



# The dimensional structure of cycling mood disorders

Lloyd Balbuena<sup>1</sup>, Marilyn Baetz, Rudy C. Bowen\*

Department of Psychiatry, University of Saskatchewan, 103 Hospital Drive, Saskatoon, Saskatchewan, Canada S7N 0W8



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## ABSTRACT

This study examines whether mood disorders differ fundamentally in terms of phase duration. Most clinically significant mood disorders are recurrent and cyclical. The phase duration of these cycles is part of the diagnostic criteria. Specifically, we determined whether a dimensional or taxonic latent structure better captures cycling mood disorders. 319 patients recruited from 5 psychiatrists and a psychoeducational program completed three questionnaires assessing aspects of mood cycling. These were the Affective Liability Scale-Short Form (ALS-SF), Mood Disorders Questionnaire (MDQ), and the Eysenck Neuroticism scale. Patient scores on these instruments were submitted to three taxometric procedures (MAMBAC, MAXEIG, and L-Mode). Comparison curve fit indices (CCFIs) were calculated to distinguish taxonic versus dimensional latent structure. In addition, graphs were produced for each procedure and compared with those of categorical or dimensional prototypes. The CCFIs of the three procedures ranged from 0.25 to 0.27, consistent with dimensional structure. The graphs closely resembled dimensional prototypes. Mood instability and other types of cycling moods probably conform to a dimensional latent structure. Patients with disorders featuring mood cycling might benefit from common treatments.

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## 1. Introduction

The phase duration of low or high mood disorders is used by psychiatry to differentiate between mood disorders. If mood is stuck at severe low levels for two weeks or two years and no switch to high mood is reported, the diagnosis is major depression or persistent depressive disorder (American Psychiatric Association, 2013). Switching into elevated mood for one week characterizes mania, four days hypomania and shorter durations are referred to as brief hypomania or the bipolar spectrum (Angst, 1998; Cassano et al., 1999; American Psychiatric Association, 2013). In general, the DSM system shifted emphasis away from fluctuations in mood to a checklist of symptoms (Goodwin et al., 2007; American Psychiatric Association, 2013). However, the symptom differences between different categories of elevated mood (and depressed mood) are small, and syndrome severity appears to be continuous, so the diagnosis depends largely on where the cut in duration is made (Fiedorowicz et al., 2011;

American Psychiatric Association, 2013). Consequently, patients are assigned to diagnostic categories, which are assumed to have clearly defined boundaries. The critical question however is whether treatment and research are improved by these apparently arbitrary cuts in phase (Cassano et al., 1999).

Defining what is meant by indicators, latent variable, taxon and category may be helpful to the general reader in understanding the taxometric method. Indicators are conditions such as fever or high blood pressure that are perceptible by the senses or with the aid of medical instruments. Latent variables such as aggression or mood instability (MI), on the other hand, can only be indirectly or partly inferred from more concrete phenomena such as yelling or facial expressions. MI is defined as frequent fluctuations of mood over time, which may be as brief as a few hours (Trull et al., 2008). It is usually identified with the borderline personality disorder (Marroquin, 2011) but has also been studied in patients with mood and anxiety disorders (Bowen et al., 2006), personality disorders (Trull et al., 2008), psychotic disorders (Marwaha et al., 2014) and in university students (Eid and Diener, 1999). Of crucial importance to our argument is the distinction between taxonic and dimensional structure. The distinction is captured by the intuitive notions of “differing in kind” (taxonic) and “differing by degree” (dimensional). Our concern is with *latent* structure, since categories such as “hot” or “cold” are artificially created by an arbitrary cut in temperature, which is continuous. As another example, “reptiles” and “mammals” are taxonic because they do not simply

*Abbreviations:* ALS, Affective Liability Scale; CCFI, comparison curve fit indices; ENS, Eysenck Neuroticism Subscale; L-Mode, latent mode factor analysis; MDQ, Mood Disorders Questionnaire; MI, mood instability; MAMBAC, mean above minus below a cut; MAXEIG, Maximum eigenvalue

\* Corresponding author. Fax: +1 306 844 1504.

E-mail address: [r.bowen@usask.ca](mailto:r.bowen@usask.ca) (R.C. Bowen).

<sup>1</sup> Present address: Administrative Data Research Centre—Wales, Swansea University, Swansea, Wales SA2 8PP, United Kingdom.

differ by degree. They differ by degree in body temperature but there are innumerable and more fundamental differences.

A taxonic structure may characterize the domain of mood disorders across diagnostic categories, but the boundaries are debatable. First, the distinction between “normal” people and people with mental disorders is usually made by applying a “distress or impairment” criterion to distinguish the group with mental disorders (American Psychiatric Association, 2013). The second is the distinction between regular psychiatric disorders and personality disorders. Terms that are applied to personality disorders like “enduring” “relatively stable across time” and “inflexible and pervasive” imply a stable course so phase duration is not specified (American Psychiatric Association, 2013). The third is the distinction between unipolar and bipolar mood disorders because of the shift to elevated mood in bipolar disorders (Perlis et al., 2011; Phillips and Kupfer, 2013). The boundary between unipolar and bipolar disorders is disputed and the demonstration of MI in patients with unipolar disorders further muddles the distinction (Bowen et al., 2004). Fourthly, within the broad category of major depression two subtypes called “melancholic” and “atypical” are contrasted. The first is characterized by “the lack of reactivity to usually pleasurable stimuli” while the latter shows “mood reactivity in response to actual or potential positive events.” (American Psychiatric Association, 2013). Our main concern in this paper is whether the categories formed using these distinctions are warranted.

Three recent papers addressing the latent structure of elevated moods reached different but reconcilable conclusions. Meyer and Keller (2003) conducted a taxometric analysis of hypomania in two large samples (young adults in one, and adolescents in the other) and concluded that hypomania has a dimensional latent structure. Their study used the Hypomanic Personality Scale as the sole indicator of hypomania (Eckblad and Chapman, 1986). Ahmed et al. (2011) examined the latent structure of mania using the Collaborative Psychiatric Epidemiological Surveys ( $n > 20,000$ ). Three indicators of mania were used, each of which covered a separate symptom domain of mania defined by DSM-IV. In addition to mania, the researchers also assessed unipolar depression using another set of indicators. The authors concluded that a taxonic solution better fits the data but that significant dimensional variation within groups reflecting illness severity remained. Prisciandaro and Roberts (2011) used three different modeling strategies to analyze data from the Epidemiologic Catchment Area study and all lines of evidence converged on a dimensional solution for mania. It seems reasonable to conclude, at the minimum, that mood problems are dimensional within a homogeneous group of individuals. Whether the population as a whole is homogeneous remains to be seen.

Given these inconsistent results and the disputable categorization of mood disorders, our hypothesis was that elevated mood has a dimensional latent structure.

## 2. Methods

### 2.1. Sample

The sample was a mixed group of outpatients from two main sources. The first group came from the practices of 5 general psychiatrists. A second group was composed of outpatients referred to a psycho-educational mood program. Patients were asked to complete a questionnaire consisting of 13 short scales before their first appointment and to bring this to the first appointment. All patients gave written consent for the use of their data for research. The study was approved by the University Behavioural Ethics Board.

**Table 1**  
Descriptive statistics of participant scores in 5 instruments.

	<i>n</i>	Mean (SD)	Range	Skewness
Mood Disorders Questionnaire <sup>a</sup>	321	6.42 (3.94)	0–19	0.23
Affective Lability Scale <sup>a</sup>	318	40.33 (13.94)	3–72	0.08
Short Eysenck Neuroticism Scale <sup>a</sup>	316	33.51 (8.78)	12–48	–0.46
PHQ-9	320	12.89 (7.52)	0–27	0.01
Penn State Worry Scale	326	39.36 (13.29)	12–60	–0.35

<sup>a</sup> Participant scores in these three instruments were used in taxometric analysis.

We started with 345 participants but because of missing data in some questionnaires, the sample size was reduced to 319. The average age was 34.80 years and 52 per cent of our sample was female. Sixty-four percent scored 10 or higher on the PHQ-9 questionnaire, indicating depression in the range typical of patients diagnosed with major depression (Manea et al., 2012; American Psychiatric Association, 2013). Forty-seven percent scored seven or higher on the MDQ indicating possible hypomania (Hirschfeld et al., 2000). This is consistent with recent estimates of the proportion of patients with mood syndromes who report hypomanic symptoms (Angst, 2006; Zimmerman et al., 2010). Sixty-three percent scored 45 or higher on the Penn-State Worry Questionnaire (Meyer et al., 1990). This indicates the proportion of patients who reported high worry, but is not necessarily the same as generalized anxiety disorder because worry is common in major depression (Salzer et al., 2009). Table 1 shows the distribution statistics for the relevant scales.

### 2.2. Indicator construction

We used three psychometrically validated scales measuring various aspects of mood instability—the Affective Lability Scale-Short Form (ALS-SF), the Mood Disorders Questionnaire (MDQ), and the Eysenck Neuroticism Subscale (ENS). The 18-item ALS-SF (Oliver and Simons, 2004) is an abridged version of the original instrument (Harvey et al., 1989) and assesses switches in moods across three factors: anxiety/depression, depression/elation, and anger. The MDQ (Hirschfeld et al., 2000) is a 15-item self-report instrument to assess switches to elevated or activated mood. Only the 13 symptom questions were used since it was not our objective to make a diagnosis but to study the indicators. The MDQ was developed to aid the recognition of bipolar I and II disorders (Hirschfeld et al., 2003). There are mixed opinions regarding its usefulness (see Zimmerman and Galione, 2011 for a review), with some studies questioning its usefulness for patients with impaired insight (Miller et al., 2004), and in distinguishing between bipolar I and II (Vieta et al., 2007). The ENS is composed of 12 questions that assess fluctuating mood and anxiety and depression. We used the ENS because it contains the MI factor that has been shown to predict suicidal ideation (Bowen et al., 2011). The Cronbach alphas were 0.94, 0.91, and 0.88 for the ALS-SF, ENS, and MDQ respectively. The items in each scale were summed to better meet the requirement for continuous variables in taxometric analysis.

### 2.3. Suitability of taxometric analysis

We assessed the suitability of our data for taxometric analysis in two ways: first, by estimating the taxon base rate and second, by evaluating the reliability and validity of our indicators. Data with base rates lower than 0.5 are suboptimal for detecting a taxon (Meehl, 1995). Since the MDQ instrument provides the threshold score of 7 for hypomania, we used it as a criterion for estimating our taxon base rate of 0.46, which is very close to the ideal. Our indicators had acceptable skewness. Then, we examined

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