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The negative syndrome of schizophrenia: Three -underlying components are better than two

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SUMMARY

Aims: To analyse the underlying structure of the negative syndrome of schizophrenia as it is represented in the Brief Negative Symptom Scale.
Methods: Cross-sectional, multicentre study, employing data from 190 evaluations. Statistics: Exploratory factor analysis using the principal component analysis method.
Results: The three-component solution explained 77.4% of the total variance. Pearson correlation coefficients between components were: 1–2 = −0.494, 1–3 = −0.117, and 2–3 = 0.179.
Conclusion: Our solution favours a three-component structure of the negative syndrome, consisting of: external world (anhedonia and asociality), inner world (avolition and blunted affect), and alogia, with the latter only marginally related to the two former components.

1. Introduction

The negative syndrome of schizophrenia, which includes social isolation, anhedonia, avolition, flat affect and alogia (Kirkpatrick et al., 2006.; Blanchard and Cohen, 2006), comprises about 20% of patients, occurs from the onset of the disorder, and lacks effective treatment. Together with cognitive symptoms, it has a significant impact on functioning, especially on the social domain (Bowie et al., 2006, 2010; Harvey et al., 2012; Rocca et al., 2014).

Previous studies on the factor structure of the negative syndrome, as it is represented in second-generation negative symptom scales (Garcia-Portilla and Bobes, 2013), suggest a two-dimensional underlying structure, with one factor – expression – related to observable signs (blunted affect and alogia), and the other – experience – related to motivation, pleasure and social involvement (Horan et al., 2011; Kirkpatrick et al., 2011; Strauss et al., 2012; Kring et al., 2013). However close examination of the factor analyses published to date raises a number of doubts that challenge the two-factor solution. Regarding the Brief Negative Symptom Scale (BNSS), four of the seven items of Factor 2 also load quite strongly on Factor 1 (>0.45) (Kirkpatrick et al., 2011), and there is no information on the correlation coefficient between these two factors that supports their independence (Kirkpatrick et al., 2011; Strauss et al., 2012). In the case of the Clinical Assessment Interview for Negative Symptoms (CAINS), none of the papers (Horan et al., 2011; Kring et al., 2013) provided information on the percentage of the variance explained (for the solution or for each of the factors obtained), or on the loadings of all items on each of the factors, so the reader is not able to know the adequacy of the factor structure. In addition, in the first paper (Horan et al., 2011) the scree plot suggested a two- or three-factor solution, yet the choice of the two-factor solution was not clearly explained by the authors.

Finally, the most important factor of both scales (Factor 1 — expression), explained 57% of the variance in the case of the BNSS (compared with 14% explained by Factor 2 — motivation and pleasure). This data was not available for the CAINS (Horan et al., 2011; Kirkpatrick et al., 2011; Strauss et al., 2012; Kring et al., 2013). This means that

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blunted affect and alogia represent the "core" of the negative syndrome, while motivation, pleasure and social involvement would be peripheral symptoms.

Bearing the above in mind, we set out to identify the underlying structure of the negative syndrome as part of the Spanish validation study of the BNSS (Mané et al., 2014). Based on our previous work (Garcia-Portilla and Bobes, 2013), we hypothesized that alogia would not belong to the negative but to the cognitive dimension of schizophrenia. Therefore we speculated that alogia would be an independent factor, with low correlation coefficients with the other symptoms of the negative dimension.

2. Methods

2.1. Study design

The data presented in this paper are from a cross-sectional, naturalistic, multicentre, validation study in patients with schizophrenia, conducted at 3 outpatient services in Spain (Parc de Salut Mar Barcelona, Hospital Clinic de Barcelona and Universidad de Oviedo). The data reported here are confined to the BNSS. For further clinical details on the sample please refer to Mané et al., 2014. The study was approved by the Ethics Committee for Clinical Research of each site, and is in accordance with the 1975 Declaration of Helsinki, as revised in 1983. Written informed consent was obtained from all subjects prior to enrolment.

2.2. Subjects

Twenty participants recruited from the schizophrenia research programmes of the three sites were enrolled based on the following inclusion criteria (1) age ≥ 18 years; and (2) diagnosis of schizophrenia (made by registered consultant psychiatrists using DSM-IV criteria). Exclusion criteria were (1) IQ below 80; and (2) neurological disorders or substance dependence except tobacco.

2.3. Procedure and measures

We followed the original BNSS validation methodology (Kirkpatrick et al., 2011). All patients were interviewed at baseline and ten were also interviewed one week later for the test–retest reliability analysis. All BNSS interviews were videotaped and rated independently by all the raters in the study [AM and DB (Parc de Salut Mar, Barcelona, Spain), CGR and GS (Hospital Clinic, Barcelona, Spain), EFE (University of Cambridge, UK), and PGP and LGA (Universidad de Oviedo, Spain)]. All raters are qualified psychiatrists or psychologists, all of whom participated in the BNSS adaptation and validation procedures. In order to improve inter-rater reliability a pilot study was conducted with two patients using the same inclusion criteria. The patients were interviewed with the BNSS-Sp. The interviews were videotaped by AM and were later assessed by all participating raters. Ratings were discussed to ensure that the BNSS-Sp criteria were understood. For further details see Mané et al. (2014).

Here we report the data from the 190 evaluations obtained from the baseline visit (20 patients rated by 7 raters) and the re-test visit (10 patients rated by 5 raters).

2.4. Statistical analysis

The statistical analysis was performed using SPSS v.17.0. The statistical significance was two-tailed and was set at 0.05. An exploratory factor analysis (EFA) using the principal component analysis (PCA) method with oblimin rotation was used to explore the component structure of 12 of the 13 BNSS items. We decided not to include item 4 "Distress" as its communalities were 0.377 (for the three-component solution) and 0.357 (for the two-component solution), thus indicating that this item has a poor fit with regard to the other items in its component. This decision was also supported by the theoretical composition of the negative syndrome. However when we repeated the same analyses including this item we obtained very similar results (Table 3). We decided to use the oblimin rotation method as it provides a better representation of clinical reality, characterized by relationships between the different dimensions of the negative syndrome (Horan et al., 2011). Due to criticism of the Kaiser rule (i.e. retention of principal components with eigenvalues above 1) we also used the scree plot to determine the appropriate number of components to extract. We then performed a PCA analysis with oblimin rotation, so as to extract the selected components of the 12 items of the BNSS. Only items with a loading ≥0.40 were considered to load on a component. The component correlation matrix was also obtained. The internal consistency of the BNSS components was calculated using Cronbach's *alpha* coefficient at the item level. Finally we calculated Pearson correlation coefficients (*r*) to determine the strength of the relationships between components.

Table 1
BNSS rotated three-component structure and component loadings.

BNSS items	Component loadings		
	Component 1 External world	Component 2 Inner world	Component 3 Alogia
1. Pleasure: intensity	**0.919**	0.460	
2. Pleasure: frequency	**0.873**	0.392	
3. Expected pleasure: intensity	**0.796**	0.348	
5. Asociality: behaviour	**0.780**	0.431	
6. Asociality: internal experience	**0.728**	0.361	
7. Avolition: behaviour	0.661	**0.746**	
8. Avolition: internal experience	0.634	**0.766**	
9. Blunted affect: facial expression	0.383	**0.912**	
10. Blunted affect: vocal expression	0.335	**0.885**	
11. Blunted affect: expressive gestures	0.490	**0.881**	0.356
12. Alogia: quantity of speech	0.550	0.619	**0.770**
13. Alogia: spontaneous elaboration	0.580	0.664	**0.742**
Eigenvalues	6.575	1.686	1.031
Percentage of total variance	54.791	14.052	8.589

3. Results

Subjects' mean age was 37.3 (11.7), 70% were male, and the mean length of illness was 11.6 years (10.4). Mean BNSS total score was 23.7 (15.4). Mean scores on each of the subscales were Anhedonia [5.0 (4.5)], Distress [1.1 (1.5)], Asociality [3.8 (2.5)], Avolition [4.1 (2.9)], Blunted affect [6.5 (5.0)], and Alogia [3.3 (3.5)].

Table 2
BNSS rotated two-component structure and component loadings.

BNSS items	Component loadings	
	Component 1	Component 2
1. Pleasure: intensity	**0.920**	0.465
2. Pleasure: frequency	**0.872**	0.419
3. Expected pleasure: intensity	**0.794**	0.411
5. Asociality: behaviour	**0.781**	0.426
6. Asociality: internal experience	**0.727**	0.399
7. Avolition: behaviour	**0.669**	0.651
8. Avolition: internal experience	0.641	**0.692**
9. Blunted affect: facial expression	0.388	**0.913**
10. Blunted affect: vocal expression	0.342	**0.865**
11. Blunted affect: expressive gestures	0.494	**0.905**
12. Alogia: quantity of speech	0.547	**0.767**
13. Alogia: spontaneous elaboration	0.577	**0.803**
Eigenvalues	6.575	1.686
Percentage of total variance	54.791	14.052