Subtyping schizophrenia: A comparison of positive/negative and system-specific approaches

F.U. Lang[a,*], S. Walther[b], K. Stegmayer[b], H. Anderson-Schmidt[c,d], T.G. Schulze[c,d], T. Becker[a], M. Jäger[a]

[a]*Department of Psychiatry and Psychotherapy II, Ulm University, Ulm, Germany*
[b]*University Hospital of Psychiatry, Bern, Switzerland*
[c]*Institute of Psychiatric Phenomics and Genomics, Munich, Germany*
[d]*Department of Psychiatry and Psychotherapy, Georg August University, Göttingen, Germany*

Abstract

Background: Schizophrenia is a heterogeneous disorder. Over the years, different approaches have been proposed to approach this heterogeneity by categorizing symptom patterns. The study aimed to compare positive/negative and system-specific approaches to subtyping.
Methods: We used the Positive and Negative Syndrome Scale (PANSS) and Bern Psychopathology Scale (BPS), which consists of subscales for three domains (language, affect and motor behavior) that are hypothesized to be related to specific brain circuits, to assess cross-sectional psychopathological characteristics in a sample of 100 inpatients with schizophrenia spectrum disorders. We then categorized participants into positive/negative and system-specific subgroups to allow comparisons of the two approaches.
Results: The analyses revealed correlations between the PANSS positive subscore and the BPS affective subscore ($r = .446$, $p < .001$) and between the PANSS negative subscore and the BPS motor behavior subscore ($r = .227$, $p = .023$). As regards the positive and negative subtype, more participants were classified as positive in the language-dominant subtype (30.3%) and affect-dominant subtype (30.3%), whereas more were classified as negative in the motor behavior-dominant subtype (44.4%). However, most patients met the criteria for the mixed subtype.
Conclusions: The results suggest that the positive/negative and system-specific approaches can be regarded as complementary. Future studies should examine both approaches in a longitudinal assessment of psychopathological symptoms and link them with qualitative-phenomenological approaches.

1. Introduction

Schizophrenia is a heterogeneous disorder. This is true with respect to both psychopathological course [1] and neurobiological findings [2]. The crucial question is how to deal with this heterogeneity. Some authors have suggested using more dimensional models with a syndrome-based approach [3,4]. In fact, the Research Domain Criteria project (RDoc), for example, favors such a dimensional concept in order to identify the underlying neurobiological mechanisms of psychiatric diseases [5]. On the other hand, one could argue for subtyping schizophrenic disorders in order to reduce heterogeneity. For example, Andreasen recommended that "we must begin to identify subgroups within this heterogeneous disorder that have a differential course and outcome" [6]. Such a subdivision could improve the individual treatment of schizophrenia [7]. However, the division into traditional subtypes (e.g. paranoid, catatonic and hebephrenic) was abolished in *DSM-5* because of doubtful validity [8].

Several attempts have been made to carve out psychopathological symptom patterns in schizophrenic disorders. The concept of distinguishing between positive and negative symptoms became popular in the 1980s [9–11], although the historical roots of this approach can be traced back to traditional psychopathological approaches, e.g. those of

* Corresponding author at: Department of Psychiatry II, Ulm University, Ludwig-Heilmeyer-Str. 2, 89312, Günzburg, Germany. Tel.: +49 8221 96 00; fax: +49 8221 96 28 122.

E-mail address: fabian.lang@bkh-guenzburg.de (F.U. Lang).

Bleuler, Conrad and Janzarik. Positive symptoms such as delusions and hallucinations are regarded as more transient, whereas negative symptoms such as blunting of affect and passive withdrawal are regarded as more persistent in terms of a defect state. Later on, a more system-specific approach towards the psychopathological symptom pattern was proposed [12]. This approach, which has its roots in the Wernicke–Kleist–Leonhard school, divides symptoms of schizophrenia into three domains, language, affect and motor behavior. The three domains are hypothesized to be related to higher order specific neuronal systems [12]. Both categorizations of symptom patterns can be interpreted in terms of a dimensional and typological approach. For example, Huber's typology of schizophrenic psychoses [13] is mainly based upon the positive/negative distinction whereas Leonhard's typology [14] is based on a more system-specific approach. Studies applying this system-specific approach demonstrated a dimensional structure of cross-sectional psychopathology, as the system-specific domains were not mutually exclusive [11].

Against this background, in the present study we compared positive/negative and system-specific (language system, limbic system, motor system) approaches by evaluating the cross-sectional clinical picture. The aims were to (i) examine the correlations of positive/negative symptoms with system-specific symptoms, (ii) determine the congruence between both approaches from a typological perspective and (iii) characterize psychopathological subtypes with respect to sociodemographic and clinical variables.

2. Materials and methods

2.1. Participants

A sample of 100 inpatients (40 women and 60 men) was recruited at the Department of Psychiatry II, Ulm University, Germany, between August 2013 and November 2014. The project was performed within the framework of the so-called "DGPPN Cohort", a national collaboration initiative of the German Association for Psychiatry, Psychotherapy and Psychosomatics (DGPPN) to establish a large-scale cohort of psychiatric patients [15]. Consecutively admitted patients were asked to participate. The inclusion criterion was a *DSM-IV* diagnosis of schizophrenia or schizoaffective disorder based on a Structured Clinical Interview for *DSM-IV* Axis I Disorders (SCID-I [16]) and a review of all available records. The study used a broader concept of schizophrenic disorders and included the diagnosis of schizoaffective disorder. Exclusion criteria were a history of medical disorder or substance abuse (other than nicotine) and intellectual disability. All patients provided written informed consent. The study was performed in accordance with the Declaration of Helsinki and the study protocol was approved by the local ethics committee.

2.2. Assessments

Psychopathological characteristics were assessed with the Positive and Negative Syndrome Scale (PANSS) [11] and the Bern Psychopathology Scale (BPS) [12]. The PANSS, a widely used 30-item scale for assessing schizophrenic symptoms, is composed of three subscales: positive symptoms (items P1-P7), negative symptoms (items N1-N7) and general psychopathology (items G1-G16). Each item can be graduated on a seven-point scale (1–7). The BPS, an assessment of system-specific psychotic symptoms, consists of 51 items grouped into three subscales for the domains language (14 items), affect (27 items) and motor behavior (10 items) [12]. The items on the language subscale describe an inhibited or disinhibited occurrence of specific language features and can be rated as 'reduced', 'increased' or 'normal'; the items refer to quantitative and qualitative abnormalities and subjective experiences in verbal thoughts. The items on the affective subscale include behavioral, autonomous and indirect signs and items related to the participant's experience. The items on the motor behavior subscale describe inhibition or disinhibition of the participant's motor behavior, whereby quantitative, qualitative and subjective aspects are considered. In addition to the assessment of specific symptoms, a global assessment of the severity of disturbance in each domain can be rated on a scale ranging from −3 (severely inhibited or anxious) to +3 (severely disinhibited/elated).

The participants' functional level was assessed with the General Assessment of Functioning scale (GAF), which is included in *DSM-IV-TR* [17], and the German version of the Personal and Social Performance scale (PSP) [18]. The GAF is the most widely used measure of psychosocial function [19]. The PSP is a useful device for assessing routine psychosocial outcomes in schizophrenia patients [20,21]. All participants were rated by the same interviewer (FUL), who has been trained extensively on rating with the scales and interviews used in the present study.

2.3. Analyses

In the first step, we examined the correlations of positive/negative symptoms with system-specific symptoms. To do this, PANSS subscores for positive and negative symptoms were compared with BPS subscores for language, affect and motor behavior by using Spearman rank correlation coefficients. The direction of change of the items (decreased or increased) was not considered when calculating the BPS subscores, instead absolute values were used.

In the second step, we examined the congruence between the positive/negative and system-specific approaches from a typological perspective. Positive, negative and mixed subtypes were defined by using the criteria provided by Kay et al. [11]. Participants who scored 'moderate' or higher on at least three of the seven positive items of the PANSS were defined as belonging to the positive subtype (POS), whereas those who scored "moderate" or higher on at least