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Original article

Latent structure of the symptomatology of hospitalized patients with bipolar mania

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ABSTRACT

Several studies have attempted to understand the dimensions of psychiatric symptoms in manic episodes, but only a few have been able to model the latent structure of mania in bipolar disorder patients using confirmatory factor analysis. The objective of the present study was to search for the best model of the symptomatology of hospitalized manic patients. To achieve this goal, 117 manic inpatients during a manic crisis participated in this research. Exploratory factor analysis was conducted followed by confirmatory factor analysis using an exploratory factor analysis solution and three other theory-based models. The exploratory factor analysis results revealed a six-factor structure: depression, suicide, insomnia, mania, psychosis, and anxiety. This solution also presented the best fit to the data when tested with confirmatory factor analysis. A five-factor solution, without suicide as a separate dimension, appeared to be more theoretically suitable. Another important finding was that anxiety was an independent dimension in mania. Some hypotheses are discussed in light of contemporary theories, and future studies should investigate this aspect further.

1. Introduction

Until 2013, bipolar disorder was classified as a mood disorder characterized by manic and depressive episodes. This means that modern diagnostic criteria according to the International Statistical Classification of Diseases and Related Health Problems, 10th revision (ICD-10) [60], and Diagnostic and Statistical Manual of Mental Disorders, 4th edition (DSM-IV) [3], strongly relied on the definition of manic symptoms as increase on mood states other than excessive activation, such as: elation, inflated self-esteem, and excessive involvement in pleasurable activities that have a high potential for painful consequences. Regardless, the hallmark indicated by those two criteria for bipolar disorder are manic episodes as they are enough to ascertain a valid diagnosis. In 2013, the 5th edition of the DSM (DSM-V) abolished the mood disorder classification, differentiating bipolar disorder from depressive disorders [4]. Several studies have discussed the symptomatology of bipolar patients, questioning whether this classic classification relies on empirical evidence [53,54,57,55,46,35]. Based on this and other evidence, the DSM-V includes an increase in energy/activity to the same degree as mood changes when considering manic or depressive episodes in bipolar disorder [4].

Although bipolar disorder is known to present two distinct mood poles, depression and mania, evidence suggests that it is possible to find depressive symptoms in patients during manic episodes and vice versa. The DSM-IV suggested a mixed state in bipolar disorder patients [3,56,14], but to have this diagnosis, the patient needed to fulfill the diagnostic criteria of both episodes at the same time. One hypothesis in the psychiatric literature is that bipolar disorder is not a mood disorder but rather an energy/activation disorder [17,38,32,2,7], which justifies the changes in the DSM-V, which considers an increase in activity as a symptom that is as important as elation and grandiosity [4].

To show the latent structure of bipolar disorder symptomatology, several authors have used factor analysis to organize symptoms into dimensions [15,50,12,28]. One of the most used measures in clinical psychiatry to understand these symptoms is the Schedule for Affective Disorders and Schizophrenia (SADS)

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[22]. The SADS was initially proposed as a structured interview for psychiatric diagnosis based on the Research Diagnostic Criteria (RDC), measuring four dimensions of psychiatric symptoms: depression, anxiety, mania, and psychosis. A different version – called the changed version (SADS-C) – with 36 items and the same factorial structure, was suggested to help screen the severity of mental disorders in the clinical context because it presents an ordinal scale for assessing each symptom [52].

The SADS-C is an interesting measure to assess the latent structure of symptoms. Understanding the dimensions of symptoms in a disease can help focus future treatment efforts in the symptomatology found in the factor analysis. For example, Johnson et al. [35] theoretically suggested that the SADS-C shows only three dimensions: depression, mania, and schizophrenia. In manic episode patients, Swann et al. [53] used cluster analysis and found six factors: impulsivity, anxious pessimism, hyperactivity, distress appearance, anger/hostility, and psychosis. These dimensions of manic episodes are relatively well known, with the exception of anxiety. Regardless, much evidence supports the presence of anxious symptoms in manic patients [14,24,51,13].

Clusters analyses are a wide variety of techniques for deriving natural groups (or clusters) in data sets. This means that variable cluster analysis, in addition to having a more clear organization of items into groups, tends to present more clusters than exploratory factor analysis (EFA), thus decreased parsimony [23,10]. Confirmatory factor analysis (CFA) has the advantage over variable cluster analysis of allowing the testing of several theoretical hypotheses with the empirical data. Confirmatory factor analysis also permits researchers to find the most precise and parsimonious theoretical model, which is usually difficult to accomplish with variable cluster analysis [6]. Finally, CFA does not rely on distance metrics used by cluster analyses, which can be misleading on ordinal data sets [44].

Rogers et al. [46] analyzed empirical SADS-C data from two clinical samples of prison inmates using CFA. The SADS-C showed a four-factor solution in both samples: dysphoria, psychosis, mania, and insomnia. Despite the results of Rogers et al. [46], no studies of CFA have used the SADS-C to understand the underlying structure of psychiatric symptoms in bipolar disorder during a manic episode. This was the objective of the present study. We assessed different models of symptomatology based on the SADS-C using CFA in a sample of hospitalized manic patients.

2. Methods

2.1. Participants

A total of 117 manic inpatients during a manic crisis participated in this study. The study was conducted in the infirmary of the Psychiatry Institute of the Federal University of Rio de Janeiro, Brazil. Sample's characteristics are depicted on Table 1 and are similar to other studies in Brazil using hospitalized manic patients [42,11,19]. The local ethical committee approved the study, and all of the patients gave verbal consent (Table 1).

2.2. Procedures

Patients who were hospitalized from June 2010 to August 2011 were evaluated using the Mini International Neuropsychiatric Interview (MINI) [59], a structured interview that allows the formulation of psychiatric diagnoses according to the criteria of the DSM-IV [3] and ICD-10 [60], which was validated and translated to Brazilian Portuguese [5]. In cases in which the same patient was hospitalized more than once during the study period, only the first hospitalization was considered. The patients who met the criteria for an actual manic episode were administered the Brazilian version of the SADS-C [26]. Both the MINI and SADS-C were applied in the first 7 days of psychiatric hospitalization for each patient. All of the evaluators were psychiatrists who received training on the use of these tools by one of the authors (EC). The evaluators were unaware of the goals of the study. The team of evaluators was divided into two groups: some applied the MINI, and others applied the SADS-C. The evaluators did not individually administer both measures for the same patient.

Table 1
Sample's demographic data – sex, age, education, age and polarity of the first crisis, and number of hospitalizations.

Variable	Descriptive statistics *N*(%)
Sex	
Male	49 (42%)
Female	68 (58%)
Age	
$\leq$25 years old	10 (9%)
$>$25 years old	107 (91%)
Education	
Primary education	90 (77%)
Secondary or tertiary education	27 (23%)
Age of the first crisis	
$\leq$25 years old	77 (66%)
$>$25 years old	40 (34%)
Polarity of the first crisis	
Manic	67 (57%)
Depression	34 (29%)
Euthymic	1 (1%)
No information	15 (13%)
Number of hospitalizations	
$\leq$5 hospitalizations	52 (44%)
$>$5 hospitalizations	65 (56%)

2.3. Statistical analysis

Exploratory factor analysis was initially conducted to understand the factorial organization of the empirical data. The EFA extraction method, due to the ordinal nature of the SADS-C data, was based on the recommendations of Jöreskog and Moustaki [36]. The polychoric correlation matrix was used with the full-information maximum likelihood (ML) as the extraction method with oblique rotation (Promax) because the factors tended to correlate with each other. The results of the EFA were then tested using CFA alongside three other models to evaluate which is the best model to explain the empirical data: the model of Johnson et al. [35], the model of Swann et al. [53], and the model of Rogers et al. [46]. All of the analyses were conducted using LISREL 9.10 software [37]. Three fit indices and one error measurement index were considered to evaluate the models [29]: χ^2 and significance levels, goodness-of-fit index (GFI), and parsimony goodness-of-fit index (PGFI). Root mean square error of approximation (RMSEA) was used as the error index. To be acceptable, the χ^2 test should present no significant difference between the proposed model and empirical data. Values for the other two fit indices (GFI and PGFI) should be $>$ 0.95 to be considered ideal, between 0.90 and 0.95 to be considered good, and $<$ 0.90 to be considered poor. Finally, the RMSEA must be $<$ 0.05 to show that the model presents a tolerable level of errors when approximated from the empirical data [29,40].

3. Results

The initial results of the EFA was adequate based on Kaiser-Meyer-Olkin (KMO) measure of sample adequacy (0.773) – it