



A two-factor structure of first rank symptoms in patients with a psychotic disorder

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ABSTRACT

Kurt Schneider defined ‘first rank symptoms’ (FRS) of psychosis. Previous research found two clusters of FRS: ‘loss of ego bound’ symptoms (e.g., delusions of external control) and auditory hallucinations (e.g. commenting voices). In patients with a psychosis we investigated whether FRS are a separate cluster within the group of positive symptoms, consisting of two underlying factors that are stable over time. We conducted a principal axis factor analysis (PAF) at baseline ($n = 857$) and a confirmative factor analysis (CFA) at three-year follow-up ($n = 414$) on (FRS) symptom score. Also, we investigated the stability of the two-factor structure of FRS over the interval. PAF on 16 items representing positive symptoms at baseline revealed two factors with eigenvalues > 1 . FRS-delusional self experience (thought withdrawal, thought broadcasting, thought insertion, and beliefs that impulses and/or actions are controlled by an outside force) clustered in one factor and FRS-auditory hallucinations (auditory hallucinations, conversational voices, and voices commenting on one’s actions) in the second factor. Furthermore, CFA on the FRS-items at follow-up confirmed the two-factor structure of FRS. FRS delusional self experience and FRS-auditory hallucinations at baseline were significantly associated with the same factors at three-year follow-up (FRS-delusional self experience: $r = 0.38$; FRS-auditory hallucinations $r = 0.47$). Hence, our findings confirm a two-factor structure of first rank symptoms, i.e. FRS-delusional self experience and FRS-auditory hallucinations, with a moderate to large internal coherence within each factor and relative stability over time. Future studies on self-processes may contribute to our understanding of the pathophysiology of first rank symptoms.

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1. Introduction

Current diagnostic models of schizophrenia are under debate because of their inability to identify homogeneous patient groups (Korver-Nieberg et al., 2011). Over the years different models of schizophrenia have been proposed and one of the most prominent models has been the concept of ‘first rank symptoms’ (FRS). FRS

were introduced by Kurt Schneider in the 1960s and rapidly became popular as a pragmatic diagnostic tool. Schneider described FRS as follows: auditory hallucinations (audible thoughts, conversational voices, and voices commenting on one’s actions), different types of abnormal perception and delusions that can be conceptualized as “loss of ego bound”, i.e., a deficit in the barrier separating self from the environment (thought withdrawal, thought broadcasting, thought insertion, and beliefs that impulses and/or actions are controlled by an outside force), and delusional perception (a normal percept which is interpreted with delusional meaning) (Mellor, 1970; Carpenter et al., 1973; Carpenter and Strauss, 1974). Findings on the prevalence and prognostic value of FRS however have been widely inconsistent. The concept of delusional perception has even somewhat fallen in oblivion in contemporary research on FRS (Rossi Monti, 1998; Waters et al., 2009; Waters and Badcock, 2010; Rosen et al., 2011). Evidence suggests that FRS symptoms are not specific for schizophrenia, making the concept not applicable for diagnostic purposes (Carpenter et al., 1973; Peralta and Cuesta, 1999; Nordgaard et al., 2008; Rosen et al., 2011). For research purposes though a well defined cluster of symptoms is helpful as unravelling its underlying mechanisms might help us understand the pathophysiological mechanisms of schizophrenia and other psychotic disorders.

Some have suggested that FRS are merely a ‘chance cluster’ of symptoms (Crichton, 1996), without a theory or presupposed aetiology. A

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critical review (Nordgaard et al., 2008) of the FRS literature pointed out that because of inconsistencies in the operationalization the (diagnostic) specificity of FRS remains unclear. It was suggested that FRS should not be considered as “atomic symptoms” but as two groups of phenomena, albeit with an overlap between them (Nordgaard et al., 2008). Previous research indeed found indications for such a two-factor structure (Loftus et al., 2000). In a group of 103 sibling pairs the first factor consisted of different types of abnormal perception (thought insertion, reading, withdrawal and broadcasting) and delusions of alien control, while the second factor grouped third person voices, thought echo and commentary voices together (Loftus et al., 2000). Peralta and Cuesta (1999) found a similar factor structure, although the factor with hallucinations also included delusion perception. However, 1-factor (Kimhy et al., 2005) and 5-factor models (Ceccherini-Nelli and Crow, 2003) have also been suggested. These contradicting findings can be explained by the number and type of symptoms that were included in the factor analyses. Kimhy et al. (2005) only included delusional symptoms while Ceccherini-Nelli and Crow (2003) included only FRS and no other psychotic symptoms.

The aim of the current study was three-fold. First we evaluated whether the cluster of FRS symptoms described by Loftus et al. (2000) can be identified within the group of all positive symptoms. Our second aim was to answer the question if a two-factor structure is underlying FRS as was previously found by Loftus et al. (2000) in a large sample of patients with a psychotic disorder. Thirdly we investigated the stability of a two-factor structure of FRS over time.

2. Methods

2.1. Population

Participants took part in the Genetic Risk and Outcome of Psychosis (GROUP) study, a naturalistic follow-up study in which 1120 patients, 1057 of their siblings, 919 of their parents and 590 healthy controls were included. Patients were selected from geographical areas in The Netherlands and Belgium and were identified by representative clinicians whose caseload was screened for inclusion criteria. Subsequently a group of patients presenting consecutively at these services either as out-patients or in-patients were recruited for the study. For the current study we only used the patient sample. Inclusion criteria for patients were I) age between 16 and 50 years, II) a diagnosis of non-affective psychotic disorder according to DSM-IV (American Psychiatric Association, 2000; 1992), and III) good command of the Dutch language. An exclusion criterion was first contact with psychiatric care for psychosis more than 10 years before study entrance. Further details on in- and exclusion criteria, procedure of recruitment and population characteristics of the GROUP study have been described in detail elsewhere (Korver et al., 2012). An additional inclusion criterion for the current study was the presence of data acquired by the Comprehensive Assessment of Symptoms and History interview (CASH) (Andreasen et al., 1992). At follow-up measurement one site replaced the CASH by the Schedules for Clinical Assessment for Neuropsychiatry (SCAN) (Wing et al., 1990) thus from this site only the baseline data was used.

2.2. Instruments

2.2.1. CASH

The Comprehensive Assessment of Symptoms and History interview (CASH) is developed to provide information about the current and past symptoms of psychotic disorders in the affective and schizophrenia spectrum (Andreasen et al., 1992). For the purpose of this study only data gathered via Sections 6 and 7 was used; in these sections the type and severity of positive psychotic symptoms were assessed. In Section 6 the following type of delusions are described: paranoid, jealousy, guilt, grandiosity, religious, somatic, reference, alien body control and the following abnormal perception phenomena thought reading, thought

broadcasting, thought insertions and thought withdrawal. The latter five symptoms are defined as part of First Rank Symptoms (FRS). Section 7 describes auditory hallucinations (including audible thoughts), voices commenting and conversational voices, somatic, tactile, olfactory and visual hallucinations. The first three symptoms are defined as being part of FRS. The presence of each positive symptom in the last months is indicated on a six point Likert scale from 0 (absent) to 5 (severe). Trained psychiatrists and psychologists administered the CASH. The CASH (Andreasen et al., 1992) unfortunately does not measure delusional perception and therefore delusional perception is not included in our analyses.

2.2.2. PANSS

The Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1987) is a 30-item rating scale. Items are rated on a 7-point scale (1 = absent, to 7 = extremely severe). The PANSS consists of three subscales: Positive Scale, Negative Scale and General Psychopathology. The items were rated by trained psychiatrists and psychologists after a semi-structured interview.

2.3. Data analyses

2.3.1. Characteristics of the sample & selection bias at follow-up

Baseline characteristics were compared between subjects who participated in the follow-up assessment and those who did not, to investigate possible selection bias in the sample. At baseline one-way multiple analysis of variance (ANOVA) and χ^2 tests were performed to assess potential differences in age, gender, diagnosis, duration of illness, education (ranging from 1 = primary school to 8 = university), cannabis dependency and positive, negative and general psychopathology symptom scores on the PANSS between patients who participated in the follow-up assessments and those who did not.

2.3.2. Structure of FRS

First all positive symptom items rated on the CASH at baseline were subjected to an exploratory principal axis factor analysis (PAF) using SPSS version 19, considering only components with an eigenvalue exceeding 1. A PAF was the rightful exploratory factor analysis, due to the skewed distribution of the data (Costello and Osborne, 2005). To facilitate the interpretation of components oblique rotation (OBLIMIN) was performed. The Kaiser–Meyer–Oklin measure of sampling adequacy should exceed the value of 0.6 (Kaiser, 1970, 1974) and the Bartlett’s test of sphericity should be significant ($p < 0.05$) for the PAF to be considered appropriate (Bartlett, 1954).

Confirmatory factor analysis (CFA) was conducted on the follow-up symptom scores of only FRS, in order to confirm the theoretical two-factor model. MPLUS version 5.1 statistical modelling program was used to perform CFA. The eight items representing FRS in the CASH interview were included in the CFA with the categorical responses 0 (absent), 1 (doubtful), 2 (mild), 3 (moderate), 4 (considerable) and 5 (severe). Because of the categorical character of the items and the expected correlation between the factors, parameter estimation was performed using Weighted Least Squares Means and Variance adjusted estimator (WLSMV). Two models with respectively one and two factors of FRS were submitted to CFA analyses. We tested a two-factor model with factor one comprising the items ‘delusion of alien body control’, ‘thought insertion’, ‘thought broadcasting’, ‘thought reading’ and ‘thought withdrawal’ and ‘auditory hallucinations’, ‘conversational voices’ and ‘commenting voices’ in the second factor. Due to large sample size type I error can be expected and therefore fit indices Comparative Fit Index (CFI), Tucker–Lewis Index (TLI) and Root Mean Square Error of Approximation (RMSEA) are applied (Yu, 2002). The CFI and TLI > 0.95 and a RMSEA < 0.08 indicated an adequate fit to the data (Yu, 2002) and were used as a rule of thumb in this study. Accordingly, the model with a two-factor solution was nested in the one-factor solution. The goodness-of-fit of nested models is evaluated by hierarchic

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