Dimensional Structure of the Frankfurt Complaint Questionnaire

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The Frankfurt Complaint Questionnaire (FCQ) was designed to evaluate the subjective symptoms of schizophrenes. Several validation studies of the FCQ using principal components analyses (PCA) have shown one-, two-, or four-factor solutions. The present study was conducted using FCQ data on 310 schizophrenes who met the ICD-10 criteria for F20 (schizophrenia) disorder. Using several guidelines to select the number of factors, the PCA yielded one factor. This result suggests a unidimensionality underlying FCQ items. A new scale comprising 24 items was derived from those items with higher weights in the first factor.

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SELF-EXPERIENCED COGNITIVE deficits of schizophrenia have received little attention, despite their high prevalence in this disease. Recently, there has been renewed interest in the study of subjective symptoms and a number of scales evaluating these symptoms have been published.1 From a historical point of view, several groups began research on subjective symptoms. Huber2 named the subjective symptoms “basic symptoms” to indicate their proximity to the hypothetized basic neural dysfunction of schizophrenia. Chapman3 studied subjective symptoms in different areas of cognition in schizophrenics and suggested an organic etiology. Several names have been proposed to identify subjective symptoms: basic symptoms or disorders, subjective experiences, subjective symptoms, subjective experience of deficit, or negative symptoms.

Among the different rating scales, the Frankfurt Complaint Questionnaire (FCQ) is the instrument most widely used in Europe for assessing subjective symptoms. Moreover, this instrument has been adapted to several languages, including an English version.4 The FCQ was developed by Stüllwold5 from the complaints of schizophrenic patients. The scale contains 98 items concerning a wide range of cognitive dysfunctions. The FCQ items are grouped into 10 categories according to phenomenological descriptive subscales: loss of control, simple perception, complex perception, language, thought, memory, motility, lack of automatism, anhedonia, and sensorial overstimulation.

Factorial analyses on 463 and 229 schizophrenes, respectively, have suggested a four-factor solution interpreted as: disturbance of automated responses, perceptual disturbances, depression, and overinclusion.6,7 Moreover, in 80 schizophrenes, Rey8 found a unidimensional structure underlying a 76-item version of the scale. Using a Spanish version of the scale, Cuesta et al.9 found a unidimensional structure and proposed a reduced version of the scale (the Frankfurt-Pamplona Subjective Experiences Scale [FPSES] comprising 18 items with loads higher than 0.58 in the first factor.

Recently, Mass et al.10 conducted a principal components analysis (PCA) on 505 schizophrenes and 187 alcoholics. The PCA yielded two factors, termed “dysphoric concomitants of severe illness particularly impairing concentration” and “subjective experiences of perceptual uncertainties.”

The aim of the present study was to explore the factor structure of the FCQ and to test the hypothesis of unidimensionality.

METHOD

Subjects

A total of 310 psychiatric patients with ICD-1011 diagnoses of schizophrenia (F20) were recruited from the psychiatric departments of two psychiatric hospitals (Pinel’s Hospital and the Hospital of Clermont de l’Oise) and three psychiatric departments of two general hospitals (the Hospitals of Péronne and Abbeville). There were 129 inpatients and 181 outpatients. The study was conducted from November 1998 to February 2000.

Each patient was interviewed by a senior psychiatrist (V.Y). The diagnostic criteria according to ICD-10 were verified using international diagnosis checklists.12 Patients with organic mental disorder or severe somatic disorder were no included. In addition, patients who were not accessible for an interview (e.g., refusal, mute) were excluded. The distribution of the clinical forms was as follows: 149 paranoid (48.1%), 63 hebephrenic (20.3%), one postpsychotic depression (0.3%), 31 undifferentiated (10%), and 66 residual (21.3%). As the study was naturalistic, almost all of the subjects (n = 277) were undergo-
The mean dose of chlorpromazine equivalent was 407.55 mg (SD 346.33). Table 1 presents background sample characteristics.

**Rating Scale**

The author's French translation of the third version of the FCQ was used.\textsuperscript{13} The FCQ is composed of 98 yes-no questions, and was completed by the inpatients a few days before discharge while they were considered to be at their clinical baseline.

In accordance with the guidelines of the FCQ manual, the questionnaire was administered by a nurse (D.B) recruited specifically for the study. The nurse explained to the patients the purpose of the questionnaire and notably the fact that their responses would have no consequences on their status (medication, decision of relapse, etc.). In case of vision difficulties or difficulties in comprehension, the items were read or explained. The Brief Psychiatric Rating Scale (BPRS)\textsuperscript{14} was completed by a senior psychiatrist (V.Y). The BPRS total score was taken into account, as well as three subscores rating positive (BPRS-P), negative (BPRS-N), and general (BPRS-G) symptomatologies.\textsuperscript{15}

All subjects participated voluntarily in the study and gave informed consent, which was obtained after the procedure had been fully explained. Subject anonymity was protected.

**Statistical Analysis**

We conducted an exploratory PCA on the correlation matrix of the 98 items of the FCQ. Several guidelines were used to select the number of factors: the Kaiser criteria (eigenvalue $> 1$), the Cattell scree test, the Horn parallel analysis, and the interpretability of the factors. Orthogonal varimax rotation was then performed.

Construct validity and reliability were evaluated by calculating Cronbach’s alpha coefficient and the average of the correlations (point biserial correlation coefficient) between each item and the total score.

**RESULTS**

PCA showed 25 factors with an eigenvalue greater than 1, which collectively represent 65.30% of the variance. The scree test showed a break between the first two factors and the other factors (Fig 1); parallel analysis retained the first two factors. The eigenvalues of the two factors were 28.24 and 3.98, respectively, and the corresponding variances were 28.80% and 4.10%. Each of the 23 remaining factors explained less than 2.5% of the variance.

<table>
<thead>
<tr>
<th>Table 1. Sample Characteristics (N = 310)</th>
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<td>Neuroleptics (equivalent chlorpromazine)</td>
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<td>FCQ score</td>
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Interpretation of the first two unrotated factors was based on the variable’s loadings (Table 2). Considering only the variables with a loading higher than 0.30, the first factor contains 95 items and the second, 14 items. Moreover, all 14 items of the second factor had a higher loading on the first factor. Thus, we decided to retain only the first factor.

As our results were compatible with the unidimensional hypothesis, we attempted to reduce the length of the inventory. First, we retained the 24 items (no. 26, 27, 35, 36, 38, 39, 42, 44, 45, 46, 55, 60, 66, 69, 73, 75, 80, 85, 86, 89, 93, 95, 96, 98) with a loading greater than 0.60. A PCA was then performed, which showed one factor with an eigenvalue higher than 1. The scree test showed a break between the first factor and the other factors, and parallel analysis gave the same results.

Concerning the reliability and the construct validity of the scale, Cronbach’s alpha coefficient was 0.97 with an average interitem correlation of 0.28. The correlations between each item and the total score were all significant ($P < .001$), with a range from 0.27 to 0.67; the average value was 0.53.

Cronbach’s alpha of the 24-item subscale of the FCQ was 0.94, with an average interitem correlation of 0.41.

The average total FCQ score was 35.46 (SD 24.29). The prevalence of the items was higher than 11%. Ten items (no. 14, 20, 23, 24, 45, 50, 51, 63, 79, 92) had a prevalence lower than 20%. The prevalence of the remaining items was 54 in the 21% to 40% range, 33 in the 41% to 60% range, and one in the 61% to 100% range.

The FCQ score correlated significantly and weakly with the BPRS score ($r = 0.14$, $P < .05$). The correlations between the FCQ score and the BPRS-P and BPRS-N scores were not significant ($r = 0.08$ and 0.05, respectively). However, the BPRS-G score correlated significantly and weakly with the FCQ score ($r = 0.15$, $P < .01$).

**DISCUSSION**

Our study does not support a four- or two-factor solution for the FCQ.

Among 229 schizophrenics meeting the ICD-8 criteria, Süllwold found a four-factor solution explaining 72% of the variance. Using a loading higher than 0.3, the factors were interpreted as (1) disturbances of automated responses, (2) perceptual disturbances, (3) depression, and (4) overinclusion. Schünenmann-Wurmhthaler et al. found a similar four-factor solution in 463 schizophrenics. In these studies, the authors used the Kaiser criteria and the interpretability of the variance to select the factors. Unfortunately, they did not display eigenvalue plots.

Mass et al. found a two-factor solution among 505 schizophrenic and 187 alcoholic inpatients meeting the ICD-10 criteria. The Kaiser criteria yielded 23 factors explaining 59.6% of the variance and the scree test yielded two nontrivial FCQ factors explaining 25.2% and 4.5% of the variance, respectively. A varimax rotation was then done and the variables with a loading higher than 0.50 were retained. The two factors were respectively termed “dysphoric concomitants of severe illness which particularly impair concentration” (FCQ-F1) and “subjective experiences of perceptual uncertainties” (FCQ-F2). These factors comprised 36 and 14 items, respectively. These authors did not examine the composition of the first two unrotated factors, and thus the rates of items having a loading higher than 0.30 in each factor are not known.

The factor analysis of Kim and Mueller relied on two fundamental postulates. The first, which they called the “postulate of factorial causation,” imposes a particular causal order on the data that observed variables are linear combinations of some underlying causal variables. The second is the “postulate of parsimony,” which allows the choice of the more parsimonious model between several factor models that are consistent with the observed data. The methods of rotation constitute the next step in factor analysis, which involves finding simpler and more easily interpreted factors through rotation, while keeping the number of factors fixed.

We believe the principle of parsimony and the criteria of interpretability of the variance must be applied to the unrotated factor solution. The primary aim of the rotation method is to increase the variable saturations on the different factors and not to reveal a factor composition that is not yet obvious in the unrotated solution. Thus, the relevance of the unrotated two-factor solution in the study by Mass et al. remains unknown.

The unidimensionality of the FCQ is supported by two studies. First, in 80 schizophrenics Reyt found a unidimensional structure underlying a 76-
Table 2. Factor Loadings of the Two-Factor (Unrotated Solution)

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Variance .2880 .0410
item version of the scale. Unfortunately, the author did not mention the eigenvalues of the factor solution. Second, Cuesta et al. found a one-factor solution in 286 psychotic inpatients meeting the DSM-III-R for psychosis (schizophrenia, schizophreniform disorder, schizoaffective disorder, etc.). The Kaiser criteria yielded 25 factors explaining 64.60% of the variance and the scree test (as reanalyzed by Mass et al.) yielded two nontrivial FCQ factors explaining 26.3% and 3.8% of the variance, respectively. The interpretation of the variance and the principle of parsimony led the authors to retain only one factor. Moreover, 87 of the 98 FCQ items were loaded in the first factor with a value between 0.30 and 0.69. Only 11 items had their highest weight in factors other than the first.

Several authors have proposed statistical methods for determining unidimensionality of a factor structure. For Reckase, the rate of the variance explained by the first factor should be higher than 20%, whereas Lumsden believes the ratio between the first and the second eigenvalue is a good indicator of unidimensionality. For Lord, a rough procedure for determining unidimensionality involves the ratio of first to second eigenvalue and an inspection as to whether the second eigenvalue is not much larger than any other value. Cuesta et al. operationalized the Lord criteria using Lord's homogeneity index $(1^o - 2^o)/(2^o - 3^o)$. The value was 24.17 in their study. In our study, the Lord homogeneity index was $(28.24 - 3.98)/(3.98 - 2.31) = 14.53$. It is important to note that this index is uncommon and its cutoff score to detect unidimensionality has not been determined. Other authors have proposed four criteria of the unrotated factor matrix that could support the hypothesis of unidimensionality: (1) the first extracted component should explain a large proportion (>40%) of the variance in the items; (2) subsequent components should explain fairly equal proportions of the remaining variance except for a gradual decrease; (3) all or most of the items should have substantial loadings (>0.3) on the first component; and (4) all or most of the items should have higher loadings on the first component than on subsequent components. Our results meet three of the four criteria.

Furthermore, Cronbach’s alpha is not only a reliability coefficient, but also an index of internal consistency. Cronbach’s alpha is an index of common-factor concentration and measures the homogeneity and the internal consistency of the scale. Its value is related to the average interitem correlation, and thus it represents a measure of unidimensionality. It is important to note that all the studies exploring the construct validity of the FCQ have shown the same value of (0.97) for this coefficient.

Cronbach’s alpha values for the different subjective symptoms scales higher than 0.80 have been found, but construct validity using factorial analyses has been seldom studied. Recently, the construct validity of the Bonn Scale for the Assessment of Basic Symptoms (BSABS) was examined using cluster analysis to identify the empirical item grouping. The results indicate five easily interpretable BSABS subsyndromes.

The issue of the number of dimensions of the FCQ has important implications. When one factor (FCQ score) or two factors (FCQ-F1, FCQ-F2) were taken into account, there were no significant differences between schizophrenia and other psychoses or alcoholism. When the 10 original subscales of the FCQ were considered, the results were contradictory. In one study, four subscales (motility, impaired simple perception, impaired complex perception, thought disorder) differentiated schizophrenics from schizoaffective and bipolar disorders, while another study found there were no significant differences among subjects with schizophrenia, alcoholism, and obsessive-compulsive disorders.

Mass et al. built two subscales extracted from the FCQ, the first being specific for schizophrenia and the second for alcoholism. In other words, as pointed out by Mass et al., the dimensional approach is not a suitable strategy concerning the problem of the specificity of the FCQ.

Unidimensionality underlying subjective symptoms could be related to a common pathogenetic mechanism as proposed by Huber. In addition, Peralta and Cuesta have proposed that subjective symptoms in psychotic disorders are the result of both a general psychotic factor and a diagnosis-related factor. To take into account the fact that subjective symptoms were observed not only in psychotic disorders but also in nonpsychotic disorders, like alcoholism, we suggest that subjective symptoms are related to a general psychopatholog-
ical dimension. This dimension would be constitutive, associated with other dimensions, of the different psychiatric syndromes.

Exploring the structure of 10 common mental disorders using confirmatory factorial analyses in the entire National Comorbidity Survey sample \((N = 8,098)\), Krueger\(^{28}\) found that a three-factor model (externalizing, anxious-misery, fear) provided the best fit for the data. This study excluded psychotic disorders.

The dimensional approach in schizophrenia using factorial analyses of the items of the Positive and Negative Syndrome Scale (PANSS) has shown that at least four or five dimensions (negative, positive, disorganization, anxious-depressive, excitation-activation) appear to best account for the phenotypic manifestations of schizophrenia.\(^{29}\)

Moreover, in psychotic disorders, five dimensions (negative signs, social dysfunctions, delusions, hallucinations, thought disorders) explain the factor structure of the Andreasen scale for positive and negative symptoms.\(^{30}\)

Using the Operational Criteria Checklist for Psychotic Illness (OCCPI), Van Os et al.\(^{31}\) explored underlying dimensions of psychopathology in a cohort of 166 patients with functional psychosis of recent onset. Using factorial analysis of the OCCPI items, they found seven psychopathological dimensions. Five of these seven dimensions bore differential associations with subsequent treatment and illness course. These authors felt that dimensional representations of psychopathological features were more useful than categorical representations as predictors of illness course and treatment decisions.

In a prospective study with an average 8-year follow-up, Klosterkötter et al.\(^{32}\) explored the predictive value of early self-experienced neuropsychological deficits for subsequent development of schizophrenia. Using the BSABS, they found that the development of schizophrenia was correctly predicted by the earlier presence of self-experienced disturbances.

It would be interesting to explore the relationships between the subjective symptom dimensions and the objective symptom dimensions using factorial analysis on the FCQ and PANSS items to test the hypothesis that the subjective dimension was independent of the objective dimensions. If the subjective dimension would constitute an independent dimension, its prognostic value could be explored.

Finally, our subscale avoids the use of the full FCQ, which takes a long time to administer. It contains 24 items, 11 and 16 of which are respectively shared by the 18-item FPSES and the 36-item FCQ-F1 subscales.

Concerning the correlations between the FCQ score and the BPRS subscale scores, our results confirm previous studies. Mass et al.\(^{26}\) did not find, in 50 schizophrenic inpatients, significant correlations between the FCQ score and the positive or the negative subscale scores of the PANSS. Moreover, they reported significant correlations between the FCQ score and the cognitive and the depression subscale scores of the PANSS.

Interpretation of the results of the present study is subject to limitations. First, only one psychiatrist interviewed patients to make a diagnosis. Second, all patients were currently in treatment. This naturalistic setting led to bias, although the correlation between the FCQ score and the neuroleptic dosage (chlorpromazine equivalent) was low \((r = 0.15, P < .01)\).

REFERENCES