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FACTOR STRUCTURE OF THE BRIEF NEGATIVE SYMPTOM SCALE

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Abstract

The current study examined the factor structure of the Brief Negative Symptom Scale (BNSS), a next-generation negative symptom rating instrument developed in response to the NIMH-sponsored Consensus Development Conference on Negative Symptoms. Participants included 146 individuals with a DSM-IV diagnosis of schizophrenia or schizoaffective disorder. Principal axis factoring indicated two distinct factors explaining 68.7% of the variance. Similar to previous findings, the factors reflected motivation and pleasure and emotional expressivity. These findings provide further support for the construct validity of the BNSS, and for the existence of these two negative symptom factors.

Keywords

Anhedonia; Avolition; Asociality; Blunted Affect; Alogia

1.0. Introduction

Studies examining the factor structure of psychiatric symptoms in schizophrenia typically indicate that negative symptoms reflect a dimension of pathology that is distinct from psychosis and disorganization (Keefe et al., 1992; Mueser et al., 1994; Peralta & Cuesta, 1995; Sayers et al., 1996; Kelley et al., 1999). However, negative symptoms may not reflect a singular construct, as the factor structure of items within negative symptom scales such as the Scale for the Assessment of Negative Symptoms (SANS: Andreasen, 1982) and Schedule for the Deficit Syndrome (SDS: Kirkpatrick et al., 1989) typically report two distinct factors: one reflecting diminished emotional expression, including alogia and

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blunted affect, and the other representing motivation and pleasure, including asociality, avolition, and anhedonia items (for review see Blanchard & Cohen, 2006).

We previously reported the development and psychometric properties of the Brief Negative Symptom Scale (BNSS: Kirkpatrick et al., 2011), a next-generation negative symptom rating instrument that was developed in response to the NIMH consensus development conference on negative symptoms (Kirkpatrick et al., 2006) and intended for clinical trial use. Across two studies, the BNSS has demonstrated strong inter-rater reliability, internal consistency, stability, and convergent/discriminant validity (Kirkpatrick et al., 2011; Strauss et al., under review). Construct validity of the BNSS was also demonstrated via Principal Components Analysis (PCA), which indicated the presence of two factors reflecting Motivation and Pleasure and Emotional Expressivity that accounted for 71% of variance (Kirkpatrick et al., 2011). A limitation of the initial study was that the observations included in the analysis were not independent- they included scores from 7 raters who evaluated 20 separate participants (140 observations). In the current study, we aimed to extend our initial examination of the factor structure of the BNSS in a large sample of unique participants.

2.0. Methods

2.1. Participants

Participants included 146 individuals meeting DSM-IV diagnostic criteria for schizophrenia or schizoaffective disorder who were recruited via the research programs at the Maryland Psychiatric Research Center. Participants were evaluated during a period of clinical stability, as indicated by no changes in medication type or dosage for a period of 4 or more weeks prior to the evaluation and as judged by themselves and their treating clinician(s). Consensus diagnosis was established via a best-estimate approach based upon multiple interviews and a detailed psychiatric history. This diagnosis was subsequently confirmed using the Structured Clinical Interview for the DSM-IV (SCID: First et al., 1997). Exclusion criteria included substance abuse or dependence in the past 6 months and history of head injury or neurological disorder. Axis I comorbid diagnoses for the sample included: Current dysthymic disorder: n = 1, Current GAD: n = 3, Current MDD: n = 4, Current OCD: n = 1, Current Panic Disorder: n = 2, Current PTSD: n = 1, Current Specific Phobia: n = 2., Lifetime Alcohol Abuse: n = 21, Lifetime Alcohol Dependence: n = 15, Lifetime Cannabis Abuse: n = 24, Lifetime Cannabis dependence: n = 7, Lifetime Cocaine Abuse: n = 3, Lifetime Cocaine Dependence: n = 6, Lifetime Hallucinogen Abuse: n = 1, Lifetime MDD: n = 20, Lifetime OCD: n = 2, Lifetime Opioid Abuse: n = 2, Lifetime Opioid Dependence: n = 2, Lifetime Polydrug Abuse: n = 4, Lifetime Polydrug Dependence: n = 2, Lifetime Social Phobia: n = 2, Lifetime Specific Phobia: n = 2, Lifetime Stimulus Abuse: n = 1, Lifetime Stimulus Dependence: n = 1. Every participant provided written informed consent for a protocol approved by the University of Maryland Institutional Review Board. Demographic information is presented in Table 1.

2.2. Procedures

Clinical ratings were made by interviewers trained to reliability standards (ICC > 0.80). Interviewers had at least one year of clinical experience and came from varying academic backgrounds (M.D., Ph.D., M.A., B.S.). Interviewers received ongoing supervision and participated in gold-standard interview meetings to maintain quality assurance. Administration time for the BNSS interview is approximately 15 minutes. There were no significant differences in ratings made by individuals from different academic backgrounds.

2.3. Data Analysis

Exploratory, rather than confirmatory, factor analysis was selected given that observations in our prior study were not independent (Kirkpatrick et al., 2011) and the factor structure of the BNSS was not thus definitively tested. Furthermore, our aim was to explore the latent structure of the scale, rather than to test an apriori model of negative symptom dimensionality. It is unclear whether the two factors found on older scales would be expected to apply to the BNSS given differences in item content. Principal Axis Extraction was selected rather than Principal Components Analysis (PCA) given that the former identifies factors based upon a mathematical model that gives accurate estimates of underlying factors, whereas PCA merely decomposes the data into a set of linear components and may yield less interpretable loadings (see Cliff, 1987). An oblique rotation was selected (promax) given that BNSS items show moderate correlations. The optimal number of factors was determined via scree plot and Eigen value > 1.0 criteria. Items with robust loadings (>0.40) were used to interpret factors.

3.0. Results

A Principal Axis Factor Analysis was conducted on the 13 BNSS items with oblique rotation (promax). The Kaiser-Meyer-Olkin measure verified sampling adequacy for the analysis, KMO = 0.88. Bartlett's test of sphericity, $\chi^2(78) = 1681$, $p < 0.001$, indicated that correlations among items were sufficiently large for the analysis. An evaluation of the Scree plot and eigen value criteria indicated two distinct and interpretable factors explaining 68.7% of the variance. The rotated factor structure is presented in Table 2.

BNSS items were assigned to factors based on their highest level of loading. Factor 1 reflects a Motivation and Pleasure dimension, consisting of the items in the Anhedonia, Avolition, and Asociality subscales. Factor 2 reflected an Emotional Expressivity dimension, consisting of the Blunted Affect, Alogia, and Lack of Normal Distress subscale items. None of the items loaded highly on more than one factor (all < 0.25).

4.0. Discussion

In two studies (see Kirkpatrick et al., 2011), the BNSS has shown good separation of the two dimensions thought to underlie negative symptoms: Motivation-Pleasure and Emotional Expressivity. Other instruments have produced less clean factor loadings or been less consistent in this regard (Blanchard & Cohen 2006; Horan et al., 2011). These factors were found on the BNSS using interviewers from a variety of academic backgrounds.

Similar to our initial study, the Lack of Normal Distress had a moderate loading on the Emotional Expressivity dimension (0.49 initial study; 0.51 current study). This result is consistent with factor analytic studies on the SDS (Kimhy et al., 2006; Nakaya & Ohmori, 2008), the only other scale that assesses lack of normal distress. The consistency of factor analytic findings across the BNSS and SDS suggests that reductions in the experience of negative emotionality have shared variance with reductions in the expression of emotion. In contrast, anhedonia appears to be more related to motivation than expressivity.

Although the BNSS has a two-factor structure similar to other scales (e.g., Horan et al., 2011; Andreasen, 1982), we do not divide the items into these two domains for scoring purposes. This is supported by the fact that the correlation between these factors is moderately high. The primary dependent variable of the BNSS is the sum of all items. This procedure makes the BNSS suitable for clinical trial use, which requires one primary outcome measure. The total score of each subscale can be considered as secondary outcome measures for exploratory purposes.

Overall, the current findings replicate and extend our initial study (Kirkpatrick et al., 2011), providing further support for the construct validity of the BNSS and further evidence for the existence of two negative symptom factors. Given its brevity and excellent psychometric properties (Kirkpatrick et al., 2011; Strauss et al., under review), the BNSS is applicable for use in clinical trials, as well as experimental and epidemiological research.

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Table 1

Participant Demographic Characteristics (n = 146)

	Mean (SD)
Age	42.1 (11.8)
Participant Education	12.6 (2.0)
Parental Education	13.3 (2.9)
% Male	74.7%
Ethnicity	
American-Indian	0.7%
Asian	1.4%
African-American	37.7%
Mixed-Race	3.4%
Caucasian	56.8%

Table 2

Factor Analysis of the BNSS

Item	Factor 1 Emotional Expressivity	Factor 2 Motivation and Pleasure
Quantity of Speech	**0.98**	−0.11
Spontaneous Elaboration	**0.95**	−0.13
Vocal Expression	**0.81**	0.04
Expressive Gestures	**0.75**	0.09
Facial Expression	**0.62**	0.23
Lack of Normal Distress	**0.51**	0.05
Frequency of Pleasure During Activities	−0.03	**0.88**
Avolition: Internal Experience	0.07	**0.81**
Avolition: Behavior	0.08	**0.79**
Intensity of Pleasure During Activities	−0.05	**0.79**
Asociality: Internal Experience	0.22	**0.67**
Asociality: Behavior	0.24	**0.62**
Intensity of Expected Pleasure from Future Activities	−0.15	**0.60**
Eigen Values	7.53	1.40
% of Variance	57.9	10.8