European Psychiatry 30 (2015) 880–884

Contents lists available at ScienceDirect

European Psychiatry

journal homepage: http://www.europsy-journal.com

Original article

Factor structure of the Bern Psychopathology Scale in a sample of patients with schizophrenia spectrum disorders

Fabian U. Lang [a,*], Annabel S. Stierlin [a,b], Katharina Stegmayer [c], Sebastian Walther [c], Thomas Becker [a], Markus Jäger [a]

[a] Department of Psychiatry and Psychotherapy II, Ulm University, Ludwig-Heilmeyer-Street 2, 89312 Günzburg, Germany
[b] Institute of Epidemiology and Medical Biometry, Ulm University, Schwabstraße 13, 89075 Ulm, Germany
[c] University Hospital of Psychiatry, Bollingenstraße 111, 3000 Bern 60, Switzerland

ARTICLE INFO

Article history:
Received 10 June 2015
Received in revised form 20 July 2015
Accepted 22 July 2015
Available online 25 September 2015

Keywords:
Factor analysis
Schizophrenia spectrum disorders
System-specific approach
Bern Psychopathology Scale

ABSTRACT

Background: The Bern Psychopathology Scale (BPS) is based on a system-specific approach to classifying the psychopathological symptom pattern of schizophrenia. It consists of subscales for three domains (language, affect and motor behaviour) that are hypothesized to be related to specific brain circuits. The aim of the study was to examine the factor structure of the BPS in patients with schizophrenia spectrum disorders.

Methods: One hundred and forty-nine inpatients with schizophrenia spectrum disorders were recruited at the Department of Psychiatry II, Ulm University, Germany ($n = 100$) and at the University Hospital of Psychiatry, Bern, Switzerland ($n = 49$). Psychopathology was assessed with the BPS. The VARCLUS procedure of SAS® (a type of oblique component analysis) was used for statistical analysis.

Results: Six clusters were identified (inhibited language, inhibited motor behaviour, inhibited affect, disinhibited affect, disinhibited language/motor behaviour, inhibited language/motor behaviour) which explained 40.13% of the total variance of the data. A binary division of attributes into an inhibited and disinhibited cluster was appropriate, although an overlap was found between the language and motor behaviour domains. There was a clear distinction between qualitative and quantitative symptoms.

Conclusions: The results argue for the validity of the BPS in identifying subsyndromes of schizophrenia spectrum disorders according to a dimensional approach. Future research should address the longitudinal assessment of dimensional psychopathological symptoms and elucidate the underlying neurobiological processes.

1. Introduction

Schizophrenia is a complex and heterogeneous disorder and several attempts have been made to disentangle its heterogeneity. In the 1980s a categorical approach, the positive/negative concept was introduced to classify schizophrenia and assess its symptoms [2,4,9]. This concept has been used since and has also been adopted by the standardized classification systems [1,19]. The Positive and Negative Syndrome Scale (PANSS) is the most commonly used assessment tool that corresponds with this approach [9].

Recently, Strik et al. [15] proposed a system-specific approach to classifying the psychopathological symptom pattern of schizophrenia. This approach divides symptoms into three domains – language, affect and motor behaviour – that are hypothesized to be related to specific brain circuits – the language system, limbic system, and motor system, respectively [15]. The assessment tool that corresponds with this approach is the Bern Psychopathology Scale (BPS) [15], which consists of 51 items that are grouped into three subscales for the domains language (14 items), affect (27 items) and motor behaviour (10 items). All items can be rated as reduced ("minus"), increased ("plus") or normal. The hypothesis underlying the BPS is illustrated in Fig. 1.

The items of the language subscale describe an inhibited or disinhibited occurrence of specific language features and refer to quantitative and qualitative abnormalities and subjective experiences in verbal thoughts. Items of the affect subscale include objective signs (e.g. gesture, respiration, sudor, muscle tone), indirect signs (e.g. delusions, hallucinations, emotional arousal) and items related to the participant's experience of grandiosity (e.g. paranoid delusions of power) or paranoid threat. The items of the motor behaviour subscale describe an inhibition or disinhibition of the participant's motor behaviour and assess quantitative,

* Corresponding author. Tel.: +49 8221 96 00; fax: +49 8221 96 28 160.
E-mail address: fabian.lang@uni-ulm.de (F.U. Lang).

http://dx.doi.org/10.1016/j.eurpsy.2015.07.010
0924-9338/

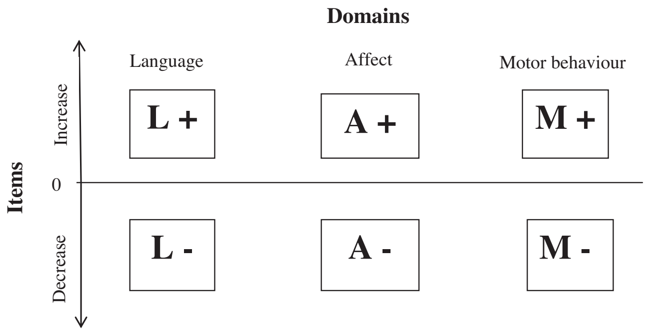

Fig. 1. The construction hypothesis underlying the BPS.

qualitative and subjective aspects [15]. In this pilot study the interrater reliability ranged from .532 to .965 (mean .875) and reached the level of significance ($P < .05$) [15]. Internal consistency and the item discrimination fulfilled the statistical requirements. The sample underlying the pilot study ($n = 168$) was comparable to our sample regarding the diagnoses [15]. Applying a Principal Component Analysis (PCA), the authors were able to group the items into three distinct factors (language, affect and motor behaviour). The three factors explained 43.05% of the variance. Each of the factors consisted of items of only a single domain after removal of items with high intercorrelations between domains. This leads to a certain degree of independence between the domains.

The aim of the present study was to examine the BPS factor structure in a sample of 149 inpatients with schizophrenia spectrum disorders. On the basis of the hypothetical construction of the BPS, we hypothesized that a 6-factor model would fit the data (Fig. 1).

2. Methods

2.1. Participants

A total of 149 inpatients were recruited at the Department of Psychiatry II, Ulm University, Germany ($n = 100$) between August 2013 and November 2014 and at the University Hospital of Psychiatry, Bern, Switzerland ($n = 49$) between June 2013 and August 2014. Consecutively admitted patients were invited to participate. All patients met the DSM-IV criteria for schizophrenia spectrum disorder on the basis of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) [5] and a review of all available records. Exclusion criteria were a history of a medical disorder or substance abuse other than nicotine, intellectual disability or age > 65 years. The study protocol was approved by the local ethics committee and all procedures were conducted in accordance with the Declaration of Helsinki. All patients provided written informed consent.

The participants had a mean age of 39.3 years (SD 11.6) and a mean duration of illness of 10.0 years (SD 10.3); 39% ($n = 58$) were female. The mean number of admissions was 6.6 (SD 9.0). A total of 44% ($n = 66$) of the participants were in regular employment and 37% ($n = 55$) were retired. Almost half (48%; $n = 72$) were in a stable partnership. The mean antipsychotic dose was 432.9 mg (SD 479.7) chlorpromazine (CPZ) equivalents. The distribution of diagnoses was as follows: 73% paranoid schizophrenia (Ulm 77%, Bern 62%), 10% catatonic schizophrenia (Ulm 7%, Bern 16%), 9% schizoaffective disorder (Ulm 12%, Bern 2%), 5% schizophreniform disorder (Ulm 0%, Bern 14%), 3% undifferentiated schizophrenia (Ulm 2%, Bern 4%) and 1% disorganized schizophrenia (Ulm 2%, Bern 0%). There was marginally difference respecting the remaining characteristics (age, gender, social functioning, illness- and treatment-related data).

2.2. Assessments

Psychopathological characteristics were assessed with the Bern Psychopathology Scale (BPS), which assesses system-specific psychotic symptoms [15]. Parameters such as demographic variables, social functioning and illness- and treatment-related data were assessed in a clinical interview and by reviewing all available records. All raters were trained extensively on the use of the scales and interviews.

2.3. Statistical analysis

Statistical analysis was performed with the VARCLUS procedure in SAS® (Statistical Analysis System, Version 9.3). This procedure is a type of oblique component analysis that aims to divide a set of numeric variables into disjoint clusters. The variables in the clusters are as closely correlated as possible with each other and as uncorrelated as possible with the variables in the other clusters. The iterative reassignment of variables to the clusters proceeds in two phases. First, variables are assigned to a cluster component on the basis of squared correlation values. Second, variables are iteratively reassigned to clusters in a way that attempts to maximize the variance explained by the cluster components, summed over all the clusters. High R^2 values with the own cluster, low R^2 values with next closest cluster and low $1\text{-}R^2$ ratios (the ratio of $1\text{-}R^2$ for a variable's own cluster to $1\text{-}R^2$ for its nearest cluster) indicate a good fit of the respective item. In this study, the number of clusters was set to 6 on the basis of the hypothetical construction of the BPS, and the VARCLUS procedure was conducted twice. Variables with a $1\text{-}R^2$ ratio > 0.8 were excluded as were variables that were not clustered in the first run. Variable clustering was then repeated in a smaller set of promising items.

3. Results

About 40.13% of the total variation in the data could be accounted for by the 6 clusters. Table 1 shows the number of items in each cluster as well as the proportion of the cluster variance explained by the included items. Five of the 6 proportions are in the range 35.01% to 46.11%; the one larger proportion (63.83%) is explained by cluster M minus, which consists of only 3 items.

Table 2 describes the clusters in detail. The R^2 values are given for each item's own cluster and for the next closest cluster; $1\text{-}R^2$ ratios lower than 0.3 can be interpreted as a strong fit [16]. The clusters of inhibited and disinhibited affect (A plus and A minus) mainly consisted of indirect and subjective signs whereas the inhibited and disinhibited mixed clusters (M/L plus and M/L minus) were characterized by predominantly quantitative symptoms. In contrast, the inhibited motor cluster (M minus) consisted exclusively of qualitative motor phenomena and the inhibited language (L minus) cluster also comprised mainly qualitative symptoms.

Table 3 shows the correlations between the cluster components. Negative associations were found for the clusters A plus and A minus and for M/L plus and M/L minus. A positive association was found for the clusters M/L minus and L minus. Fig. 2 shows the factor structure derived from our data.

Table 1
The 6 clusters and proportion of cluster variance explained by the included items.

Cluster	Items (n)	Proportion explained (%)
A plus	16	38.63
M/L plus	11	39.47
M/L minus	8	41.01
A minus	14	35.07
M minus	3	63.83
L minus	4	46.11