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ORIGINAL PAPER

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Abnormal subjective experiences in schizophrenia: its relationships with neuropsychological disturbances and frontal signs

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Abstract The prevalence of abnormal subjective experiences is high in schizophrenic patients. This study starts from the hypothesis that these subjective disorders are associated with cognitive disturbances. In order to test this hypothesis a study was carried out on 40 patients who were diagnosed as suffering from schizophrenia according to RDC and DSM-III-R criteria. They were consecutively admitted due to a recrudescence of their symptomatology. Version 3 of the Frankfurt Complaint Questionnaire, adapted for Spanish by the authors, was used as an instrument for the assessment of subjective experiences. Eight patients refused to answer the questionnaire. A neuropsychological battery, including the Mini-Mental State, some subtests from the WAIS, Bender's visual-motor test, Rey's Complex Figure, and the Trail Making Test, was used. Frontal neurological signs were evaluated. The abnormal subjective experiences of schizophrenics presented a close association with neuropsychological disturbances and, to a lesser degree, of intensity with frontal neurological signs. Regression analyses by means of stepwise method and partial correlation analyses were undertaken. Many significant relationships between subjective experiences and cognitive disturbances persisted after controlling the influence of age, gender, education, lack of insight, neuroleptic doses, and biperidene doses.

Introduction

There is a trend in medicine to give more importance to clinical signs, which are objective and may be verified, than to symptoms. In schizophrenic patients there is a tendency to pay greater attention to objective or behavioral symptoms than to subjective ones, the latter being seldom evaluated. Furthermore, one often finds schizophrenic patients who, although they do not present severe symptoms, are unable to lead a full social and working life. Many of these patients base their difficulties on subjective complaints, mainly of impaired cognitive functioning.

The studies of subjective symptoms or complaints of schizophrenic patients started with Huber (1957, 1966) and with McGie and Chapman (1961). Huber used the term "basic symptoms" for subjective symptoms mainly of a cognitive type described by the patients, obtained through the phenomenological method and which are not accessible to behavioral observation. Huber (1957) used the term "basic symptoms" because, due to their phenomenological character, they are psychophysiological and psychoneurological transitional symptoms. Huber referred to them as "substrate closed," i.e., "they are globally regarded as resulting from some assumed underlying primary cognitive derailment" (Koehler and Sauer 1984) and he suggested that they were more related to the supposed ethiopathogenic alterations in schizophrenia than to other types of symptoms.

"Basic symptoms" would thus be the symptoms upon which the most typical schizophrenic symptoms would develop, such as delusions or hallucinations. These abnormal subjective experiences and Andreasen's negative symptoms are overlapping clinical dimensions that are present in the same patients. However, the former are primarily based on patients' self-descriptions and the latter are behaviorally defined (Koehler and Sauer 1984; De Leon et al. 1991).

Chapman (1966) studied disturbances in attention, perception, memory, motility, and speech in 40 schizophrenics. He suggested that "these phenomena may be subjectively experienced by the patient long before established disease appears overtly."

The prevalence of abnormal subjective experiences or "basic symptoms" is high in schizophrenic patients (Huber 1966; Liddle and Barnes 1988; Peralta and Cuesta 1989a, b), but it does not have specificity for the diagnosis of these disorders (Huber 1966; Petho and Bitter 1985; Ebel et al. 1989; Mundt et al. 1989; Bitter et al. 1989). Their assessment got significance in the 1980s with the development of eight instruments or evaluation scales

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(Andreasen and Olsen 1982; Petho and Bitter 1985; Sülwold 1986; Gross et al. 1987; Liddle and Barnes 1988; Cutting and Dunne 1989; van den Bosch and Rozendaal 1990; Selten et al. 1991).

The Frankfurt Complaint Questionnaire (FCQ; Sülwold 1986) is a self-rated questionnaire for the assessment of abnormal subjective experiences of cognitive disturbances (Peralta and Cuesta 1991; Peralta and Cuesta 1994). It was derived from reports obtained from schizophrenic patients. These patients reported more subjective experiences than controls in the FCQ (Sülwold 1985). The FCQ is composed of a heterogeneous set of subjective symptoms: complaints of physical (decreases in drive, energy, endurance, initiative, or patience) and mental exhaustion (feelings of having troubles in attention or concentration), increased sleep disturbances, feelings of becoming easily angry, discomfort from changes, etc.

Cognitive disorders were the cornerstones of the definition of dementia praecox by Kraepelin (1919). Schizophrenic disorders show a greater number of cognitive disturbances than all other mental disorders (Kolb and Whinshaw 1983). Cognitive disturbances are related more to the negative than positive schizophrenic symptoms (Crow 1980; Kolakowska et al. 1985; Green and Walker 1985; Keilp et al. 1988; Andreasen et al. 1990; Addington et al. 1991), although some studies have not found a relationship between the presence of positive and negative symptoms and cognitive disturbances (Faustman et al. 1991; Wagman et al. 1987).

In addition, schizophrenic patients present more neurological symptoms and neurological soft signs than other mental disorders (Rochford et al. 1970; Heinrichs and Buchanan 1988; Owens and Johnstone 1980; Woods et al. 1986; Liddle 1987; Kolakowska et al. 1985), although their prevalence is not enough to give them diagnostic value. Moreover, frontal signs have been found associated with cognitive performances (Kennard et al. 1960; Mosher et al. 1971). However, there are few neuropsychological studies that included the so-called Luria's frontal signs (Benson and Stuss 1982; Manschreck and Ames 1984) and there are few scales specifically designed to evaluate frontal signs (Goldberg et al. 1987; Merriam et al. 1990; Royal et al. 1993).

Many of Luria's frontal signs have been integrated into neurological soft sign batteries. Nevertheless, the frontal signs are independent dimensions, because they are extracted as individual factors in the factorial analysis of the neurological soft signs (Schröder et al. 1992).

The authors have started from the hypothesis that the schizophrenics' abnormal subjective experiences are associated with cognitive dysfunctions. The present study was undertaken to test this hypothesis.

Materials and methods

The sample comprised 40 schizophrenic patients who were consecutively admitted due to a recrudescence of their symptomatology. Patients aged over 50 years or with a positive history of serious physical illness, severe head trauma, and/or alcohol abuse or abuse of other substances were excluded. Axis V of the DSM-III-R (GAF) and the Strauss-Carpenter scale (Strauss et al. 1974) were used.

Patients were assessed and diagnosed through a semistructured interview for schizophrenia (Landmark 1982). They fulfilled RDC (Spitzer et al. 1978) and DSM-III-R criteria for schizophrenic disorder. The Spanish version of the AMDP psychopathological inventory (Guy and Ban 1979) was also used. Specifically, three items of AMDP concerning lack of insight were considered here: lack of feeling ill, lack of insight, and uncooperativeness. These items were scored 0–3 depending on their intensity and frequency by asking the patients directly and by observing their behavior. Scores were added together to obtain an index of lack of insight.

Version 3 of the FCQ adapted to Spanish by the authors was used. The FCQ is a self-rated questionnaire which has 98 yes/no questions. The subjective complaints are grouped according to the abnormalities of the symptoms evaluated in ten phenomenological descriptive subscales (loss of control, simple perception, complex perception, language, thought, memory, motility, lack of automatism, anhedonia/anxiety and sensory overstimulation). These ten subscales are grouped into four factors: central cognitive disturbances, perception and motility, depressivity and internal and external overstimulation, along with a total score (FCQT).

Eight patients refused to answer the FCQ, making a total sample of 32 patients (Table 1).

A neuropsychological battery composed of Spanish validated tests that included general tests such as the Edinburgh test (Oldfield 1971), the Spanish version of the Mini-Mental State (Lobo et al. 1979), seven Wechsler Adult Intelligence Scale (WAIS) subtests (Wechsler 1955) and Bender's visual–motor test (Bender 1947) was used. Moreover, we employed some frontal-related tests: Rey's Complex Figure (Rey 1959) and forms A and B of the Trail Making Test (Reitan 1978). The neuropsychological exploration lasted about 2 h and was carried out in one or two sessions.

A frontal-signs battery was constructed, from seven signs of dynamic organization of the motor act and sequence copying, from the Christensen version of Luria's frontal test (Christensen 1978). Each sign was evaluated quantitatively, scored separately from 0

Table 1 Sociodemographic and clinical characteristics of the sample

Sample size (*n*)	32
Age (years)	27.44 ± 7.63
Gender	26/6
Marital status	
Single	26
Married	5
Separated	1
Education (years)	10.16 ± 2.52
Age at onset (years)	21.50 ± 5.73
Global Assessment Functioning (past year)	54.00 ± 15.23
Global Assessment Functioning (actual)	18.59 ± 5.91
Strauss-Carpenter Scale (total score)	10.37 ± 3.48
Neuroleptic doses (cpz units)	1189.82 ± 716.66
Biperidene doses	4.64 ± 3.80
Schizophrenic disorders (DSM-III-R subtypes)	
Disorganized	3
Catatonic	2
Paranoid	13
Undifferentiated	13
Residual	1

to 2 (0 = severe alteration; 1 = moderate alteration; 2 = normal). A total score for all of them was also obtained. In a previous study (Cuesta and Peralta 1995) an elevated internal consistency of this frontal sign scale (Cronbach's alpha = 0.70) was found.

The neuropsychological battery and the frontal signs were evaluated by one of the authors (M.J.C.). The clinical, neuropsychological, and subjective symptom assessments were carried out independently after the symptomatology had stabilized (3 or 4 weeks after admission). The correction of the FCQ inventory was performed after clinical and neuropsychological assessments. The assessment methods were approved by the Ethical Committee of our hospital and patients gave informed consent for inclusion in the study.

All patients were treated with neuroleptics. The average values of neuroleptic doses were converted to equivalent doses of chlorpromazine following Davis's method (1976). The average equivalent dose of chlorpromazine of the days of the neuropsychological assessment was 1189.82 ± 716.6 (300–3275). The majority of the patients were also taking biperidene at an average dosage of 4.64 ± 3.80 mg (0–15).

Neuropsychological results and frontal sign scores were arranged indicating lower scores for better performances. Pearson correlations between abnormal subjective experiences and cognitive performances were carried out. The Bonferroni procedure was chosen for statistical correction of the large series of correlations performed (Grove and Andreasen 1982). To control the possible misleading effect of intervening variables regression analysis procedures (stepwise method) were obtained. The following variables were included in each regression analysis simultaneously with cognitive performances and FCQT: age, gender (which was also considered as quantitative), the level of education, lack of insight, neuroleptic doses, and biperidene doses. The statistical analyses were carried out using the computerized statistical program SPSSX-PC (Norusis 1986).

Table 2 Frankfurt complaint questionnaire (FCQ) and neurological and neuropsychological results. WAIS Wechsler Adult Intelligence Scale

FCQ (total score)	41.56 ± 25.35
Edinburgh test	13.40 ± 6.47
Mini-Mental State	32.48 ± 2.30[a]
Neurological signs (total score)	5.06 ± 2.73
WAIS	
Information	11.66 ± 3.17
Vocabulary	12.06 ± 2.46
Similarities	12.16 ± 2.87
Digit span	12.41 ± 3.34
Block design	10.19 ± 3.39
Digit symbol	9.13 ± 3.03
Object assembly	9.09 ± 3.90
Bender's visuomotor test	53.78 ± 22.49
Rey's Complex Figure	
Accuracy of copy	30.89 ± 6.36
Time of copy	218.19 ± 163.32
Accuracy of memory	15.16 ± 8.16
Trail Making	
Form A (s)	70.24 ± 34.42
Form B (s)	218.88 ± 146.55

[a] Spanish version of the Mini-Mental State yielded a possible total score of 35 because it comprised two added tasks (digits backward and similarities; Lobo et al. 1979)

Results

No epidemiological or clinical differences were found between the patients who filled out the FCQ and those who refused to answer it. The results on the FCQ, on the exploration of frontal signs and on the neuropsychological tests, are shown in Table 2. The total score (FCQT) was taken from the FCQ in order to simplify the description of the study, and given the fact that the statistical results were similar to those of the ten subscales and four factors of the FCQ.

No significant correlations between the epidemiological variables (age, number of episodes, GAF current, or GAF past year) and the FCQT were found. The female gender presented significantly higher scores on the FCQT (variance analysis, F = 6.51, $P \leq 0.01$). The level of education was negatively correlated with the FCQT (r = –0.51, $P \leq 0.03$). The average dosages of neuroleptics and the average dosages of biperidene were inversely correlated with the FCQT (r = –0.36, $P \leq 0.03$; r = –0.36, $P \leq 0.03$). Lack of insight index and FCQT were not significantly correlated (r = 0.18, $P \leq 0.15$).

Table 3 Correlations between abnormal subjective experiences and neurological and neuropsychological performances. FCQT Frankfurt Complaint Questionnaire Total score

	FCQT	FCQT partial correlations[a]
Total frontal sign score	0.40**	0.25
Neuropsychological tests		
Mini-Mental State	0.38**	0.26
WAIS		
Information	0.42**	0.03
Vocabulary	0.58***	0.67***
Similarities	0.33*	0.21
Digit span	0.52***	0.60**
Block design	0.66***	0.74***
Digit symbol	0.38**	0.11
Object assembly	0.18	0.32
Bender's test	0.49***	0.43*
Rey's Complex Figure		
Accuracy		
Copy	0.54***	0.51**
Memory	0.40**	0.07
Trail Making		
Form A	0.70***	0.72***
Form B	0.72***	0.77***

NOTE: All the correlations indicated higher subjective experiences for lower performances

[a] Partial correlations through regression, procedure (stepwise method) after allowing for the effect of age, gender, education, duration of illness, lack of insight index, neuroleptic doses, and biperidene doses

* = $P \leq 0.05$

** = $P \leq 0.01$

*** = $P \leq 0.001$

Critical value for P (≤ 0.05) using Bonferroni procedure is $P \leq 0.0035$

Very significant correlations were found between the FCQT and the frontal sign and neuropsychological results. After Bonferroni correction many of the significant correlations endured (Table 3). All associations indicated higher subjective experiences with poorer cognitive and neurological performances.

Many FCQT significant correlations with neuropsychological performances persisted after allowing for the effect of age, gender, education, lack of insight, and doses of neuroleptics (chlorpromazine equivalents) and biperidene doses. These variables were introduced simultaneously in the regression procedures to obtain the partial correlation coefficient between FCQT cognitive performances (Table 3).

Discussion

This is the first study aimed specifically to examine the relationships of abnormal subjective experiences with neuropsychological disturbances and frontal neurological signs. The subjective experiences of the schizophrenics showed a strong association with neuropsychological disturbances and, to a lesser degree, of intensity with neurological frontal signs. These strong correlations were in many cases independent of the effect of certain intervening variables such as age, gender and education, lack of insight, neuroleptic treatment, and biperidene doses.

The lack of insight did not influence the expression of subjective experiences in our patients. Neither did lack of insight modify the strong association between subjective experiences and cognitive performance. These results would contradict the fact that lack of insight into illness has been traditionally related to brain damage in neurological patients. However, as Cuesta and Peralta (1994) have reported, lack of insight and cognitive performance are not associated in schizophrenic patients (Cuesta and Peralta 1994).

No similar studies have been carried out. However, Kick (1991), in a study focused on the follow-up of "basic symptoms," found significant correlations between performances on the WAIS Picture Completion subtest and the total score on the FCQ, but only after 6 weeks of follow-up, not after the acute episode or after 24 weeks. From a neurophysiological point of view, other authors have found correlations between the "basic symptoms" and smooth-pursuit eye-movement abnormalities, contingent negative variation latency, and reaction time (van den Bosch 1988; Hasse-Sender et al. 1982).

Taken together, subjective experiences seem to be important in schizophrenic patients for several reasons. Firstly, they show stronger associations with neuropsychological performance than do psychopathological symptoms (i.e., negative symptoms). Therefore, they are very closely related to neuropsychological and neurophysiological alterations, and it has been suggested that they have a "mediating value" between the functional and clinical alterations of the patients (van den Bosch et al. 1988). Secondly, they are often precursors to objective or manifest symptoms. Lastly, their typification would be of interest in the cognitive rehabilitation therapy of the deficit states (Brenner 1989).

Our results are in accordance with Huber's original hypothesis, which proposed that subjective experiences of schizophrenics seem to be true signs of cognitive dysfunctions. However, more studies are needed to confirm the present results definitively, because certain limitations should be overcome. Depression and motivation, variables which can influence the cognitive performances, were not addressed in this study. Moreover, the correlation coefficients between subjective experiences and cognitive performances obtained a moderate degree of associations in terms of shared variance. The explained variance accounted for by these associations between FCQT and cognitive tests ranged from 3% (object assembly; $r = 0.18$) to 52% (form B of trail making; $r = 0.72$).

Finally, these results should be considered with caution, due to the limitations derived from the small number of patients in our sample. They require future verifications, but may serve to stimulate future studies in the area of subjective experiences of schizophrenic patients.

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