with bipolar disorder using daily mood charts. Furthermore, existing studies have typically employed case study designs (Jenner et al., 1967), small samples ($n=7$) of individuals with rapid cycling bipolar disorder (Gottschalk et al., 1995), or have focused only on the relationship between mood and triggers of bipolar symptoms – such as sleep disorder (Bauer et al., 2006) or phases of the menstrual cycle (Shivakumar et al., 2008). No research to date has examined daily patterns of mood and functioning in a large sample of individuals with bipolar disorder, nor the environmental triggers associated with mood shifts in people newly diagnosed with the condition. This is a significant gap in the literature, as identifying patterns to mood symptoms can significantly reduce the impact of the illness (Berk et al., 2010), particularly by identifying targets for wellbeing plans. Therefore, the aim of the current study was to undertake a detailed analysis of mood symptoms, functional capacity, medication compliance and environmental triggers in a large sample of individuals newly diagnosed with bipolar disorder, using daily monitoring.

2. Method

2.1. Design

The current exploratory study was conducted within the context of a broader randomised controlled trial (RCT) examining the effectiveness of an online psychoeducation program for individuals newly diagnosed with bipolar disorder. A total of 419 participants were randomly assigned to receive an online psychoeducation program, an online program with adjunctive peer support or to a waitlist control group. Although no group differences were found at post-intervention or follow-up, those receiving peer support showed higher adherence to the program and slightly lower depression and impairment levels at a 6-month follow-up. Full details of the RCT are available in Proudfoot et al. (2012). In the present study, RCT participants who completed at least 75% of their mood charts over 10 weeks ($n=192$) were included for analysis. All procedures were approved by the UNSW Australia Human Research Ethics Committee.

2.2. Participants

Participants were recruited through the Black Dog Institute Mood Disorders Clinic, the Black Dog Institute website, various mental health organizations and practitioners, as well as advertisements placed in the print media. Inclusion criteria were: aged 18–75 years, diagnosed with bipolar disorder by a mental health professional in the past 12 months, currently being treated for bipolar disorder by a mental health professional, able to read and write in English, and living in Australia. Diagnosis was further confirmed using the Mood Swings Questionnaire (MSQ-27; Parker et al., 2006), a 27-item self-report scale with individuals scoring 22 or above having a high probability of bipolar disorder. Using this cut-off score, the MSQ-27 has been shown to have 80.9% sensitivity and 98.2% specificity in differentiating individuals with bipolar disorder from those with unipolar depression (Parker et al., 2006). Participants were excluded if they were not currently under the regular care of a mental health professional.

2.3. Measures

2.3.1. Patient Mood Chart

The Patient Mood Chart (PMC; Parker et al., 2007) is a paper-based mood chart on which participants record their daily mood, functional impairment and medication compliance. Three categories of mood state are monitored: 'OK' (indicating euthymia), 'low' (depression) and 'high' (hypomania/mania). A score of zero is used to indicate euthymia (i.e., feeling "average" or "normal"), while 'low' and 'high' moods are rated for intensity from 1 (*mild*) to 3 (*severe*), with severe defined as "the worst you have ever been for any episode". Participants had the option of recording both high and low mood in the one day. Functional impairment is rated from 0 (*no functional impairment*) to 3 (*severe impairment*) according to how severely their mood symptoms had impacted on functional capacity on that day. Medication compliance is also rated on a scale of 0–3, where 0 indicates that no medication was prescribed, 1 indicates that no medication was taken, 2 indicates that some medication was taken, and 3 indicates that all medication was taken. Participants are also given space in the PMC to record factors that they believe may have precipitated their mood symptoms each day. These include people, places, events or activities that were deemed by the participant to have "triggered" their mood symptoms in some way. In each of the three RCT conditions participants were asked to complete the PMC daily for 10 consecutive weeks.

2.4. Statistical analyses

Univariate Analyses of Variance (ANOVA) were used to test for group differences in mean lows, highs, functional impairment and medication compliance. Analyses revealed no group differences in the PMC data (all $Ps > 0.05$), so the data were aggregated for further analysis of the whole sample. Average daily highs, lows, functional impairment and medication compliance across the 10-week period were plotted and visually inspected for trends in the data. In addition, symptom triggers were categorized into 20 themes by the second author (see Appendix A for the full list of categories and examples). These themes were not determined a priori, but rather, emerged from the participant's description of triggers. A random sample of 10% of the triggers was also thematically categorized by the first author to ensure rating reliability. The frequency with which each trigger category occurred was then totaled for each day of the week and expressed as a percentage of all triggers listed for that day of the week.

3. Results

Clinical characteristics of the participants included in the current analysis relative to the remainder of the RCT sample are shown in Table 1. On inspection of symptom variability across the 10-week period, low mood in particular appeared to show cyclical variation across the separate weeks of the intervention, with the most severe lows occurring early in the week and the least severe occurring on or close to the weekend. Post-hoc analyses were therefore conducted to test for weekly cyclicity in PMC variables. Mean scores for highs, lows, functioning limitation and medication compliance for each day of the week (i.e., Monday-Sunday) over

Table 1
Baseline clinical characteristics of the current sample relative to the remainder of the RCT participants.

Variable	Current sample		Remainder of RCT sample		Inferential statistics			
	M	S.D.	*M*	S.D.	d.f.	*F*	eta	*p*
Depression[a]	6.38	2.14	6.60	2.00	356	0.98	0.00	0.32
Anxiety[a]	7.01	2.15	6.95	2.17	352	0.08	0.00	0.78
Self Esteem[b]	27.24	5.21	27.35	5.68	356	0.04	0.00	0.84
Work and Social Adj.[c]	22.76	9.05	24.52	7.85	358	3.88	0.01	0.05
Life Satisfaction[d]	14.42	6.93	14.21	6.81	360	0.08	0.00	0.78
Health Locus of Control[e]								
Internal	23.24	4.93	23.20	4.66	359	0.01	0.00	0.93
Powerful Others	17.81	5.60	16.60	5.36	357	4.56	0.01	0.03
Chance	18.14	5.25	17.70	5.02	359	0.66	0.00	0.42
Control[f]	3.09	2.35	3.36	2.23	357	1.30	0.00	0.26
Understanding[f]	4.94	2.52	4.74	2.57	358	0.52	0.00	0.47
Stigma[g]	5.92	3.65	6.48	3.01	358	2.56	0.01	0.11

[a] Goldberg Anxiety and Depression Scale (Goldberg et al., 1988).
[b] Rosenberg Self-Esteem Scale (Rosenberg, 1965).
[c] Work and Social Adjustment Scale (Mundt et al., 2002).
[d] Satisfaction With Life Scale (Diener et al., 1985).
[e] Multidimensional Health Locus Of Control (Wallston et al., 1978).
[f] Brief Illness Perception Questionnaire (Broadbent et al., 2006).
[g] Participants rated 0 (*Strongly Disagree*) to 10 (*Strongly Agree*) the extent to which they agreed with the statement "I do not tell people I have bipolar disorder, as they will think negatively of me".