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# Standardized Assessment of Psychopathology by Relatives of Mentally Disordered Patients

## Preliminary Results of Using the Positive and Negative Syndrome Scale to Compare Schizophrenic and Affective Disorders

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### Key Words

Psychopathology · Assessment by relatives · Schizophrenia · Affective disorders · Positive and Negative Syndrome Scale · Factor analysis

### Abstract

**Background:** For optimizing the validity of diagnoses of mental disorders, several sources of information should be used to assess psychopathological symptoms. Among these are relatives of patients with mental illness. The very low number of empirical studies examining the assessment of psychopathology by relatives of adult, nondemented mentally ill patients stands in significant contrast to the clinical importance of this source of information, however. **Sampling and Methods:** Using the Positive and Negative Syndrome Scale (PANSS), researchers asked 163 relatives of patients with the main clinical ICD-10 diagnosis of schizophrenic, recurrent depressive or bipolar disorders to rate the current symptoms of the patients at the time of outpatient community-oriented treatment. **Results:** On average, severity of symptoms was rated as absent or minimal, although anxiety, depression and passive/apathetic social as well as emotional withdrawal, motor retardation, poor attention, and disturbance of volition were clearly rated above the PANSS mean total score for all patients. A six-factor structure identified by factor analysis better illustrates the significant

differences in the assessments of the three main diagnostic groups than the three established PANSS scales. With the exception of 'problematic social behavior', differences among the diagnostic groups appeared in all factors and were particularly pronounced for 'delusional beliefs' and 'motor impairments'. **Conclusions:** The results of this study showed that the use of standardized instruments such as PANSS for the assessment of psychopathology by relatives is not only practical, but produces adequately reliable results. The use of PANSS for this purpose, however, requires interviewing of relatives by trained experts able to explain technical terms. Because this study did not sufficiently explore the validity of this approach, further research on this specific issue is urgently needed and should, for example, assess the concordance of ratings between professionals and relatives as well as correlation with suitable external criteria.

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### Introduction

It is indisputable that relatives or close reference persons (hereafter, only the term 'relatives' will be used) of people with mental illness shoulder the major share of the burden of daily assistance for these individuals [1, 2]. This particularly applies to patients with chronic disorders, and those living in their normal surroundings not

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being treated in inpatient or day care settings. In such contexts and because of their situational and emotional proximity, relatives may be aware of changes in the patients' mental conditions and behavior at a very early stage. Thus, they represent a rich source of information for the diagnostic and therapeutic process [3]. While professional carers routinely discuss and use this input from parents of mentally ill children and youths [4, 5], a literature search conducted in the Medline and Psycdex databases (with no limitation on the publication period) seems to indicate that the research interest of adult psychiatry in this area is insignificant. The combination of the search terms 'psychopathology', 'assessment by relatives' (or caregivers), and 'observer rating' (or information) was used. Of 234 articles identified addressing the issue of standardized assessment and practical use of relatives' information on psychopathological symptoms of patients, the majority (69%) come from the field of child and youth psychiatry. A small subset (8%) presented psychopathological findings of primarily somatically ill (e.g. cancer) patients. Of the remaining 55 publications from the field of adult psychiatry, most focus exclusively on relatives' information on patients with different forms of dementia. Only three papers [6–8] presented detailed empirical work on relatives' assessment of the nature and severity of psychopathological symptoms of adult mentally ill patients not suffering from dementia. These studies used (parts of) standardized diagnostic assessment instruments such as the Brief Psychiatric Rating Scale [9] and the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID) [10]. Results of these three studies differ significantly, however. While Dixon and King [6] concluded that patients are the better sources of information compared with their relatives because the latter had reported fewer symptoms, Lara et al. [8] emphasized the importance of the additional information collected from relatives that was not expressed by the patients themselves. Based on significantly different assessments between relatives and patients depending on the nature of the symptoms, Hambrecht and Häfner [7] argued that information by relatives could be helpful, but should be used with caution.

Against this background, the theoretical consequence is clear: various sources such as the rating of professional carers, the self-report of the patient or the assessment by relatives should be used to obtain information on psychopathology to optimize diagnosis and treatment, because the extent or reliability of each individual source is inadequate [11]. In view of the very small number and inconsistent findings of the empirical studies on relatives' in-

formation on adult patients with mental disorders, further fundamental methodological research could be deemed necessary. First, this means examining already tested and practicable assessment instruments within clinical contexts to analyze their usefulness for obtaining information from relatives. Furthermore, and for practical reasons, it seems important to search for adequate instruments that are shorter than clinical diagnostic interviews (e.g. SCID [10], Schedules for Clinical Assessment in Neuropsychiatry (SCAN) [12]) but can still be used for various mental disorders.

In the context of a German study assessing the psychosocial burden on and attitudes towards disorders of relatives of patients with chronic affective and schizophrenic disorders during community treatment [13], we decided to examine the Positive and Negative Syndrome Scale (PANSS) [14] for the following reasons. Since its introduction, the PANSS has been intensively validated [15–17], and factor-analyzed when used with larger samples [18–23]. Since the study by Kay and Sevy [24], a five-factorial structure (positive, negative, excitement, depression/anxiety, cognitive) was the most frequently replicated solution. Although the PANSS has been specifically developed for schizophrenic disorders, its 'general psychopathology' subscale allows a significant number of symptoms not specific to schizophrenic disorders to be rated as well. To date, however, only few studies have compared patients with acute schizophrenic and bipolar disorders, finding more similarities than differences with the exception of cognitive [25] and excitement [26] factors. It must be emphasized that none of the PANSS studies cited are based on relatives' ratings.

The current study addressed the following research questions: (1) Is a standardized instrument (PANSS) appropriate for relatives' assessment of psychopathological symptoms occurring over a 4-week period when patients are treated in an outpatient community-oriented mental health care setting? (2) Under these conditions, what evidence can be provided about the quality of the instrument used? (3) Does the nature of the mental disorder result in differences in the assessments (e.g., comparing schizophrenic vs. affective disorders)?

## Methods

### *Data Collection*

From October 2003 through August 2004, researchers contacted patients with the designated main clinical ICD-10 diagnosis being treated in inpatient facilities or outpatient departments of three of the four psychiatric hospitals in the city of Dresden

(population 460,000) in East Germany and asked for consent to interview (one of) their relatives. The study was approved by the Ethics Committee of the Medical Faculty Carl Gustav Carus Dresden, and informed consent was obtained from all participating patients and relatives.

A total sample of 163 relatives of patients with the diagnosis of schizophrenic (F20.x), recurrent depressive (F33.x) or bipolar disorders (F31.x) was recruited, with a refusal rate (for patients and relatives) of 12.3%. The clinical diagnosis was reexamined by an independent evaluator using anonymous written descriptions of psychopathological symptoms for each patient. By means of the original diagnostic algorithms of SCAN 2.1 [12], this expert made an ICD-10 diagnosis for the relevant F codes without further specification (i.e. without the digits after the point). Cohen's kappa measuring concordance between the clinical diagnoses given by the physicians in attendance and the independent assessments by means of written descriptions of symptoms was 0.921, and can be viewed as good.

A researcher (i.e. clinical psychologist) collected the data for this study using a standardized questionnaire completed during interviews with the relatives. Besides the assessment of the relevant psychiatric symptoms, sociodemographic characteristics of the relatives (age, gender, relationship with the patient, etc.) were recorded. The interview was conducted when the patient had been at home for a minimum of 4 weeks since the last inpatient or day hospital treatment (mean: 24.0 months; standard deviation: 63.2 months; range: 4 weeks to 35 years). Furthermore, clinical records of the patients included in the study were analyzed, focusing mainly on sociodemographic and disorder-related data. Psychiatrists in attendance rated the current level of the patients' social functioning by using the Global Assessment of Functioning Scale (GAF score) [27].

#### *Description of the Standardized Instrument for Assessment of Psychopathology*

The PANSS [14] is a standardized instrument normally used by experts for assessing the severity of relevant psychiatric symptoms based on observational interviewing. The PANSS consists of 30 items: seven productive features from different functional areas are summated to constitute a positive syndrome scale<sup>1</sup>; seven deficit items similarly form a negative syndrome scale<sup>2</sup>, and the remaining 16 items which cannot be linked decisively to either syndrome serve as a general psychopathology scale<sup>3</sup>. For each item, the seven-point scale of severity ranges from 1 (absent) to 7 (extreme).

To guarantee the objectivity and reliability of the rating, the PANSS manual includes detailed definitions and specific criteria

<sup>1</sup> Positive Scale (items P01 to P07): delusions, conceptual disorganization, hallucinatory behavior, excitement, grandiosity, suspiciousness, hostility.

<sup>2</sup> Negative Scale (items N01 to N07): blunted affect, emotional withdrawal, poor rapport, passive/apathetic social withdrawal, difficulty in abstract thinking, lack of spontaneity and flow of conversation, stereotyped thinking.

<sup>3</sup> General Psychopathology Scale (items G01 to G16): somatic concern, anxiety, guilt feelings, tension, mannerisms and posturing, depression, motor retardation, uncooperativeness, unusual thought content, disorientation, poor attention, lack of judgment and insight, disturbance of volition, poor impulse control, preoccupation, active social avoidance.

for all rating points of 30 symptoms, illustrated by anchor examples for each rating. The commonly accepted data analysis concentrates on calculation of means for each of the three subscales as well as for the total score. Furthermore, definitions of the rating scale and calculation of means provide the basis for interpreting the results: symptoms with ratings greater than 2 must be judged as pathological, in the clinically significant sense.

In this study, the PANSS was used following all interview instructions and rating definitions of the original. The only modification involved instructing the relatives to consider for their assessment not only a brief period of observation of the patient, but also the previous 4 weeks. In order to avoid problems of understanding caused by the technical terms of the PANSS, relatives were interviewed by an expert researcher capable of explaining the questions as necessary. The patients were not present in these sessions. At the end of each interview the relatives were provided the opportunity to add other symptoms which they had assessed as important but were not included in the PANSS.

#### *Statistical Analyses*

To answer the first research question, data were analyzed descriptively (means, standard deviations, percentages) and the internal consistency of the three PANSS scales was assessed by calculating Cronbach's alpha coefficient and reliability analyses of the items.

The second research question concerning the quality of the PANSS was answered by analyzing the missing data and the open-ended comments as well as by factor analysis (principal component analysis with Kaiser-Guttman criterion and varimax rotation). Furthermore, the internal consistency of the factorial model was calculated as well as a bivariate correlation analysis.

Following assessment of the relevant preconditions, a multivariate analysis (MANOVA) including all PANSS scales (factors) was calculated to answer the third research question about the usefulness of the instrument for different disorders. For this, Pillai's Spur criterion was used as the test statistic.

The statistics program SPSS for Windows, version 12.0, was used for all analyses. All tests were two-tailed. Statistical significance is denoted as follows: no marking or n.s. = not significant, \* = significant at  $\alpha$ -level  $\leq 5\%$ , \*\* = significant at  $\alpha$ -level  $\leq 1\%$ .

## **Results**

### *Features of the Study Samples*

The mean age of the patients was 47.1 years and 54% of the patients were female. The average number of years since the onset of their illness was approximately 15 years, and the patients had been hospitalized on average 5 times (table 1).

The mean age of the relatives was 50.1 years. Older adults represented the majority of this sample. Of the interviewees, 57% were female. Nearly two thirds of the participants were spouses (40.5%) or parents (23.9%) of

**Table 1.** Sociodemographic and illness-related features of the patients, subdivided according to the three main diagnostic ICD-10 categories

	Schizophrenic disorder (n = 53)	Recurrent depressive disorder (n = 52)	Bipolar disorder (n = 53)	Total population (n = 158)
Gender				
Female	19	31	35	85
Male	34	21	18	73
Age, years	44.4 ± 14.8	49.4 ± 11.8	47.6 ± 14.8	47.1 ± 13.9
Marital status				
Married	10	36	27	73
Divorced	11	8	12	31
Widowed	4	1	3	8
Single	28	7	11	46
Comorbid disorders				
None	15	11	17	43
Only mental disorders(s)	7	7	5	19
Somatic disorder(s)	20	10	17	47
Mental and somatic disorder(s)	11	24	14	49
Onset of illness, years ago	16.1 ± 11.9	17.4 ± 13.6	13.1 ± 9.8	15.5 ± 11.9
Previous hospitalizations	5.9 ± 5.9	3.7 ± 3.2	5.2 ± 4.8	5.0 ± 4.8
Period at home <sup>1</sup>				
<2 months	27	26	18	71
2–6 months	11	7	13	31
6–12 months	0	6	5	11
1–5 years	9	6	10	25
5–10 years	1	1	4	6
>10 years	5	2	2	9

<sup>1</sup> Time span (until the interview of the relatives) during which the patients have been treated in outpatient community-oriented setting after discharge from the last hospitalization.

patients. On average relatives had supported the patient for 12 years (table 2).

#### *Assessment of Psychiatrically Relevant Symptoms of Patients by Their Relatives*

To evaluate the relatives' assessments of the severity of symptoms, the most important descriptive parameters for the individual items were calculated, as well as for the three PANSS subscales and the PANSS total score. Table 3 shows the means and standard deviations. Those symptoms that have been experienced by all relatives on average as most severe ('anxiety' and 'depression') and least severe ('hallucinatory behavior') are highlighted. Furthermore, the distribution of percentages of the given answers with clinically nonsignificant ratings ( $\leq 2$ ) are contrasted with those with clinically significant ratings ( $> 2$ ). Comparing the means demonstrates that 'grandiosity' was experienced most rarely in pathological severity by relatives within the assessment period. Most frequently

this occurred for 'anxiety', a symptom that significantly stands out in terms of the severity of its clinical expression. All together, the severity of symptoms assessed by all participating relatives on average showed only a tendency towards minor clinical significance (score = 2.03) when patients were not treated in inpatient or day hospital settings.

Furthermore, table 3 demonstrates the reliability analyses of the three PANSS scales. Except for the positive scale, results show very good internal consistency (Cronbach's alpha  $> 0.80$ ). Corrected item-total correlation ( $r_{it}$ ) as an important criterion for the predictive contribution of the items for the relevant scale lies within the acceptable range of  $r_{it} > 0.30$  except for 'hostility' and 'somatic concern'. 'Emotional withdrawal' and 'passive/apathetic social withdrawal' show a very good corrected item-total correlation ( $r_{it} > 0.70$ ).

**Table 2.** Sociodemographic features of the relatives/key reference persons, subdivided according to the three main diagnostic ICD-10 categories of the patients

	Schizophrenic disorder (n = 55)	Recurrent depressive disorder (n = 53)	Bipolar disorder (n = 55)	Total population (n = 163)
Gender				
Female	38	26	29	93
Male	17	27	26	70
Age, years	55.7 ± 14.9	47.9 ± 13.9	46.6 ± 13.6	50.1 ± 14.6
Marital status				
Married	43	39	42	124
Divorced	4	4	8	16
Widowed	5	0	0	5
Single	3	10	5	18
School education				
None	0	0	0	0
10 classes completed	33	35	36	104
University entrance qualification	21	17	19	57
Other	1	1	0	2
Relative is the patient's				
Parent	30	2	7	39
Spouse/partner	8	43	32	83
Sibling	6	1	0	7
Child	7	7	7	21
Other	4	0	9	13
Key reference person of the patient				
Yes	36	49	43	128
Partly	18	2	11	31
No	1	2	1	4
Duration of support for the patient, years	12.3 ± 9.6	12.2 ± 11.5	10.2 ± 9.5	11.6 ± 10.2

#### *The Quality of the PANSS as Determined by Ratings by Relatives*

This study used two major criteria to assess the quality, i.e. practicability and reliability of the PANSS. As concerns validity<sup>4</sup>, we could – because of the main focus of the study design [13] – only assess one component of construct validity. To evaluate practicability, missing values as well as the open-ended comments made by relatives during data collection were analyzed. Next, we examined the differentiation regarding content and the plausibility to interpret the found factor solution (factor and reliability analyses). Finally, we compared the assessment by relatives with the level of the patients' social functioning (GAF score) determined by the psychiatrists in attendance at the time of evaluation (convergent validity).

<sup>4</sup> Objectivity was addressed by training of interviewers as well as strict use of the manual in interviews and will not be discussed further here.

#### *Analysis of Free Comments and Missing Values*

Sixty relatives (37% of all interviewees) commented further in free form on the current symptoms of the patients. Of 82 comments with varied content, 65% included more detailed explanations on individual symptoms or on the association among these symptoms. Six comments (7%) explicitly stated that the patients were 'better off' during the assessment period than before. In 8% of the comments, problems related to the assessments were expressed; this corresponds to the number of ratings missing.

Out of a total of 4,890 (163 relatives × 30 items) possible ratings, only 7 were missing, and these were not clustered on any one or two individual items. A summary of the qualitative content analysis of the free comments according to the method established by Mayring [28] demonstrated that the majority of the missing values were not caused by problems of understanding, but because certain types of behavior could not be observed easily by



**Table 3.** Descriptive statistics and analysis of the PANSS items and scales (n = 163)

Alpha	$r_{it}$	$h_{it}$	PANSS items/scales		Mean	SD	Normal	Pathol.
0.6785			<i>Positive Scale (P)</i>		1.6249	0.5952	81.42	18.58
	0.4446	0.6275	Delusions	P01	1.4785	1.0143	85.89	14.11
	0.3547	0.6526	Conceptual disorganization	P02	1.6994	1.0008	79.14	20.86
	0.4282	0.6341	<b>Hallucinatory behavior</b>	<b>P03</b>	<b>1.3313</b>	<b>0.9166</b>	89.57	10.43
	0.3733	0.6503	Excitement	P04	2.3252	1.1857	60.12	39.88
	0.4237	0.6347	Grandiosity	P05	1.3374	0.9377	91.41	8.59
	0.4459	0.6264	Suspiciousness	P06	1.8405	1.2015	74.23	25.77
	0.2478	0.6763	Hostility	P07	1.3620	0.8152	89.57	10.43
0.8570			<i>Negative Scale (N)</i>		2.2524	0.9346	63.37	36.63
	0.5921	0.8412	Blunted affect	N01	2.1902	1.2047	66.26	33.74
	0.7401	0.8188	Emotional withdrawal	N02	2.6074	1.3583	53.99	46.01
	0.6587	0.8317	Poor rapport	N03	2.2270	1.2586	61.35	38.65
	0.7207	0.8218	Passive/apathetic social withdrawal	N04	2.5706	1.4486	54.60	45.40
	0.5771	0.8437	Difficulty in abstract thinking	N05	1.9264	1.0747	74.23	25.77
	0.6149	0.8380	Lack of spontaneity and flow of conversation	N06	1.9816	1.2643	69.94	30.06
	0.4597	0.8595	Stereotyped thinking	N07	2.2638	1.2757	63.19	36.81
0.8499			<i>General Psychopathology Scale (G)</i>		2.1083	0.6642	68.79	31.21
	0.2432	0.8522	Somatic concern	G01	2.1350	1.1195	66.87	33.13
	0.5682	0.8358	<b>Anxiety</b>	<b>G02</b>	<b>2.7055</b>	<b>1.3741</b>	48.47	51.53
	0.4258	0.8444	Guilt feelings	G03	2.1595	1.3785	69.33	30.67
	0.4846	0.8407	Tension	G04	2.2761	1.1562	61.96	38.04
	0.4012	0.8447	Mannerisms and posturing	G05	1.5767	1.0298	87.12	12.88
	0.5514	0.8370	<b>Depression</b>	<b>G06</b>	<b>2.7055</b>	<b>1.5110</b>	53.37	46.63
	0.5882	0.8347	Motor retardation	G07	2.4233	1.3236	56.44	43.56
	0.5388	0.8378	Uncooperativeness	G08	1.8589	1.2012	79.14	20.86
	0.4393	0.8432	Unusual thought content	G09	1.5583	0.9564	85.89	14.11
	0.3562	0.8468	Disorientation	G10	1.5337	0.7800	87.73	12.27
	0.6006	0.8348	Poor attention	G11	2.5031	1.1460	57.06	42.94
	0.3381	0.8489	Lack of judgment and insight	G12	1.9018	1.3015	76.07	23.93
	0.6178	0.8332	Disturbance of volition	G13	2.5460	1.2581	53.99	46.01
	0.3602	0.8466	Poor impulse control	G14	1.8528	1.0786	74.23	25.77
	0.5542	0.8369	Preoccupation	G15	2.2086	1.2295	60.74	39.26
	0.4431	0.8428	Active social avoidance	G16	1.7178	1.1195	82.21	17.79
0.9134			Score		2.0288	0.6279	70.21	29.79

Alpha = Cronbach's alpha;  $r_{it}$  = corrected item-total correlation;  $h_{it}$  = change of Cronbach's alpha if item deleted; normal = percentage of 1 or 2 ratings indicating clinically nonsignificant severity of symptoms; pathol. = percentage of >2 ratings indicating clinically significant severity of symptoms.

relatives (e.g., '... conversation with P is very limited ... generally he speaks only a few words, ... makes it difficult to assess stereotyped thinking ...').

The interviewees supplemented a list of symptoms from their point of view a total of 16 times (20%). Seven of these additions could be assigned to one of the existing PANSS items without any problems after some more detailed exploration. Six comments could only be categorized with limited accuracy, mainly because the relatives

described multiple issues (e.g. 'lacking self-confidence' or 'sense of inferiority'), and splitting these into different items inadequately reflected their comprehensive meaning. The following three additions could not be categorized at all: 'helper syndrome, i.e. excessive care for others', 'neglect of everyday requirements related to their person', 'markedly elevated mood'.

**Table 4.** Results of the factor analysis (PCA) and the reliability analysis (internal consistency of the factors)

Alpha	r <sub>it</sub>	h <sub>it</sub>	PANSS factors/items		F 01	F 02	F 03	F 04	F 05	F 06	F 07	F 08
0.8752			<i>Anergia (F 01)</i>									
	0.7917	0.8334	Emotional withdrawal	N02	<b>0.8415</b>	-	-	-	-	-	-	-
	0.6425	0.8599	Blunted affect	N01	<b>0.7596</b>	-	-	-	-	-	-	-
	0.6814	0.8535	Disturbance of volition	G13	<b>0.7138</b>	-	-	-	-	-	-	-
	0.7274	0.8457	Passive/apathetic social withdrawal	N04	<b>0.7084</b>	-	-	-	-	-	-	-
	0.6745	0.8546	Poor rapport	N03	<b>0.6420</b>	-	-	0.3472	-	-	-	-
	0.5601	0.8728	Preoccupation	G15	<b>0.5326</b>	-	-	-	-	-	0.3640	-
0.7345			<i>Anxious-depressive concern (F 02)</i>									
	0.5928	0.6342	Guilt feelings	G03	-	<b>0.8098</b>	-	-	-	-	-	-
	0.6040	0.6274	Anxiety	G02	-	<b>0.6973</b>	-	-	-	-	-	-
	0.5950	0.6323	Depression	G06	0.4476	<b>0.6281</b>	-	-	-	-	-	-
	0.3253	0.7703	Somatic concern	G01	-	0.3358	-	-	-	-	-	<b>0.5959</b>
0.7722			<i>Delusional beliefs (F 03)</i>									
	0.5681	0.7261	Delusions	P01	-	-	<b>0.7835</b>	-	-	-	-	-
	0.5017	0.7435	Hallucinatory behavior	P03	-	-	<b>0.7613</b>	-	-	-	-	-
	0.4633	0.7553	Suspiciousness	P06	-	-	<b>0.5778</b>	-	-	-	-	-
	0.5324	0.7358	Unusual thought content	G09	-	-	<b>0.5665</b>	-	-	-	0.3674	-
	0.5699	0.7268	Lack of judgment and insight	G12	-	-	<b>0.4815</b>	-	0.3382	-	0.3728	-
	0.5050	0.7423	Grandiosity	P05	-	-0.3651	<b>0.4815</b>	-	0.3357	-	0.3819	-
0.7577			<i>Cognitive impairments (F 04)</i>									
	0.5416	0.7105	Conceptual disorganization	P02	-	-	-	<b>0.7483</b>	-	-	-	-
	0.6498	0.6511	Difficulty in abstract thinking	N05	0.3355	-	-	<b>0.7352</b>	-	-	-	-
	0.6522	0.6454	Poor attention	G11	0.3858	-	-	<b>0.6020</b>	-	-	-	-
	0.4139	0.7892	Stereotyped thinking	N07	-	<b>0.5073</b>	-	0.3854	-	-	0.3711	-
0.7447			<i>Motor impairments (F 05)</i>									
	0.5682	0.6767	Mannerisms and posturing	G05	-	-	-	-	<b>0.7299</b>	-	-	-
	0.6196	0.6372	Lack of spontaneity/ flow of conversation	N06	-	-	-	0.3808	<b>0.5857</b>	-	-	-
	0.6273	0.6319	Motor retardation	G07	0.4850	-	-	-	<b>0.5492</b>	-	-	-
	0.3654	0.7753	Tension	G04	-	-	-	-	<b>0.5378</b>	0.4561	-	-
0.6241			<i>Problematic social behavior (F 06)</i>									
	0.3831	0.5763	Hostility	P07	-	-	-	-	-	<b>0.7543</b>	-	-
	0.4807	0.5274	Poor impulse control	G14	-	-	-	-	-	<b>0.6980</b>	-	-
	0.4322	0.5467	Excitement	P04	-	-	-	-	-	<b>0.6876</b>	-	-
	0.4125	0.5561	Uncooperativeness	G08	-	-	-	-	-	0.3767	<b>0.4236</b>	-
	0.2021	0.6427	Active social avoidance	G16	-	-	-	-	-	0.3660	<b>0.6790</b>	-
	0.3546	0.6142	Disorientation	G10	-	-	-	-	-	0.1940	-	<b>0.8260</b>
			Variance (cumulative %)		14.571	23.701	32.739	40.795	48.770	55.910	61.670	66.188

Reliability analysis: Alpha = Cronbach's alpha; r<sub>it</sub> = corrected item-total correlation; h<sub>it</sub> = change of Cronbach's alpha if item deleted.

Factor analysis: - = loadings on factors within the range from -0.33 to 0.33 are not given in this table; loadings on factors in bold demonstrate the original eight-factorial structure; loadings on factors highlighted in gray demonstrate the six-factorial solution.

### *Differentiation regarding Content and Plausibility of Interpretation*

The formation of the positive and negative symptom scales shows clearly that the PANSS was specifically conceptualized to assess schizophrenic disorders. The constitution of a general psychopathology scale which combines 16 heterogeneous symptoms makes a differentiated assessment regarding content difficult if one does not want to look at each individual item separately. This

raises the question of finding a more appropriate subscale structure if comparing various mental disorders is intended, as in this study. On the one hand, this structure should be more differentiated regarding content, i.e. losing less informational content by combining many different items. On the other hand, a satisfactory homogeneity of the scales (Cronbach's alpha) should be guaranteed that should equal the original three-dimensional version, which achieved a mean level of 0.795.

A factor analysis (PCA) with all 30 PANSS items produced an eight-factor solution (table 4), accounting for 66.2% of the total variance. The last two factors included only two items each (G08/G16 and G01/G10), thus decreasing statistical quality (Cronbach's alpha of these factors = 0.489 and 0.361, respectively) as well as substantive interpretation of the eight-factor solution. Therefore, and based on considerations of content, we changed the assignment of five items in a second step. This generated a six-factorial structure in which the changes compared with the statistical solution were minimal. Three of the factors ('anergia', 'delusional beliefs', and 'motor impairments') could be accepted in their original version, and most items of factors 7 and 8 (G08, G10, G16) were assigned to factor 6 ('problematic social behavior'). Item N07 was moved from factor 2 to factor 4, and thus assigned to 'cognitive impairments' by content. Final item G01 from factor 8 could best be added to factor 2 ('anxious-depressive concern').

Table 4 further demonstrates that the homogeneity of the scales and the corrected item-total correlations of the six-factorial structure are quite good. The mean result of the internal consistency (Cronbach's alpha = 0.751) is slightly below the level achieved by the PANSS subscales. This is counteracted by a more differentiated interpretation of content, however. The corrected item-total correlation is within a critical range ( $r_{it} < 0.30$ ) only for 'active social avoidance', but the results of the corrected item-total correlation for 'emotional withdrawal' and 'passive/apathetic social withdrawal' are even slightly improved in contrast to the subscale findings.

#### *Correlation between the GAF Score and the PANSS Ratings*

The currently attending psychiatrists performed a global rating of the general level of social functioning (GAF score) for 145 of the 163 of the patients in the study. All patients were not rated because it was not possible to contact the psychiatrists in private practice for each case. Because the assessment of physicians and relatives referred to the same time period, we could expect a significantly negative correlation<sup>5</sup> between the GAF score and the PANSS ratings.

Because the GAF scale is characterized by ordinal level data, we computed Spearman's Rho as the correlation coefficient. The results (table 5) mostly demonstrated

<sup>5</sup> The higher the GAF score, the better the rating of the patient's social functioning. The higher the PANSS ratings, the more severe the psychiatric symptoms.

**Table 5.** Correlation between GAF score and PANSS ratings by relatives (n = 145)

PANSS factors and scales		Rho
Factor 01	Anergia	-0.50**
Factor 02	Anxious-depressive concern	-0.13 n.s.
Factor 03	Delusional beliefs	-0.42**
Factor 04	Cognitive impairments	-0.38**
Factor 05	Motor impairments	-0.35**
Factor 06	Problematic social behavior	-0.26*
P scale	Positive Syndrome	-0.29**
N scale	Negative Syndrome	-0.43**
G scale	General Psychopathology	-0.36**

\*  $\alpha \leq 0.05$ ; \*\*  $\alpha \leq 0.01$ ; n.s. = not significant.

moderate but highly significant, and as expected, negative correlations between the assessments made by experts and lay persons. Furthermore, the results demonstrated that the six PANSS factors enable a more differentiated assessment. Thus, correlations of the factors 'anergia' and 'delusional beliefs' with the GAF score are the most significant, whereas 'anxious-depressive concern' is the only PANSS dimension for which no significant correlation with the global level of social functioning was found.

#### *Differences of Assessments Related to the Nature of the Mental Disorder*

To explore differences across the three groups of relatives in their assessments of the severity of the current psychiatric symptoms of the patients, we computed a multivariate variance analysis on the basis of the six PANSS factors and of the original three PANSS subscales. In both cases the global comparison produced a highly statistically significant result:  $F = 4.78^{**}$  and eta-square = 0.155 for the factorial structure;  $F = 5.05^{**}$  and eta-square = 0.087 for the subscales. Results of the following multiple comparisons and the affiliated descriptive statistics are presented in table 6. The largest effect appeared on factor 3 ('delusional beliefs'). Not surprisingly, relatives of patients with schizophrenic disorders rated the severity of these symptoms significantly higher than the other two groups of relatives. These ratings reach the level of pathology (i.e. clinical significance) only if variance is taken into consideration, however. Results of the comparisons of factors 1 ('anergia') and 2 ('anxious-depressive concern') are also interesting. On the one hand, these show the highest severity ratings. On the other hand, results for factor 2 show that not all parts of the



**Table 6.** Descriptive statistics and results of the variance analysis exploring differences in the ratings of symptoms related to the nature of the mental disorder

	Mean			SD			MANOVA		
	F20.x	F33.x	F31.x	F20.x	F33.x	F31.x	F	signifi- cance	eta- square
Factor 01	2.6939	2.1981	2.2758	1.0559	1.0248	0.9119	3.882	0.023	0.046
Factor 02	2.2045	2.7170	2.3682	0.9978	1.0144	0.9669	3.737	0.026	0.045
Factor 03	1.9515	1.3050	1.4576	1.0202	0.3577	0.4424	13.530	0.000	0.145
Factor 04	2.3955	1.9104	1.9818	1.0180	0.7372	0.7182	5.335	0.006	0.063
Factor 05	2.4455	1.8632	1.8773	1.1167	0.6679	0.7358	8.054	0.000	0.091
Factor 06	1.8455	1.7547	1.7242	0.6382	0.6591	0.5492	0.574	0.565	–
Positive	1.8519	1.4852	1.5325	0.7544	0.4640	0.4538	6.544	0.002	0.076
Negative	2.6000	1.9946	2.1532	1.0137	0.8470	0.8388	6.550	0.002	0.076
General	2.2492	2.0789	1.9955	0.7241	0.6491	0.5996	2.111	0.124	–

F20.x = Schizophrenic disorder; F33.x = recurrent depressive disorder; F31.x = bipolar disorder.

symptomatology are experienced as significantly most severe by relatives of patients with schizophrenic disorder. This also reconfirms that content is better differentiated by the six-factorial structure than by the three subscales. These three subscales are not suitable for differentiating between the relatives of patients with recurrent depressive disorders and the two other groups of relatives. Within the factorial structure the core symptomatology of schizophrenic disorders – represented by factors 1, 3, 4, and 5 – can be clearly separated from the symptomatology of depressive disorders (factor 2). Finally, it should be mentioned that no significant group differences appeared for factor 6 ('problematic social behavior') and the PANSS subscale 'general psychopathology'.

## Discussion

The results of our study show that, as a standardized survey instrument, the PANSS can be used to obtain assessments of psychiatrically relevant symptoms of adult patients from their relatives. This is not only true for schizophrenic disorders, but also for affective disorders.

In terms of *practicability*, we encountered few problems of understanding when trained experts administered the PANSS in an interview with relatives. Given the volume of the reports, their informational content, and the option to compare the relatives' observations with assessments of psychopathology performed by experts, this instrument provides a valuable alternative for clinical

practice in contrast to unstructured ad hoc descriptions of a patient's mental health state by relatives. The time required for conducting the assessment (including introduction and explanation) ranges from 20 to 30 min. Within the framework of clinical practice it should be possible to invest this amount of time at least for cases difficult to assess and for research in the field of adult psychiatry this should be feasible without major problems.

*Reliability* of the PANSS when used for assessments by relatives was analyzed for internal consistency, applied to the scale as well as the factorial structure of the instrument. Cronbach's alpha coefficients are almost without exception  $>0.70$ , and thus can be viewed as satisfactory or even good. Because of their lower level of internal consistency, only the positive scale (Cronbach's alpha = 0.68) and factor 6 ('problematic social behavior', Cronbach's alpha = 0.62) need to be discussed more critically. Concerning the positive symptoms it could be of importance that the period of assessment did not particularly focus on acute phases of the disorder in which the degree of severity of these symptoms is usually much higher. As the results of this study show, relatives generally assess the symptoms of patients in all three diagnostic groups in everyday life as hardly noticeable with a tendency towards minor clinical significance. In this situation, negative symptoms ('anergia') and related syndromes ('anxious-depressive concern', 'cognitive impairments', 'motor impairments') are of much higher importance than positive symptoms. Furthermore, the assessment of these re-

lated symptoms might be less reliable if this is performed with the PANSS scale structure. The factorial structure seems to be superior in this case, because 'delusional beliefs' obviously combine those PANSS items which represent the so-called positive symptoms best (see also discussion on validity). Internal consistency of this factor (Cronbach's alpha = 0.77) can be described as good. That it is significantly lower for 'problematic social behavior', a syndrome that can be viewed as linked to positive symptoms, might be due to the 'patchwork' character of factor 6, i.e. its formation was based not only on statistical factors but considered content as well. Therefore, future research should thoroughly assess the usability of this factor and suggest some necessary modifications.

Future studies should also perform retesting as an additional method of determining reliability. Because the PANSS is an instrument sensitive to changes in symptoms, the standard retest procedure defining an interval of several weeks between the first and second assessment [29] cannot be used. In this study, this problem was indicated by some difficulties assessing the previous 4 weeks (see 'Methods' section) as a whole by the relatives, because symptoms fluctuated within this period. In these cases, the mean of the maximum and minimum rating for the relevant item was calculated as a compromise solution. Therefore, and in principle, we would recommend choosing shorter periods, particularly if the PANSS is used in acute phases of mental disorders.

Furthermore, when relatives have already been confronted for years with chronic mental health problems of the patients, retests in different stages of disorders could explore systematic underestimations of the severity of symptoms. For assessments by experts such observer drift is a well-known phenomenon, occurring when raters have been familiar with severe mental disorders for long periods in their field of work [9]. Because this is a general phenomenon of the assessment heuristics of anchoring adjustment [30], the probability that this might be transferable to assessments by relatives is rather high.

The *validity* of this instrument in terms of content for schizophrenic disorders is well supported by numerous previous studies [e.g. ref. 15, 17, 20, 31–33]. This is in contrast to our research that has presented only first preliminary results on validity aspects of assessments by relatives if the psychopathology of different disorders is rated with the PANSS. Our study encountered no problems assigning to the PANSS items additional symptoms named by relatives of the patients. The free comments, however, showed that some aspects of the psychopathological status and of complex pathological behaviors relevant to the

assessment of affective disorders could not be rated or could be rated only with inadequate specificity. Examples for this are (hypo-)manic mood, sense of inferiority, and self-destructive behavior such as suicidality and alcohol misuse. If we intend to use the PANSS for more than schizophrenic disorders, as the results of the multivariate variance analysis in this study clearly demonstrate is possible with the factorial structure, revisions and additions of content are necessary.

Striking a balance between validity and practicability (time limitation of the assessment of psychopathology) of the instrument when selecting items may be difficult. An expansion into the field of affective disorders seems feasible, because the PANSS already contains many items relevant to this (e.g. depression, guilt feelings, blunted affect, grandiosity). The inclusion of other mental disorders cannot be answered within the current study, but appears questionable due to the significant number of additional symptoms/items that would be required.

The main problem and demand for *criterion validation* is finding adequate external criteria which should in a predictive way correlate with the assessment of psychopathological symptoms. Thus, the GAF score rated in this study is not suitable for this because its construction directly interlinks the assessment of psychopathology by the psychiatrists in attendance and the rating of the global level of social functioning.

The GAF score could be better used for *construct validation* in our study, however, because we compared the assessments of similar constructs (psychopathology and social functioning) by professionals with those by relatives. This convergent validity is one component of construct validity. The correlations between the GAF score and the PANSS ratings are within a range of moderate degree, and therefore corroborate the construct validity of the assessments by relatives.

Furthermore, comparing the results of our factor analysis with those from other PANSS studies [17–24, 31–33] – all having ratings of schizophrenic disorders conducted solely by experts – showed more similarities than differences. This is also a point in favor of the construct validity of the psychopathological assessments performed by relatives. Correspondence of the item assignments concerning the factors 'delusional beliefs' [17–21, 23, 24, 31–33], 'cognitive impairments' [17–24, 31, 32] and 'anxious-depressive concern' [17–24, 31–33] is high between different studies. The comparison of the most significant factor of the current study ('anergia') shows less uniformity, however, because the item 'disturbance of volition' clearly assigned to this factor in our study was not in-

cluded in the factorial structure in several other analyses [17–19, 21, 23, 31]. Furthermore, the two items ‘lack of spontaneity and flow of conversation’ and ‘motor retardation’, which rather consistently fall in the negative dimension [17–21, 23, 24, 32], load on the factor ‘motor impairments’ in our study [31]. This factor to date has not been identified in comparable form in other studies. As a possible explanation for this we suggest that relatives of people with mental illness notice motor impairments of the patients separately, because these are frequently associated with burdensome restrictions of previous leisure time and other social activities. In this context it should also be considered that the five-factorial structure of the PANSS has been repeatedly criticized because the quality of fit, as well as the assignment of items to individual factors, have sometimes turned out to be quite different [34–36]. In response to this criticism, the factorial structure in our study on relatives shows good results in terms of the percentage of explanation of total variance (66.2%) and the complete integration of all items. The reliability problem of factor 6 has already been discussed.

Despite the very small number of studies on the issue of assessment of psychopathology by relatives within the field of adult psychiatry, the prospects are encouraging. Our results indicate that the use of a standardized assessment instrument like the PANSS is not only feasible, but also seems to produce adequately reliable results. The main limitations of the study include the relatively small sample sizes of each main clinical diagnosis and the restriction of the study area to the city of Dresden and its surroundings (and therefore to a more or less urban population of the socioeconomic middle class). Furthermore, the cross-sectional design does not consider phases of the disorders needing inpatient treatment or changes of symptomatology during the course of the disorders. Therefore, we reiterate the importance of retests to fur-

ther explore reliability. Because our study design included the validity of the assessment of psychopathology by relatives to only a limited extent, further empirical research focused on this specific issue is urgently needed. In particular, and as an important step of construct validation, a comparison of expert and relatives’ assessments when using the PANSS is necessary because the global level of social functioning (GAF score) only serves as a very rough marker for the assessment of convergent validity [37–39]. For the still missing criterion validation, methods such as standardized performance tests and adequate physiological parameters of the patients (like heart rate variability [40]) might be used. When comparing schizophrenic and affective disorders, the PANSS factorial structure demonstrated superiority to the PANSS scale structure. Content of the PANSS items needs to be expanded for affective disorders, however. Among other options, the Brief Psychiatric Rating Scale, Expanded Version (BPRS 4.0) [9] could be useful for this task, because it contains such items as suicidality and elevated mood.

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