Measuring motivation in people with schizophrenia

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A B S T R A C T

Motivational deficits are a key determinant of poor functional outcomes in schizophrenia. These impairments are typically evaluated using various clinical rating scales; however, the degree of convergence between motivation scores derived from different instruments is not clear. In the present study, we measured motivational deficits in 62 patients with schizophrenia using 5 scores derived from 3 different instruments. We found that the scores from these different instruments were highly inter-correlated, and largely independent of severity of other symptom domains (e.g., depression). Our findings suggest that clinical ratings scales evaluating motivational deficits are tapping into a similar underlying construct.

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1. Introduction

Motivational deficits are a prevalent feature of schizophrenia, even in the early stages of illness (Lyne et al., 2012; Fervaha et al., 2015). The importance of these symptoms is highlighted by consistent findings from several studies demonstrating that these impairments represent a critical link to the poor functional outcomes characterizing this illness (Faerden et al., 2009; Foussias et al., 2011; Konstantakopoulos et al., 2011; Green et al., 2012; Fervaha et al., 2013; Rocca et al., 2014; Fervaha et al., 2015). While several instruments exist to evaluate these symptoms, the degree of convergence between scores derived from different instruments, as well as whether motivational deficits scores overlap with ratings of symptom severity in other domains of illness (e.g., depression), is not clear.

Several ratings scales exist that evaluate negative symptoms more broadly and in doing so also tap into aspects of motivational impairment (Weiser and Garibaldi, 2015). An example of such an instrument includes the Scale for the Assessment of Negative Symptoms (SANS) which includes an avolition/apathy subscale (Andreasen, 1989). In addition to the SANS, newer negative symptom rating scales have been developed that include specific items tapping into motivational deficits

(Kirkpatrick et al., 2011; Kring et al., 2013). In contrast, some investigators have utilized a motivational deficit specific instrument such as the Apathy Evaluation Scale (AES) in order to assess the severity of this domain of illness (Marin et al., 1991).

Several studies have supported the notion that motivational deficits evaluated using different ratings scales provide converging information. For example, a previous study using the newer Clinical Assessment Interview for Negative Symptoms has found moderate overlap between motivational deficit ratings derived from this scale and those derived from the SANS (Kring et al., 2013). Another study reported a high degree of overlap between motivational deficits evaluated using another new rating scale, the Brief Negative Symptom Scale, and scores derived from the AES (Hartmann et al., 2015). Motivational deficits, as rated on the SANS, have also been linked to scores from other measures of amotivation/apathy (Yazbek et al., 2014). Furthermore, in a recent study we showed that ratings of motivational deficits taken from 3 different ratings scales all provided convergent information, and factor analysis revealed a single-factor solution, suggesting that ratings from these different scales were all tapping into a similar unifying construct (i.e., motivational deficits) (Foussias et al., 2015).

In the present study we specifically examined the degree of convergence between motivational deficit scores derived from selected instruments, and further explored the discriminant validity of these scores. We hypothesized that motivational deficit scores from different instruments would be highly correlated, and would similarly not be highly

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related to other variables such as positive and depressive symptom severity.

2. Methods

2.1. Participants

Patients with schizophrenia were recruited from outpatient clinics at the Centre for Addiction and Mental Health. Selection criteria for participants included: (1) diagnosis of a schizophrenia or schizoaffective disorder depressed subtype (no current mood episode), and an absence of any other current Axis I disorder (e.g., substance dependence within the past 3 months), confirmed using the Mini International Neuropsychiatric Interview (Sheehan et al., 1998) and medical records, (2) age 18–35 years, (3) stable outpatient, with no inpatient hospitalizations within the previous 3 months, (4) competence to provide informed consent, evaluated using the MacArthur Competence Assessment Tool (Appelbaum and Grisso, 2001), (5) no serious or unstable medical condition, and (6) ability to communicate in English. The study was approved by the institutional research ethics board, and all participants provided written informed consent prior to study participation.

2.2. Measures and procedure

Three instruments were used to evaluate motivational deficits: the clinician version of the AES (Marin et al., 1991), the Quality of Life Scale (QLS) (Heinrichs et al., 1984), and the SANS (Andreasen, 1989).

The AES is an 18-item rating scale that taps into both subjective and behavioral aspects of motivational deficits. An example item includes: "S/he has motivation." The total score from the instrument was used as a measure of motivational deficits, where higher scores reflect greater deficits.

From the QLS, we extracted the motivation item as a measure of motivational deficits. This item taps into goal-directed motivation and is rated based on subjective accounts of initiative, persistence, and self-reported achievements. We have previously shown that this item is highly associated with the 3-item intrinsic motivation score also derived from the QLS (Nakagami et al., 2008; Fervaha et al., 2015). Higher scores on this measure reflect greater motivation or, conversely, less motivational deficits.

In addition to scores from the AES and QLS, we also extracted 2 scores from the SANS. Specifically, we used the avolition/apathy subscale global item as a measure of motivational deficits, and in addition we computed another score by summing individual items from the avolition/apathy subscale excluding the global item. In addition to this, we also computed a third score by summing individual items from the avolition/apathy and anhedonia/asociality subscales (excluding global items). For each of these scores higher values indicate greater severity of motivational deficits.

Positive symptom severity was also evaluated using the thought disturbance factor (Mueser et al., 1997) derived from the anchored version of the Brief Psychiatric Rating Scale (BPRS) (Woerner et al., 1988). Symptoms of disorganization were also evaluated using factor scores derived from the BPRS (Woerner et al., 1988; Mueser et al., 1997). Severity of depressive symptoms was evaluated using the total score from the Calgary Depression Scale for Schizophrenia (CDSS) (Addington et al., 1992). Notably, the CDSS does not evaluate symptoms such as anergia, anhedonia, or lack of interest and therefore may represent an instrument that is well suited to discriminate depressive and negative symptoms in schizophrenia. Finally, antipsychotic dosage equivalents were computed using chlorpromazine equivalents (Gardner et al., 2010).

2.3. Statistical analyses

Convergent and discriminant validity of the motivational deficit scores was evaluated using Spearman's rank-order correlation

Table 1
Sociodemographic and clinical characteristics of the patient sample.

Variable	Schizophrenia (N = 62) Mean (S.D.) or %
Age (years)	26.3 (3.9)
Sex (% male)	67.7
Diagnosis (%)	
Schizophrenia	95.2
Schizoaffective disorder	4.8
Antipsychotic dosage (chlorpromazine) equivalents[a]	530.9 (225.5)
AES total	37.6 (9.6)
QLS motivation	3.6 (1.6)
SANS avolition global	2.1 (1.3)
SANS avolition subscale	5.3 (3.5)
SANS avolition-anhedonia subscales	11.5 (6.7)
BPRS positive symptoms	8.1 (4.3)
BPRS disorganization symptoms	5.0 (1.8)
CDSS total	1.8 (2.7)

Abbreviations: AES: Apathy Evaluation Scale; QLS: Quality of Life Scale; SANS: Scale for the Assessment of Negative Symptoms; BPRS: Brief Psychiatric Rating Scale; CDSS: Calgary Depression Scale for Schizophrenia.
[a] 60 patients were receiving atypical antipsychotic monotherapy, while 2 participants were receiving typical antipsychotics.

coefficients. Next, we wanted to replicate our previous findings of a single-factor solution parsimoniously explaining the data (Foussias et al., 2015). For this, we conducted an exploratory factor analysis with principal axis extraction on 4 motivation scores (not including the SANS avolition/apathy subscale score). Initially, no rotation was specified; however, the results remain unchanged if varimax or promax rotations were specified. Statistical tests were considered significant at a p-value of less than 0.05 (two-tailed). Data were analyzed using SPSS Statistics version 20 (IBM Corp., Armonk, NY, USA).

3. Results

3.1. Patient characteristics

Sixty-two patients with schizophrenia participated in the present study. Sociodemographic and clinical characteristics of the sample are presented in Table 1.

3.2. Convergent validity

All of the motivational deficit scores were highly inter-correlated (Table 2). The factor analysis resulted in a Kaiser–Meyer–Olkin measure of sampling adequacy of 0.79 and a significant Bartlett's test of sphericity ($\chi^2 = 162.0$, $p < 0.001$). In addition, all communalities were high (i.e., greater than 0.60). Examination of the scree plot and eigenvalues revealed a clear one-factor solution explaining 71.1% of the variance. Notably, all 4 scores loaded highly onto this factor with loading values each greater than 0.77.

Table 2
Convergent validity between motivation scores.

Variable	AES total	QLS motivation	SANS avolition global	SANS avolition subscale
AES total	–			
QLS motivation	−0.79[***]	–		
SANS avolition global	0.65[***]	−0.76[***]	–	
SANS avolition subscale	0.68[***]	−0.74[***]	0.93[***]	
SANS avolition–anhedonia subscales	0.68[***]	−0.70[***]	0.78[***]	0.82[***]

[***] All correlations are significant at p < 0.001.