

RESEARCH ARTICLE

Open Access

Psychometric properties of the self-report version of the Quick Inventory of Depressive Symptoms (QIDS-SR₁₆) questionnaire in patients with schizophrenia

Irene M Lako¹, Johanna TW Wigman^{2,3}, Rianne MC Klaassen⁴, Cees J Slooff⁵, Katja Taxis¹, Agna A Bartels-Velthuis^{2*} and GROUP investigators

Abstract

Background: Self-report instruments for the assessment of depressive symptoms in patients with psychotic disorders are scarce. The Quick Inventory of Depressive Symptoms (QIDS-SR₁₆) may be a useful self-report instrument, but has received little attention in this field. This paper aimed to test the psychometric properties of the QIDS-SR₁₆ questionnaire in patients with a psychotic disorder.

Methods: Patients diagnosed with a psychotic disorder from health care institutions in The Netherlands were included in the study. Depressive symptoms were assessed with the QIDS-SR₁₆ and the Calgary Depression Scale for Schizophrenia (CDSS). Psychotic symptoms were assessed with the Positive and Negative Syndrome Scale (PANSS) and extrapyramidal symptoms (EPS) with three EPS rating scales. Spearman's correlation coefficients were used to compare the total score of the QIDS-SR₁₆ with the total scores of the CDSS, PANSS-subcales and EPS rating scales.

Results: In a sample of 621 patients with psychotic disorders, the QIDS-SR₁₆ showed good internal consistency ($\alpha = 0.87$). The QIDS-SR₁₆ correlated moderately with the CDSS ($r = 0.44$) and the PANSS subscale for emotional distress ($r = 0.47$). The QIDS-SR₁₆ showed weak correlation with the PANSS subscale for negative symptoms ($r = 0.28$) and minimal correlation with EPS rating scales ($r = 0.09-0.16$).

Conclusions: The QIDS-SR₁₆ may reliably assess depressive symptoms in patients with psychotic disorders, but its concurrent validity with the CDSS was rather poor in this population. We would recommend developing a new self-report questionnaire for the assessment of depressive symptoms in patients with psychotic disorders.

Background

Depressive symptoms are highly prevalent in patients with schizophrenia, with prevalence rates estimated between 7% and 75% [1,2]. Depressive symptoms are present throughout all phases of the illness [3] and may lead to a higher burden of disease and more frequent relapses [4,5]. Screening and routine monitoring of these symptoms may guide appropriate treatment [6,7]. Depressive symptoms can be difficult to distinguish from negative symptoms and extrapyramidal symptoms (EPS),

such as drug-induced parkinsonism [8]. Adequate recognition of depressive symptoms, as well as regular monitoring of symptomatic changes is essential to guide appropriate treatment in patients with schizophrenia [7,9]. Therefore, monitoring depressive symptoms requires reliable instruments with tested validity in patients with schizophrenia. To date, the only instrument designed for the assessment of depressive symptoms in this patient population is the interview-based Calgary Depression Scale for Schizophrenia (CDSS) [10]. The CDSS is a reliable and valid instrument that is able to distinguish depressive symptoms from negative psychotic symptoms and EPS [10]. However, the interview-based assessment method has some drawbacks, such as

* Correspondence: a.a.bartels@umcg.nl

²University of Groningen, University Medical Center Groningen, University Center for Psychiatry, Rob Giel Research Center, Groningen, The Netherlands
Full list of author information is available at the end of the article

the need for trained interviewers and observer bias. Self-report may be as good as interview-based assessments for monitoring change in psychopathology [11] and saves time and costs in routine clinical practice [12]. The availability of self-report depression instruments with comparable reliability and validity in patients with schizophrenia is however limited [13]. The Beck Depression Inventory-II (BDI) is the only self-report depression instrument for which complete information on psychometric properties in a population with schizophrenia are available for review [14]. Review of these properties demonstrated that the concurrent and predictive validity of the BDI was rather poor, perhaps because almost half of the items of the BDI could also be interpreted as negative symptoms [13].

The Quick Inventory of Depressive Symptoms (QIDS-SR₁₆) is a short and easy-to-use self-report instrument to assess depressive symptoms [15]. The QIDS-SR₁₆ is sensitive to symptomatic change and its psychometric properties are good in patients with depressive disorders [16]. Furthermore, it was found that the presence of psychotic symptoms did not meaningfully affect the ability of self-rating to recognize depressive symptoms in patients with major depressive disorder [17]. To our knowledge, the reliability and validity of the QIDS-SR₁₆ has not been tested in patients with schizophrenia. A question of specific interest is whether the QIDS-SR₁₆ can distinguish depressive symptoms from negative and extrapyramidal symptoms in this population (divergent validity). Furthermore, it is unknown whether the latent structure of the QIDS-SR₁₆ remains one-dimensional [18,19], or that multiple (negative symptom) dimensions can be identified when applied in patients with schizophrenia.

The aim of the current study is to evaluate the psychometric properties of the QIDS-SR₁₆ in a population of patients with psychotic disorders. We examined (1) the internal consistency of the QIDS-SR₁₆, (2) the dimensional structure, (3) the concurrent validity with other depression instruments and (4) the divergent validity with negative and extrapyramidal symptoms.

Methods

Subjects

Subjects were patients participating in the Genetic Risk and Outcome of Psychosis (GROUP) study, a naturalistic longitudinal cohort study. The longitudinal GROUP study is conducted by four academic centers in the Netherlands and a large number of mental health institutes in the Netherlands and the Dutch speaking region of Belgium. The GROUP study was approved centrally by the Ethical Review Board of the University Medical Center Utrecht and all participants gave written informed consent in accordance with the committee's guidelines. For a detailed overview of the GROUP structure, data flow, quality control, recruitment, sample characteristics of the studied

patients and training procedures of the assessors see Korver et al. [20]. The current data was collected during the second assessment of the study, three years after the baseline assessment (GROUP data release 3.02). Patients were included in the current study if they had a diagnosis of a psychotic disorder according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) criteria [21] and if data of the following rating scales were complete: the QIDS-SR₁₆, CDSS, and Positive and Negative Syndrome Scale (PANSS) [22], Abnormal and Involuntary Movements Scale (AIMS) [23] and Barnes Akathisia Rating Scale (BARS) [24]. These rating scales were administered by trained research assistants.

All research assistants were very well trained in administering the instruments. Data on interrater reliability of the GROUP study were not yet available for the second assessment, but the intraclass correlation coefficient of PANSS total score of the first assessment was 0.946 (95% confidence interval 0.758 to 0.996) [20].

Two weeks before the assessment patients were sent the self-report questionnaires (i.e., QIDS-SR₁₆), with the request to bring them along completed to the assessment. Interviews and tests were administered in a fixed order (i.e., PANSS, CDSS, EPS scales), normally on the same day.

Measures

Patients completed the self-report version of QIDS-SR₁₆ to assess depressive symptoms [15] (see for English version in Additional file 1, for multiple translations and scoring instructions see <http://www.ids-qids.org/>). The measure consists of 16 items, covering nine depressive symptom domains. Each domain score is based on the highest score on the pertaining items. Domain scores and item scores are rated on a Likert scale ranging from 0 to 3, with a total score range of 0–27. For an interpretation the QIDS-SR₁₆ total score see <http://www.ids-qids.org/>. Depressive symptoms were also assessed by the 9-item CDSS interview [10]. Item scores are rated on a Likert scale ranging from 0 to 3. A sum score above 4 out of 27 on the CDSS was used as cut-off scores to establish the presence of a minor depressive episode or clinical depression [10,25]. Psychotic symptoms were assessed with the PANSS [22,26]. For the current analyses, we used the five-factor model of the PANSS [27], consisting of the subscales 'positive symptoms', 'negative symptoms', 'disorganization symptoms', 'excitement' and 'emotional distress'. Item scores of the PANSS range from 1 (not present) to 7 (extreme) and the subscales scores for negative symptoms range from 7–49 and 7–28 for emotional distress. Extrapyramidal symptoms were assessed using the AIMS [23], the BARS [24] and, when available, the 'motor examination' subscale of the Unified Parkinson's Disease Rating Scale (UPDRS) [28]. The

Table 1 Patient characteristics (N = 621)

	Mean (SD; range) or N (%)
Age	30.1 (7.3; 18–59)
Male (%)	478 (77%)
Education	
Primary school	39 (6%)
Secondary school/high school	322 (52%)
Vocational education	150 (24%)
Vocational higher education	65 (11%)
University	45 (7%)
Illness duration (years)	7.3 (4.1; 2.0–43.1)
Age of onset first psychosis (years)	22.3 (6.7; 5–51)
Primary diagnosis	
Schizophrenia	398 (64%)
Schizoaffective disorder	80 (13%)
Schizophreniform disorder	37 (6%)
Delusional disorder	14 (2%)
Brief psychotic disorder	13 (2%)
Psychotic disorder NOS	64 (10%)
Other psychotic disorder	15 (2%)
Antidepressants ^a	81 (17%)
Antipsychotics ^a	
No antipsychotics	67 (14%)
Risperidone	58 (12%)
Olanzapine	91 (19%)
Quetiapine	28 (6%)
Clozapine	71 (15%)
Haloperidol	16 (3%)
Aripiprazol	50 (10%)
Other antipsychotics	35 (7%)
Combination therapy	65 (14%)
QIDS-SR ₁₆ (total)	6.6 (4.9; 0–26)
CDSS (total)	2.0 (2.8; 1–16)
PANSS Total	61.8 (18.9; 41–148)
PANSS-EMO (emotional distress)	13.1 (4.8; 8–33)
PANSS-NEG (negative symptoms)	12.6 (5.4; 4–41)
PANSS-POS (positive symptoms)	11.3 (5.4; 3–39)
PANSS-DIS (disorganized symptoms)	14.2 (5.1; 10–46)
PANSS-EXC (excitement symptoms)	10.6 (3.2; 2–29)
AIMS (total)	0.1 (0.2; 0–1.9)
BARS (total)	0.3 (0.6; 0–4.0)
UPDRS (subtotal motor symptoms) ^b	0.2 (0.1; 0–1.4)

Abbreviations: SD Standard Deviation; QIDS-SR₁₆ Quick Inventory of Depressive Symptomatology 16-item self-report version; CDSS Calgary Depression Scale for Schizophrenia; PANSS Positive and Negative Syndrome Scale; AIMS Abnormal Involuntary Movement Scale; BARS Barnes Akathisia Rating Scale and UPDRS Unified Parkinson's Disease Rating Scale.

^a Data on medication was available for n = 481 (77%) patients.

^b UPDRS ratings were available for n = 531 (85%) patients.

CDSS interview, the PANSS interview and the EPS rating scales were administered by the same research assistant on the very same day. The self-report QIDS-SR₁₆ was sent to the participant about two weeks prior to the assessment, with the request to fill in the questions and bring the questionnaire along to the research assistant. Different rating scales were used for the assessment EPS because each of the rating scales reflects a different subset of motor symptoms. The AIMS is focused on dyskinesia (involuntary movements), the BARS on akathisia (restlessness) and the UPDRS on parkinsonism. The symptoms measured by these scales may relate themselves differently to depressive symptoms. For example, depressive symptoms have also been associated with parkinsonism [8] and restlessness or psychomotor agitation is also a depressive symptoms (see question 16 of the QIDS-SR₁₆).

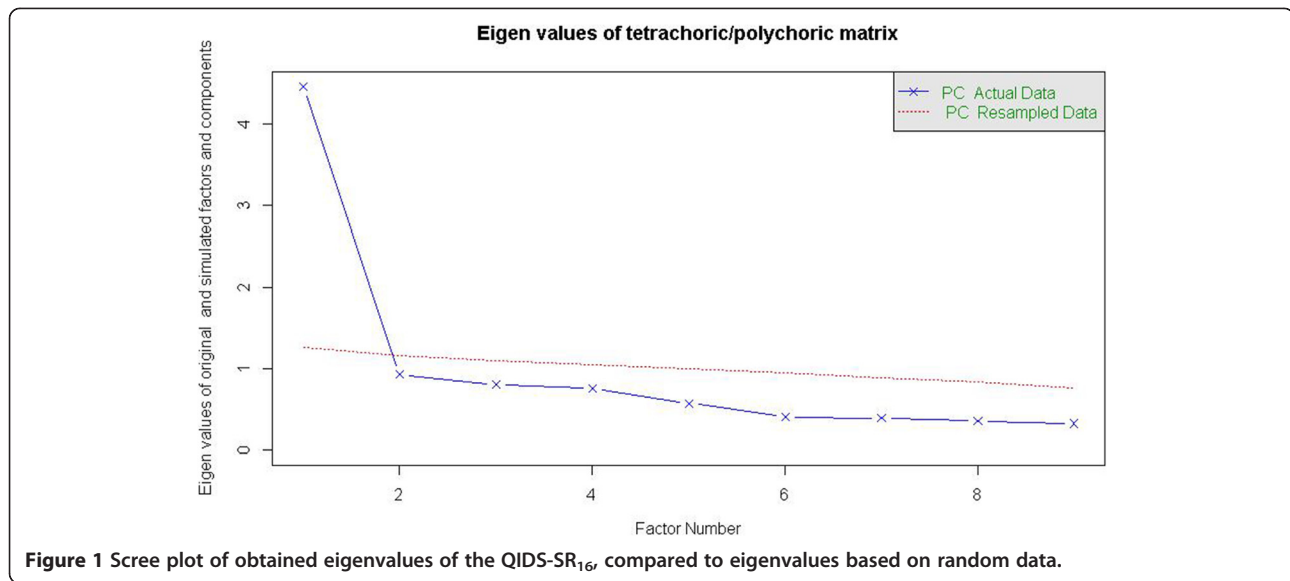
Statistical analyses

Psychometric properties of the QIDS-SR₁₆ were examined using SPSS, version 16.0, and R (v.3.0.1) running in R-studio. The internal consistency of the QIDS-SR₁₆ was assessed by calculating ordinal alpha, the conceptual equivalent to Cronbach's alpha for ordinal data [29] with the R packages 'psych' [30], and 'GPArotation' [31]. A value of 0.80 or higher indicated good internal consistency [32]. Additionally, polychoric inter-item correlations of the QIDS-SR₁₆ were calculated. Average values of $r > 0.15$ were deemed acceptable, since depressive symptoms as covered by the QIDS-SR₁₆ may represent a broad construct [33]. The dimensional structure

Table 2 Mean scores on individual items of the QIDS-SR₁₆ (N = 621)

QIDS-SR ₁₆ items	Mean	SD
1 Sleep onset insomnia	0.93	1.09
2 Mid-nocturnal insomnia	0.76	0.99
3 Early morning insomnia	0.41	0.86
4 Hypersomnia (excessive sleep)	1.03	0.92
5 Feeling depressed	0.65	0.76
6 Decreased appetite	0.20	0.50
7 Increased appetite	0.35	0.69
8 Weight reduction	0.39	0.79
9 Weight gain	0.36	0.77
10 Concentration/decision making	0.64	0.81
11 Self-view	0.69	1.09
12 Suicide ideation	0.32	0.68
13 General interest	0.40	0.75
14 Energy level	0.55	0.77
15 Feeling slowed down	0.35	0.72
16 Feeling restless	0.49	0.82

Abbreviations: SD Standard Deviation.



of the QIDS-SR₁₆ was examined by using a parallel analysis to determine how many principal components should be extracted from the data (PCA) [34]. In parallel analysis, the factors are retained as long as the *i*th eigenvalue from the actual data is greater than the *i*th eigenvalue extracted from a randomly drawn dataset that is similar to the actual dataset in its number of cases and variables. The parallel analysis was based on the polychoric inter-item correlations and conducted with the R-package ‘psych’ [30]. If a 1-component structure was found, this would suggest that the items that are covered by the QIDS-SR₁₆ are best represented by one underlying construct, i.e. depression. The total score of the QIDS-SR₁₆ was compared with the scores on the CDSS,

PANSS and EPS rating scales. Concurrent validity was investigated by calculating Spearman correlations (ρ) of the QIDS-SR₁₆ with the CDSS and the PANSS subscale for emotional distress. Divergent validity was examined by calculating Spearman correlations of the QIDS-SR₁₆ with the PANSS-Negative symptoms subscale and the three EPS rating scales. Spearman correlations were used because of non-normality of the data. Bootstrapping was used to calculate the 95% confidence intervals (95% CI) of the correlations.

Results

Sample

Overall, 809 (72%) of the 1119 patients with a psychotic disorder who presented at baseline participated in the

Table 3 Polychoric correlation coefficients (95%CI) between the individual items of the QIDS-SR₁₆

	Sleep	Depressed mood	Appetite/weight	Concentration	Self-view	Suicidal ideation	Interest	Energy	Psychomotor
Sleep	1								
Depressed mood	0.33 (0.23-0.42)	1							
Appetite/weight	0.19 (0.10-0.29)	0.22 (0.12-0.32)	1						
Concentration	0.33 (0.24-0.41)	0.47 (0.39-0.56)	0.37 (0.28-0.44)	1					
Self-view	0.36 (0.25-0.46)	0.58 (0.52-0.66)	0.29 (0.17-0.42)	0.52 (0.44-0.61)	1				
Suicidal ideation	0.36 (0.26-0.47)	0.59 (0.50-0.68)	0.30 (0.20-0.42)	0.39 (0.28-0.48)	0.61 (0.52-0.69)	1			
Interest	0.38 (0.27-0.48)	0.52 (0.42-0.61)	0.36 (0.26-0.45)	0.52 (0.42-0.61)	0.49 (0.37-0.59)	0.53 (0.42-0.63)	1		
Energy	0.39 (0.30-0.47)	0.44 (0.35-0.54)	0.29 (0.19-0.39)	0.54 (0.47-0.62)	0.42 (0.33-0.52)	0.35 (0.24-0.46)	0.56 (0.47-0.65)	1	
Psychomotor	0.24 (0.12-0.34)	0.46 (0.36-0.56)	0.35 (0.25-0.44)	0.63 (0.56-0.70)	0.52 (0.45-0.60)	0.38 (0.28-0.48)	0.46 (0.35-0.55)	0.47 (0.39-0.55)	1

Abbreviations: QIDS-SR₁₆ Quick Inventory of Depressive Symptoms 16-item self-report version.

Table 4 Spearman correlations (95%CI) of QIDS-SR₁₆ symptom domains with the CDSS total score

QIDS-SR ₁₆ domains	Correlation
Sleep disturbance	0.22 (0.14-0.30)
Depressed (sad) mood	0.46 (0.38-0.52)
Change in appetite or weight	0.14 (0.07-0.22)
Concentration/decision making	0.27 (0.19-0.34)
Self-view	0.36 (0.28-0.43)
Suicidal ideation	0.38 (0.31-0.45)
Interest	0.33 (0.24-0.40)
Energy/fatigue	0.28 (0.21-0.35)
Psychomotor agitation/retardation	0.28 (0.20-0.35)

Abbreviations: QIDS-SR₁₆ Quick Inventory of Depressive Symptoms 16-item self-report version; CDSS Calgary Depression Scale for Schizophrenia. All correlations were significant ($p < .001$).

second assessment. Patients who participated in the second assessment did not differ in age ($F[1,1117] = 3.15$; $p = 0.076$), gender ($\chi^2[1] = 0.71$; $p = 0.40$) or duration of illness ($F[1,1032] = 3.26$; $p = 0.071$) from those who only completed baseline assessment. Of the 809 patients who participated in the second assessment, 621 patients completed all questionnaires that were required for inclusion in the current study (QIDS-SR₁₆, CDSS and PANSS). Demographic and clinical descriptive information of this sample can be found in Table 1. The mean scores on the individual items of the QIDS-SR₁₆ are given in Table 2. According to the CDSS, clinical depression was present among 17% ($N = 103$) of the patients.

Internal consistency and dimensionality

The QIDS-SR₁₆ showed good internal consistency (ordinal $\alpha = 0.87$). All individual inter-item correlations were within an acceptable range of 0.19-0.63 (Table 3) with an average inter-item correlation of 0.42. The parallel analysis results suggested that the data of the QIDS-SR₁₆ can be reduced to one component in this sample (Figure 1).

Concurrent and divergent validity

The correlations of the individual domains of the QIDS-SR₁₆ with the CDSS ranged between 0.14 and 0.46 (Table 4). The total score of the QIDS-SR₁₆ correlated moderately with the CDSS ($\rho = 0.44$; $p < .001$) and the PANSS subscale for emotional distress ($\rho = 0.47$; $p < .001$), as displayed in Table 5. The QIDS-SR₁₆ showed weaker correlations with negative symptom ratings of the PANSS ($\rho = 0.28$; $p < .001$) and extrapyramidal symptom ratings of the AIMS ($\rho = 0.09$; $p < .05$), BARS ($\rho = 0.16$; $p < .001$) and UPDRS-motor subscale ($\rho = 0.13$; $p < .001$).

Discussion

The current study was, to the best of our knowledge, the first to investigate the psychometric properties of the QIDS-SR₁₆ in a large sample of patients with psychotic disorders. The QIDS-SR₁₆ remained unidimensional in the current sample, representing depressive symptoms as an independent domain from negative symptoms and other psychotic symptoms in patients with schizophrenia [19,35]. Furthermore, the internal consistency of the QIDS-SR₁₆ was good in our patient population, and comparable to that previously reported for the CDSS [36]. This suggests that patients with a psychotic disorder are able to rate their depressive symptoms in a reliable way [11]. The QIDS-SR₁₆ agreed moderately with the CDSS, suggesting conceptual differences with the rating scale that is currently considered as the gold standard for assessment depressive symptoms in patients with schizophrenia.

These conceptual differences may reflect differences in item selection between the QIDS-SR₁₆ and the CDSS. Unlike the CDSS, the QIDS-SR₁₆ is not specifically designed to assess depressive symptoms in patients with psychotic disorders. Especially the QIDS-SR₁₆ symptom domains on 'sleep' and 'appetite' showed low agreement with the CDSS in our study. The scores on the sleep domain were relatively high compared to other domains of the QIDS-SR₁₆; this was in most cases driven by the

Table 5 Concurrent and divergent validity of the QIDS-SR₁₆ total score

		QIDS-SR ₁₆	CDSS	PANSS-D
Concurrent validity	QIDS-SR ₁₆	1		
	CDSS	0.44 (0.38-0.51)**	1	
	PANSS-D	0.47 (0.41-0.54)**	0.59 (0.54-0.64)**	1
Divergent validity	PANSS-N	0.28 (0.19-0.35)**	0.34 (0.28-0.41)**	0.40 (0.33-0.47)**
	AIMS	0.09 (0.01-0.16)*	0.06 (-0.01-0.14)	0.06 (-0.02-0.14)
	BARS	0.16 (0.09-0.24)**	0.09 (0.01-0.16)*	0.15 (0.07-0.23)**
	UPDRS-motor	0.13 (0.05-0.21)**	0.20 (0.13-0.28)**	0.25 (0.17-0.33)**

Concurrent validity of the QIDS-SR₁₆ total score with other depression instruments and divergent validity with negative symptoms and extrapyramidal symptoms. Values are Spearman correlation coefficients (95% CI). Significant correlations were indicated by * = $p < .05$; ** = $p < .001$.

Abbreviations: QIDS-SR₁₆ Quick Inventory of Depressive Symptoms 16-item self-report version; CDSS Calgary Depression Scale for Schizophrenia; PANSS Positive and Negative Syndrome Scale, emotional distress subscale (-D) and Negative symptom subscale (-N); AIMS Abnormal and Involuntary Movements Scale; BARS Barnes Akathisia Rating Scale and UPDRS-motor, Motor subscale of the Unified Parkinson's Disease Rating Scale.

'hypersomnia' item (excessive sleep) (see Table 2). Excessive sleep and increased appetite may reflect side effects of antipsychotics [37,38] and hence not necessarily be related to the 'physical' symptoms of depression [21]. Indeed, post hoc analysis using ordinal logistic regression demonstrated that those patients using antipsychotics with high antagonistic affinity for the histamine receptor (olanzapine or clozapine) reported higher scores on excessive sleep than patients using other antipsychotics (OR [95%CI] = 1.88 [1.31-2.68]). Similarly, patients using olanzapine or clozapine were more likely to report increased appetite (OR [95%CI] = 1.94 [1.28-2.95]). It can be argued that antipsychotic side effects confounded changes in sleep and appetite as measured by the QIDS-SR₁₆ in the current sample. In contrast, the CDSS measures 'early awakening' and 'morning depression' as a proxy for the physical symptoms of depression, in a way less sensitive to confounding by antipsychotic side effects. Another conceptual difference is that the CDSS and other self-report questionnaires like the Center of Epidemiologic Studies-Depression [39], but not the QIDS-SR₁₆, cover hopelessness. Patients with schizophrenia may be prone to psychological depressive symptoms like hopelessness and self-deprecation, possibly related to demoralization in response to the severe mental illness [40]. Thus careful item selection targeting only those depressive symptoms specific for patients with a psychotic disorder may be relevant for the validity of a self-report depression instrument in this population.

Although there was some overlap, the QIDS-SR₁₆ discriminated depressive symptoms from negative symptoms in an acceptable way, in line with previous work on the full 30-item Inventory of Depressive Symptoms (IDS) in a mixed population of patients with schizophrenia and bipolar disorder [41]. In addition, a latent factor for negative symptoms was not identified for the QIDS-SR₁₆, despite that several items overlap with negative symptoms, such as of concentration difficulties (question #10), lack of interest (#13) and lack of energy (#14). The current results suggest that, although the QIDS-SR₁₆ may partly tap into the negative symptom dimension and thus should be interpreted with care, its divergent validity is acceptable in patients with psychotic disorders.

An unexpected result is the relatively high correlation of the CDSS with negative symptoms in comparison to previous reports of the CDSS in patients with schizophrenia [13]. Some correlation with negative symptoms is acceptable, as patients may often experience both negative and depressive symptoms at the same time [42]. Another caveat when interpreting the current results is that the majority of the patients had low EPS ratings. The relatively young and possibly well stabilized sample of patients may explain the rare presence of EPS, as previously described for the baseline measurement of the current sample [43]. We therefore

remain inconclusive about the divergent validity of the QIDS-SR₁₆ with respect to the extrapyramidal symptoms in this population.

An important strength of the study is its large sample size. A limitation of the study design may be that the same research assistant rated both the CDSS and the PANSS interview. This may have led to an overestimation of the correlation between the CDSS and the PANSS subscale for emotional distress, because of prior knowledge of the raters based on the previous interview. Therefore, the PANSS subscale for emotional distress does not necessarily outperform the QIDS-SR₁₆ on its concurrent validity with the CDSS.

To conclude, we showed that patients with a psychotic disorder can reliably rate their depressive symptoms by means of the self-report. However, despite the fact that the QIDS-SR₁₆ can provide clinicians with useful additional and clinically relevant information, we would not recommend applying the QIDS-SR₁₆ for the assessment of depressive symptoms in this population, based on the poor concurrent validity of the QIDS-SR₁₆ with the CDSS. Future research may focus on the development of a new self-report instrument, especially designed to assess depressive symptoms in patients with psychotic disorders.

Conclusions

Seventeen percent of patients with psychotic disorders suffered from depressive symptoms. Although the Quick Inventory of Depressive Symptoms (QIDS-SR₁₆) may provide unique and clinically relevant information on depressive symptoms, this self-report instrument is not suitable for the use in patients with psychotic disorders. There is a need for a new self-reporting instrument covering depressive symptoms specific for patients with a psychotic disorder.

Additional file

Additional file 1: The Quick Inventory of Depressive Symptomatology (16-Item) (Self-Report) (QIDS-SR₁₆).

Competing interests

All other authors declare that they have no competing interests. ZON-MW and VCVGZ had no further role in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the paper for publication. This study was supported by unconditional grants from the Christian Fellowship of Care for Mental and Neurological Disorders (VCVGZ), the Dutch Foundation for Mental Health and the Mental Health Centre Drenthe (GGZ Drenthe).

Authors' contributions

IML, JTWW and AABV analyzed the data and wrote the first draft of the manuscript. RMCK, CJS and KT helped with the drafting of the manuscript. GROUP investigators designed the study and wrote the protocol. All authors contributed to and have approved the final manuscript.

Authors' information

GROUP investigators:

Richard Bruggeman and Durk Wiersma: University of Groningen, University Medical Center Groningen, University Center for Psychiatry, Rob Giel Research Center, Groningen, The Netherlands
Wiepke Cahn and René S. Kahn: University Medical Center Utrecht, Department of Psychiatry, Rudolf Magnus Institute of Neuroscience, Utrecht, The Netherlands
Lieuwe de Haan and Carin J. Meijer: Academic Medical Center University of Amsterdam, Department of Psychiatry, Amsterdam, The Netherlands
Inez Myin-Germeys and Jim van Os: Maastricht University Medical Center, South Limburg Mental Health Research and Teaching Network, EURON, Maastricht, The Netherlands

Acknowledgements

The authors wish to thank all patients and their families, healthy subjects, and all researchers who gave their time and effort to make this GROUP project possible. The infrastructure for the GROUP study is funded by the Geestkracht program of the Dutch Health Research Council (ZON-MW, grant number 10-000-1002) and matching funds from participating universities and mental health care organizations (Site Amsterdam: Academic Psychiatric Centre AMC, Ingeest, Arkin, Dijk en Duin, Rivierduinen, Erasmus MC, GGZ Noord Holland Noord; Site Utrecht: University Medical Centre Utrecht, Altrecht, Symfona, Meerkanten, RIAGG Amersfoort, Delta; Site Groningen: University Medical Center Groningen, Lentis, GGZ Friesland, GGZ Drenthe, Dimence, Mediant, GGNet, Yulius and Parnassia Bavo Groep; Site Maastricht: Maastricht University Medical Center, GGZ Eindhoven en de Kempen, GGZ Midden-Brabant, GGZ Oost-Brabant, GGZ Noord-en Midden-Limburg, Mondriaan Zorggroep, Prins Clauscentrum Sittard, RIAGG Roermond, Universitair Centrum Sint-Jozef Kortenberg, CAPRI University of Antwerp, PC Ziekeren Sint-Truiden, PZ Sancta Maria Sint-Truiden, GGZ Overpelt, OPZ Rekem). The research leading to these results has received funding from the European Community's Seventh Framework Program under grant agreement No. HEALTH-F2-2009-241909 (Project EU-GEL).

Author details

¹Division of Pharmacotherapy and Pharmaceutical Care, Department of Pharmacy, University of Groningen, Groningen, The Netherlands. ²University of Groningen, University Medical Center Groningen, University Center for Psychiatry, Rob Giel Research Center, Groningen, The Netherlands. ³Department of Psychiatry and Psychology, Maastricht University Medical Center, Maastricht, The Netherlands. ⁴Rivierduinen Mental Health, Leiden, The Netherlands. ⁵Department of Psychotic Disorders, Mental Health Center Assen (GGZ Drenthe), Assen, Netherlands.

Received: 30 May 2013 Accepted: 19 August 2014

Published: 3 September 2014

References

1. Siris SG, Bench C: **Depression and schizophrenia**. In *Schizophrenia*. 2nd edition. Edited by Hirsch SR, Weinberger D. Oxford, UK: Blackwell; 2003:140–167.
2. Buckley PF, Miller BJ, Lehrer DS, Castle DJ: **Psychiatric comorbidities and schizophrenia**. *Schizophr Bull* 2008, **35**(2):383–402.
3. Leff J: **Depressive symptoms in the course of schizophrenia**. In *Depression in Schizophrenia*. Edited by DeLisi LE. Washington, DC: American Psychiatric Press; 1990:3–23.
4. Conley RR, Ascher-Svanum H, Zhu B, Faries DE, Kinon BJ: **The burden of depressive symptoms in the long-term treatment of patients with schizophrenia**. *Schizophr Res* 2007, **90**(1–3):186–197.
5. Tollefson GD, Andersen SW, Tran PV: **The course of depressive symptoms in predicting relapse in schizophrenia: a double-blind, randomized comparison of olanzapine and risperidone**. *Biol Psychiatry* 1999, **46**(3):365–373.
6. Lako IM, Taxis K, Bruggeman R, Kneegtering H, Burger H, Wiersma D, Slooff CJ: **The course of depressive symptoms and prescribing patterns of antidepressants in schizophrenia in a one-year follow-up study**. *Eur Psychiatry* 2012, **27**(4):240–244.
7. Schennach-Wolff R, Obermeier M, Seemuller F, Jager M, Messer T, Laux G, Pfeiffer H, Naber D, Schmidt LG, Gaebel W, Klosterkötter J, Heuser I, Maier W, Lemke MR, Ruther E, Klingberg S, Gastpar M, Moller HJ, Riedel M: **Evaluating depressive symptoms and their impact on outcome in schizophrenia applying the Calgary Depression Scale**. *Acta Psychiatr Scand* 2011, **123**(3):228–238.
8. Norman RM, Malla AK, Cortese L, Diaz F: **Aspects of dysphoria and symptoms of schizophrenia**. *Psychol Med* 1998, **28**(6):1433–1441.
9. Bressan RA, Chaves AC, Pilowsky LS, Shirakawa I, Mari JJ: **Depressive episodes in stable schizophrenia: critical evaluation of the DSM-IV and ICD-10 diagnostic criteria**. *Psychiatry Res* 2003, **117**(1):47–56.
10. Addington D, Addington J, Matickayndale E: **Assessing depression in schizophrenia - the Calgary depression scale**. *Br J Psychiatry* 1993, **163**:39–44.
11. Lindenmayer JP, Kay SR, Plutchik R: **Multivantaged assessment of depression in schizophrenia**. *Psychiatry Res* 1992, **42**(3):199–207.
12. Moller HJ: **Standardised rating scales in psychiatry: methodological basis, their possibilities and limitations and descriptions of important rating scales**. *World J Biol Psychiatry* 2009, **10**(1):6–26.
13. Lako IM, Bruggeman R, Kneegtering H, Wiersma D, Schoevers RA, Slooff CJ, Taxis K: **A systematic review of instruments to measure depressive symptoms in patients with schizophrenia**. *J Affect Disord* 2012, **140**(1):38–47.
14. Beck AT, Steer RA, Ball R, Ranieri W: **Comparison of beck depression inventories -IA and -II in psychiatric outpatients**. *J Pers Assess* 1996, **67**(3):588–597.
15. Rush AJ, Trivedi MH, Ibrahim HM, Carmody TJ, Arnow B, Klein DN, Markowitz JC, Ninan PT, Kornstein S, Manber R, Thase ME, Kocsis JH, Keller MB: **The 16-item Quick Inventory of Depressive Symptomatology (QIDS), clinician rating (QIDS-C), and self-report (QIDS-SR): a psychometric evaluation in patients with chronic major depression**. *Biol Psychiatry* 2003, **54**(5):573–583.
16. Trivedi MH, Rush AJ, Ibrahim HM, Carmody TJ, Biggs MM, Suppes T, Crismon ML, Shores-Wilson K, Toprac MG, Dennehy EB, Witte B, Kashner TM: **The Inventory of Depressive Symptomatology, Clinician Rating (IDS-C) and Self-Report (IDS-SR), and the Quick Inventory of Depressive Symptomatology, Clinician Rating (QIDS-C) and Self-Report (QIDS-SR) in public sector patients with mood disorders: a psychometric evaluation**. *Psychol Med* 2004, **34**(1):73–82.
17. Rush AJ, Carmody TJ, Ibrahim HM, Trivedi MH, Biggs MM, Shores-Wilson K, Crismon ML, Toprac MG, Kashner TM: **Comparison of self-report and clinician ratings on two inventories of depressive symptomatology**. *Psychiatr Serv* 2006, **57**(6):829–837.
18. Bernstein IH, Wendt B, Nasr SJ, Rush AJ: **Screening for major depression in private practice**. *J Psychiatr Pract* 2009, **15**(2):87–94.
19. Bernstein IH, Rush AJ, Stegman D, Macleod L, Witte B, Trivedi MH: **A Comparison of the QIDS-C16, QIDS-SR16, and the MADRS in an adult outpatient clinical sample**. *CNS Spectr* 2010, **15**(7):458–468.
20. Korver N, Quee PJ, Boos HB, Simons CJ, De Haan L, GROUP Investigators: **Genetic Risk and Outcome of Psychosis (GROUP), a multi site longitudinal cohort study focused on gene-environment interaction: objectives, sample characteristics, recruitment and assessment methods**. *Int J Methods Psychiatr Res* 2012, **21**(3):205–221.
21. American Psychiatric Association: *Diagnostic and Statistical Manual of Mental Disorders: DSM-IV: Washington*. Washington, D.C.: American Psychiatric Association; 1994.
22. Kay SR, Fiszbein A, Opler LA: **The positive and negative syndrome scale (PANSS) for schizophrenia**. *Schizophr Bull* 1987, **13**(2):261–276.
23. Guy W: *ECDEU Assessment Manual for Psychopharmacology (DHHS Publ No ADM 91-338)*. Washington, DC: Rockville, MD, U.S. Department of Health, Education, and Welfare; 1976.
24. Barnes TR: **A rating scale for drug-induced akathisia**. *Br J Psychiatry* 1989, **154**:672–676.
25. Bressan RA, Chaves AC, Shirakawa I, De Mari J: **Validity study of the Brazilian version of the Calgary depression scale for schizophrenia**. *Schizophr Res* 1998, **32**(1):41–49.
26. Bentsen H, Munkvold OG, Notland TH, Boye B, Bjoerge H, Lersbryggen AB, Oskarsson K, Berg-Larsen R, Malt UF: **The interrater reliability of the Positive and Negative Syndrome Scale (PANSS)**. *Int J Methods Psychiatr Res* 1996, **6**:227–235.
27. Van der Gaag M, Hoffman T, Remijsen M, Hijman R, De Haan L, Van Meijel B, Van Harten PN, Valmaggia L, De Hert M, Cuijpers A, Wiersma D: **The five-factor model of the Positive and Negative Syndrome Scale II: a ten-fold cross-validation of a revised model**. *Schizophr Res* 2006, **85**(1–3):280–287.
28. Hughes AJ, Daniel SE, Kilford L, Lees AJ: **Accuracy of clinical diagnosis of idiopathic Parkinson's disease: a clinico-pathological study of 100 cases**. *J Neurol Neurosurg Psychiatry* 1992, **55**(3):181–184.

29. Gadermann AM, Guhn M, Zumbo D: **Estimating ordinal reliability for Likert-type and ordinal item response data: a conceptual, empirical, and practical guide.** *Practical Assess Res Eval* 2012, **17**(3):1–13.
30. Revelle W: **An overview of the psych package.** 2011, Retrieved from <https://sapa-project.org/>.
31. Bernaards CA, Jennrich RI: **Gradient projection algorithms and software for arbitrary rotation criteria in factor analysis.** *Educ Psychol Meas* 2005, **65**:676–696.
32. Streiner DL: **Starting at the beginning: an introduction to coefficient alpha and internal consistency.** *J Pers Assess* 2003, **80**(1):99–103.
33. Clark LA, Watson D: **Constructing validity: basic issues in objective scale development.** *Psychol Assess* 1995, **7**:309–319.
34. O'Connor BP: **SPSS and SAS programs for determining the number of components using parallel analysis and velicer's MAP test.** *Behav Res Methods Instrum Comput* 2000, **32**(3):396–402.
35. Muller MJ, Szegedi A, Wetzel H, Benkert O: **Depressive factors and their relationships with other symptom domains in schizophrenia, schizoaffective disorder, and psychotic depression.** *Schizophr Bull* 2001, **27**(1):19–28.
36. Addington D, Addington J, Maticka-Tyndale E: **Specificity of the Calgary depression scale for schizophrenics.** *Schizophr Res* 1994, **11**(3):239–244.
37. Miller DD: **Atypical antipsychotics: sleep, sedation, and efficacy.** *Practical Assess Res Eval* 2004, **6**(Suppl 2):3–7.
38. Teff KL, Kim SF: **Atypical antipsychotics and the neural regulation of food intake and peripheral metabolism.** *Physiol Behav* 2011, **104**(4):590–598.
39. Radloff LS: **The CES-D scale: a self-report depression scale for research in the general population.** *Applied Psychol Measurement* 1977, **1**:385–401.
40. Mauritz M, Van Meijel B: **Loss and grief in patients with schizophrenia: on living in another world.** *Arch Psychiatr Nurs* 2009, **23**(3):251–260.
41. Simonsen C, Sundet K, Vaskinn A, Ueland T, Romm KL, Hellvin T, Melle I, Friis S, Andreassen OA: **Psychosocial function in schizophrenia and bipolar disorder: relationship to neurocognition and clinical symptoms.** *J Int Neuropsychol Soc* 2010, **16**(5):771–783.
42. Kulhara P, Avasthi A, Chadda R, Chandiramani K, Mattoo SK, Kota SK, Joseph S: **Negative and depressive symptoms in schizophrenia.** *Br J Psychiatry* 1989, **154**:207–211.
43. Koning JP, Vehof J, Burger H, Wilffert B, Al Hadithy A, Alizadeh B, Van Harten PN, Snieder H, Genetic Risk and Outcome in Psychosis (GROUP) investigators: **Association of two DRD2 gene polymorphisms with acute and tardive antipsychotic-induced movement disorders in young Caucasian patients.** *Psychopharmacol* 2012, **219**(3):727–736.

doi:10.1186/s12888-014-0247-2

Cite this article as: Lako et al.: Psychometric properties of the self-report version of the Quick Inventory of Depressive Symptoms (QIDS-SR₁₆) questionnaire in patients with schizophrenia. *BMC Psychiatry* 2014 **14**:247.

Submit your next manuscript to BioMed Central and take full advantage of:

- Convenient online submission
- Thorough peer review
- No space constraints or color figure charges
- Immediate publication on acceptance
- Inclusion in PubMed, CAS, Scopus and Google Scholar
- Research which is freely available for redistribution

Submit your manuscript at
www.biomedcentral.com/submit

