The multidimensional measurement of the positive symptoms of psychosis

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Abstract

The measures most frequently used to assess psychotic symptoms fail to reflect important dimensions. The Psychotic Symptom Rating Scale (PSYRATS) aims to capture the multidimensional nature of auditory hallucinations and delusions. Individuals (N = 276) who had recently relapsed with positive symptoms completed the auditory hallucinations and delusions PSYRATS scales. These scores were compared with the relevant items from the SAPS and PANSS, and with measures of current mood. Total scores and distribution of items of the PSYRATS scales are presented and correlated with other measures. Positive symptom items from the SAPS and PANSS reflected the more objective aspects of PSYRATS ratings of auditory hallucinations and delusions (frequency and conviction) but were relatively poor at measuring distress. A major strength of the PSYRATS scales is the specific measurement of the distress dimension of symptoms, which is a key target of psychological intervention. It is advised that the PSYRATS should not be used as a total score alone, whilst further research is needed to clarify the best use of potential subscales. Copyright © 2007 John Wiley & Sons, Ltd.

Key words: PSYRATS, multidimensional, psychosis, symptoms, measurement

Introduction

Psychosis is a complex disorder that manifests in a variety of presentations. A number of assessment tools have been developed that aim to measure the presence and severity of the range of positive and negative symptoms occurring in common psychotic disorders such as schizophrenia. These tools, such as the Present State Examination (Wing et al., 1974) and the Positive and Negative Syndrome Scale (PANSS) (Kay et al., 1989) have proved useful for the purpose of diagnostic classification, and for informing subsequent treatment. However, the broad range of experiences and behaviours assessed by such measures constrains the detailed measurement of specific symptoms. In particular, diagnostic scales tend to have few items dedicated to the measurement of delusions and

hallucinations, even though these positive symptoms are those most frequently associated with a presentation of psychosis.

Another limitation of these scales in measuring the positive symptoms of psychosis is highlighted by research advocating a multidimensional approach to such symptoms. With reference to auditory hallucinations, detailed phenomenological assessments have identified a range of factors associated with how people cope with their voice-hearing experiences, and consequently how distressed they become (see, for example, Romme and Escher, 1989; Nayani and David, 1996). These studies have contributed to a cognitive model of voices that emphasizes the role of beliefs about voices in understanding why they may be appraised as distressing (Chadwick and Birchwood, 1995).

A number of assessment tools for the measurement of delusions have also been developed, each employing a multidimensional approach (Kendler et al., 1983; Garety and Hemsley, 1987; Harrow et al., 1988). Although there is some inconsistency about the chosen dimensions of delusions, three are frequently identified: that is, distress, preoccupation and conviction (see Garety and Hemsley, 1987). For example, Peters et al. (1999) showed that the degree of conviction with which a delusional belief is held, and the level of preoccupation it engenders, are both independent of the degree of distress experienced. Thus, assessment tools such as the PANSS, while being limited to a single item for key symptoms, will inevitably miss the multidimensional nature of such symptoms. Further, these single items may be rated in terms of the most easily observed aspects of symptoms, such as conviction of belief, or frequency of hallucinations, in effect adhering to a forced unidimensionality. Thus, focusing on a single dimension of symptoms results in a lack of attention to other relevant dimensions such as emotional distress.

In light of the need for improvements in this area, Haddock et al. (1999) developed the psychotic symptom rating scales (PSYRATS), which contains separate scales for auditory hallucinations and delusions. The auditory hallucination scale included eleven items and the delusion scale six, all rated from zero to four. Factor analysis yielded three independent factors for the auditory hallucinations scale: emotional characteristics, physical characteristics and cognitive interpretation. Two factors were reported in relation to the delusion scale, termed emotional characteristics and cognitive interpretation (Haddock et al., 1999). The PSYRAT scales have proved easy to use while assessing a breadth of information relevant to the key symptoms of psychosis. They have been used as outcome measures in a number of recent clinical trials aimed at evaluating the effectiveness of psychological interventions for psychosis (Durham et al., 2003; Lewis et al., 2002). However, the PSYRATS factor subscales have not been consistently used. This may be due to the previous lack of consistency in reports of symptom dimensions, and the small sample used by Haddock et al. (1999). The small sample size may also have dissuaded the authors from presenting normative data.

Whilst the PSYRATS scales provide a total cumulative score for each symptom, the multidimensional nature of the symptoms suggest that the total score should not be presented alone. This is particularly so, given that symptom dimensions can change independently during therapy (Brett-Jones et al., 1987; Chadwick and Lowe, 1994; Garety, 1992). This has prompted some researchers to report their use of PSYRATS on the basis of single items (for instance Freeman et al., 2004).

The current study reports the distribution of symptom severity, as assessed by the PSYRATS scales, for a large sample of individuals who had recently relapsed with the positive symptoms of psychosis. This is intended to provide reference data for the evaluation of the clinical presentation of patients. The interrelationship between the items within the subscales are reported, along with the relationship between PSYRATS single items, and total scores, with other measures of psychotic symptoms, i.e. the PANSS and the SAPS (Scale for the Assessment of Positive Symptoms) (Andreasen, 1984), and with current mood (depression and anxiety). We also aim to validate the previous reports of the factor structure of the PSYRATS scales on a large sample. The current study will be the first to provide psychometric data on the PSYRATS scales.

Method

Participants

There were 276 participants, recruited from the 301 who took part in the PRP (Psychological Treatment for the Prevention of Relapse in Psychosis; ISRCTN: 83557988) trial, and they constituted those who had fully completed the PSYRATS measures. Of these, 83 (30.1%) were female and 193 (69.9%) male. Diagnoses were extracted from current clinical records; schizophrenia (85.5%), schizoaffective disorder (13%) or delusional disorder (1.5%). Their mean age was 37.7 years (*SD* = 10.9) and mean duration of illness was 10.7 years (*SD* = 8.8). Patients had received a mean of five admissions (*SD* = 6.0). Both auditory hallucinations and delusions were reported by 123 patients, 11 had hallucinations only and 105 had delusions only. In order to be eligible for the trial, participants were required to have relapsed not more than 3 months before consent was obtained. They were excluded if they had a primary diagnosis of alcohol or substance dependency, organic syndrome, or learning disability, or had an insufficient command of English to engage in psychological therapy.

Patients reported their ethnicity as White (73.2%), Black-African (9.1%), Black-Caribbean (7.2%), Black-other (2.2%), Indian (1.8%) and Other (6.5%). Most patients were unemployed (79.7%) with the remainder

being full-time employed (5.8%), part-time employed (2.5%), voluntarily employed (3.3%) or Other (8.7%).

Recruitment

The PRP Trial is a British multicentre, randomized controlled trial of cognitive behaviour therapy and family intervention for psychosis, designed to investigate both the therapeutic outcome and the psychological processes associated with psychosis. The trial is located in four NHS Trusts in London and East Anglia. Recruitment was from clinical teams, both inpatient and outpatient services, with the aim of obtaining a representative sample of individuals with psychosis. Patients meeting the eligibility criteria were asked to provide informed consent for participation by a trial research worker or clinical psychologist.

Materials

Patients were assessed using the following measures.

Positive symptom measures

- Scale for the Assessment of Positive Symptoms (Andreasen, 1984). The SAPS is 35-item, six-point (0–5) rating instrument for the assessment of the positive symptoms of psychosis. Symptoms are rated over the last month. Five scores are obtained: Total (35 items), hallucinations (7), delusions (20), bizarre behaviour (5), and positive formal thought disorder (9).
- *Positive and Negative Syndrome Scale* (PANSS) (Kay et al., 1989). The PANSS is a 30-item, seven point (1–7) rating instrument developed for the assessment of phenomena associated with schizophrenia. Symptoms over the past 72 hours are rated. Four scores are obtained: Total (30 items) Positive Scale (7), Negative Scale (7), and General Psychopathology (16).
- *Psychotic Symptom Rating Scales* (Haddock et al., 1999). The PSYRATS is a 17-item, five-point scale (0–4) multidimensional measure of delusions and auditory hallucinations. Symptoms over the last week are rated. Two scores are obtained: Auditory Hallucinations Scale (11 items) and Delusions Scale (6 items). The dimensions of auditory hallucinations are: frequency, duration, location, loudness, beliefs about origin, negative content, intensity of negative content, amount of distress, intensity of distress, disruption of life and control. The dimensions of delusions are: amount of preoccupation,

duration of preoccupation, conviction, amount of distress, intensity of distress and disruption of life.

Measures

- Beck Depression Inventory – II (Beck et al., 1996). The BDI-II is a self-report 21-item, four point scale (0–3) for the assessment of depression. Depression is assessed over the past fortnight.
- Beck Anxiety Inventory (Beck et al., 1988). The BAI is a self-report 21-item scale for the assessment of the physiological manifestation of anxiety. Participants endorse symptoms on a four point scale relating to the previous week.

Procedure

The baseline assessment was completed by a trial research worker after patient consent had been obtained, but before randomisation to a trial condition. The aim was to complete the assessment within a 3-week period. Interviews were audiotaped for reliability and quality control purposes.

Analysis

All analyses were conducted using SPSS for Windows (version 10.0; SPSS, 2000). Significance test results are quoted as two-tailed probabilities. Associations were examined using Spearman rank-based correlations.

Results

PSYRATS scores and distribution of items

The group as a whole ($N = 276$) had a mean score of 14.4 on the auditory hallucination scale ($SD = 14.6$, range = 0–41) and 13.5 on the delusion scale ($SD = 7.1$, range = 0–24), where high scores are indicative of more severe characteristics of symptoms. Those specifically reporting auditory hallucinations ($N = 144$) had a mean score of 27.6 on the relevant scale ($SD = 6.7$, range = 10–41), while for those specifically reporting delusions ($N = 228$) there was a mean score of 16.3 on the delusion scale ($SD = 4.0$, range = 5–24). For the 123 participants who reported both auditory hallucinations and delusions (as defined by scores above zero on the frequency item of both scales), the total scores of the

two scales were correlated ($r = 0.44$, $p < 0.001$). The distribution of scores for each item are reported below in Table 1 (auditory hallucination) and Table 2 (delusions).

PSYRATS item inter-relationships

Auditory hallucination subscale
Eleven of the 55 correlations were significant at the 0.1% level; these were amount of negative content with degree of negative content ($r = 0.68$), amount of intensity ($r = 0.59$), intensity of distress ($r = 0.51$) and disruption ($r = 0.20$); degree of negative content with amount

of distress ($r = 0.41$), intensity of distress ($r = 0.48$) and disruption ($r = 0.44$); amount of distress with intensity of distress ($r = 0.71$), and disruption ($r = 0.38$); frequency and duration ($r = 0.45$); and intensity of distress with disruption ($r = 0.40$).

Delusion subscale
Eight of the 15 correlations were significant at the 0.1% level, as follows. Amount of preoccupation correlated significantly with conviction ($r = 0.28$), duration of preoccupation ($r = 0.52$), intensity of distress ($r = 0.30$) and disruption to life ($r = 0.25$). Duration of preoccupation correlated significantly with intensity of

Table 1. PSYRATS auditory hallucination distribution data as a percentage of the sample ($N = 144$)

	0	1	2	3	4
Frequency	Less than once/week	At least once/week	At least once/day	At least once/hour	Almost continuous
	1.4	24.3	32.6	22.2	19.4
Duration	Not present	A few seconds	Several minutes	At least one hour	Hours at a time
	–	25.0	34.7	16.0	24.3
Location	No voices present	Inside head only	Outside head, close to ears	Outside, close to ears, away from ears	Outside head only
	–	34.0	9.7	13.2	43.1
Loudness	No voices present	Whispers	Same as own voice	Louder than own voice	Extremely loud
	–	25.7	55.6	14.6	4.2
Origin of voice	No voices present	Internally generated	<50% sure external	>50% sure external	100% external
	–	19.4	8.3	32.6	39.6
Amount of negative content	None	Occasional	<50%	>50%	100%
	16.7	9.7	14.6	26.4	32.6
Degree of negative content	None	Some – not relating to self	Personal verbal abuse	Personal abuse relating to self-concept	Personal threats to self/family
	16.7	8.3	16.0	32.6	26.4
Amount of distress	None	<10%	<50%	>50%	100%
	13.9	7.6	17.4	29.2	31.9
Intensity of distress	None	Slightly	Moderate	Very, but could feel worse	Very
	13.2	13.9	20.8	30.6	21.5
Disruption to Life	None	Minimal	Moderate	Severe	Complete
	4.2	19.4	31.9	36.8	7.6
Controllability	Complete control	Mostly controllable	50% control	Mostly uncontrollable	No control
	7.6	5.6	6.3	14.6	66.0

Table 2. PSYRATS delusion distribution data as a percentage of the sample (*N* = 228)

	0	1	2	3	4
Amount of preoccupation	Less than once/week	At least once/week	At least once/day	At least once/hour	Continuous
	0.4	13.2	35.5	24.6	26.3
Duration of preoccupation	No delusions	A few seconds	Several minutes	At least one hour	Several hours
	–	9.2	31.6	33.3	25.9
Conviction	No delusions	<10%	10–49%	50–99%	100%
	–	1.3	5.7	46.1	46.9
Amount of distress	None	Minority of occasions	<50% of occasions	50–99% of occasions	Always
	10.5	8.3	12.3	32.5	36.4
Intensity of distress	None	Slight	Moderate	Marked	Extreme
	10.5	11.4	17.5	43.9	16.7
Disruption to life	None	Minimal	Moderate	Severe	Complete
	4.8	12.3	34.6	40.4	7.9

distress (r = 0.31) and disruption to life (r = 0.28). Amount of distress correlated significantly with intensity of distress (r = 0.66). Intensity of distress correlated significantly with disruption to life (r = 0.35).

Convergent validity: relationships with other measures of symptoms and current mood

Non-parametric correlation coefficients were calculated between the PSYRATS auditory hallucination individual items and total score, and the PANSS hallucinatory behaviour item and SAPS auditory hallucinations item. The individual item scores and total scores on the PSYRATS delusions scale were compared to the PANSS delusions item and the SAPS global rating of delusions. Finally, the individual items and total scores for both PSYRATS scales were correlated with current depression and anxiety. Pearson correlations coefficients are presented in Tables 3 and 4. Given the number of correlations involved, significance was set at p < 0.001.

The item measuring hallucinatory behaviour in the PANSS was related to the overall PSYRATS total and to the individual items measuring frequency, duration, disruption and beliefs about origin (with increased hallucinatory behaviour being associated with external beliefs about the origin of the voice). The PANSS item was not related to location, loudness, controllability, negative content or distress. The item measuring auditory hallucinations in the SAPS was related to the individual items measuring frequency, duration and disruption but not the total score or any other individual items.

Depression was related to the PSYRATS total score and the individual items of negative content (amount and degree), distress (amount and intensity) and controllability, but not to frequency, duration, location, loudness, beliefs about origin or controllability. Anxiety was not related to the PSYRATS total or any individual items.

The item measuring delusions in the PANSS was related to the overall PSYRATS total, and the individual items measuring preoccupation (amount and duration) and conviction, but not to distress (amount and intensity) or disruption to life. The items measuring delusions in the SAPS were related to the PSYRATS total, pre-occupation (amount and duration), conviction and disruption to life, but not with distress (amount and intensity).

Depression was related to the PSYRATS total score and the individual items of preoccupation (duration), distress (amount and intensity) but not with pre-occupation (amount), conviction or disruption to life. Anxiety was not related to the PSYRATS total and was only related to one individual item (intensity of distress).

Table 3. Relationship between PSYRATS auditory hallucinations scale, items and totals, with PANSS and SAPS and depression and anxiety

Auditory hallucinations (N = 144)	PANSS hallucinatory behaviour (N = 144)	SAPS auditory hallucinations (N= 144)	Depression (N = 137)	Anxiety (N = 129)
Frequency	0.57**	0.68**	0.15	0.14
Duration	0.42**	0.31**	0.18	0.08
Location	0.01	−0.01	0.03	−0.07
Loudness	0.10	0.08	0.05	−0.06
Beliefs about origin	0.30**	0.04	−0.15	−0.12
Amount of negative content	0.16	0.01	0.45**	0.19
Degree of negative content	0.23	0.11	0.37**	0.14
Amount of distress	0.09	−0.02	0.40**	0.21
Intensity of distress	0.10	0.03	0.37**	0.17
Disruption	0.37**	0.27*	0.23*	0.07
Controllability	0.16	0.05	0.22	0.14
Total	0.47**	0.27**	0.46**	0.17

*$p < 0.01$.
**$p < 0.001$.

Table 4. Relationship between PSYRATS delusions scale, items and totals, with PANSS and SAPS and depression and anxiety

Delusions (N = 228)	PANSS delusions	SAPS global rating of delusions	Depression (N = 137)	Anxiety (N = 129)
Amount of preoccupation	0.48**	0.36**	0.15	0.14
Duration of preoccupation	0.34**	0.28**	0.29**	0.13
Conviction	0.37**	0.29**	0.04	−0.05
Amount of distress	0.19*	0.20*	0.32**	0.19
Intensity of distress	0.14	0.17	0.31**	0.26**
Disruption to life	0.21*	0.23**	0.14	0.08
Total	0.40**	0.35**	0.36**	0.24*

*$p < 0.01$.
**$p < 0.001$.

Factor structure

The factor structure of the auditory hallucination and delusions subscales were explored using a principal components (factor) analysis with a single varimax rotation. The Kaiser criterion (eigenvalue greater than 1) was used to determine the number of factors. Only those who reported auditory hallucinations were included in the analysis of the auditory hallucination scale, and only those who reported delusions were included in the analysis of the delusion scale. This approach was adopted so as the analysis would not be influenced by the significant percentage of the sample who did not report one or other of the symptoms. As shown in Table 5, the auditory hallucination scale exhibited a four-factor structure. However, only one factor contained more than three items. This factor included items related to negative content, distress and disruption.

The delusions scale exhibited a two-factor structure, with three items in each, as seen in Table 6.

Discussion

The current study presents the distribution of symptom characteristics from the PSYRATS scales in a sample

Table 5. Factor loadings for PSYRATS auditory hallucination scale

Item	Factor			
	1	2	3	4
Frequency		0.854		
Duration		0.826		
Location				0.778
Loudness			0.757	
Beliefs re-origin				0.774
Negative content				
Amount	0.850			
Degree	0.817			
Distress				
Amount	0.830			
Intensity	0.825			
Disruption	0.441		0.440	
Control			0.604	
Cumulative percentage of variance	30.7	44.2	55.7	65.8

Table 6. Factor loadings for PSYRATS delusions subscale

Item	Factor	
	1	2
Preoccupation		
Amount		0.781
Duration		0.729
Conviction		0.668
Distress		
Amount	0.899	
Intensity	0.919	
Disruption	0.523	
Cumulative percentage of variance	40.8	63.1

of individuals who have recently relapsed with positive symptoms of psychosis. As expected, there is a high prevalence of severe symptomatology within this group. Of those who experienced auditory hallucinations, about 75% reported hearing voices at least once a day, with about 40% experiencing voices for at least an hour at a time. Almost one-third stated that the content of their voices were always negative, almost one-third also reported the maximum possible level of distress. The current results broadly match those of Nayani and David's (1996) study in which 49% of their sample stated there was an external source to their voices. Of those participants who reported delusions, about half reported high levels of preoccupation – thinking of the delusion at least once an hour – and almost half were 100% convinced of their belief. Approximately half the sample reported marked or extreme distress, with 'severe' or 'complete' disruption to life. The presentation of the distribution of scores for each item, along with the means and standard deviations, should provide a clinically useful reference point for interpreting scores on these scales in individual cases.

The relationship between the commonly used psychiatric measures of PANSS and SAPS with the PSYRATS items suggests that the diagnostically based tools only reflect selected aspects of psychotic symptomatology. For example, although both the PANSS hallucination items correlated significantly with the auditory hallucination PSYRATS total, the diagnostic tool seems to be mostly related to the more objectively measurable characteristics associated with hearing voices, these being the 'frequency', 'duration', and

'disruption to life'. The PANSS and SAPS ratings seem to be relatively insensitive in their ability to measure the distress associated with hallucinations, or their negative content. The failure of the psychiatric scales to assess the negative content and distress associated with hallucinations is important, given that it is these items that are most highly related to levels of depression (and to a lesser extent anxiety) within our sample, as opposed to items such as hallucination frequency and duration.

The pattern of results obtained with the PSYRATS auditory hallucination scale is broadly repeated with the PSYRATS delusion scale. The PANSS and SAPS measures are significantly correlated with the PSYRATS delusions total, although the strength of the relationship is mainly due to these measures reflecting levels of preoccupation and conviction associated with the delusion, rather than the distress. Again, this highlights the limitations of the diagnostic measures in terms of distress, as it is the distress items of the delusion scale that are most strongly associated with depression.

Taken together, these results suggest that diagnostic psychiatric measures reflect restricted aspects of psychotic symptomatology; those less linked to psychological distress. Given that emotional distress is routinely the primary target for psychological interventions, our results support calls from other researchers (Birchwood, 2003) for measures able to measure change in distress. Further, PSYRATS comprises a valuable measure of symptom-related distress that can be employed not just in clinical trials of psychosocial interventions but also in research for a wider range of psychiatric interventions.

The results of the factor analysis in the current sample supported the two-factor structure of the delusions subscale reported by Haddock et al. (1999). However, the three-factor structure for auditory hallucinations in the original study was not replicated, with the current study producing an extra fourth factor. Our results resemble those of a recent report of PSYRATS dimensions in a sample of three-hundred and nine cases of early onset psychosis (Drake et al., 2004). These authors again found a two-factor structure for delusions, but a less clear structure emerged for the hallucination scale. We therefore probably still lack a clear understanding of the dimensions of hallucinatory experience. Some but not all studies identify a two factor structure of delusions on the PSYRATS. Peters et al. (1999) found conviction and preoccupation to be two separate dimensions, along with a third dimension of distress. Further, despite our two-factor structure for delusions, the inter-item correlations were not great for levels of conviction and pre-occupation. The fact that the PSYRATS delusion scale only contains six items may have limited the potential for more than two factors to emerge. Whilst there is a need for reliable subscales reflecting the various dimensions of psychotic symptom dimensions, the use of a total score for the PSYRATS results in the loss of interesting analyses in relation to symptom dimensions. At the moment, it would seem best to present PSYRATS data both as a total score, but also with reference to the key single items of relevance to a particular study (e.g. Freeman et al., 2004). However, it is envisaged that future improvements within scales measuring the multidimensional nature of the positive symptoms of psychosis will be sensitive to clinical change within the therapeutic process.

The current study investigated a predominantly chronic sample, with on average around ten years of illness, which limits the applicability of our data to a first episode cohort. Our sample also seems to contain a gender bias, although this is in line with previous studies (for example, Lewis et al., 2002). To summarize, the PSYRATS scales appear to be useful for the measurement of a number of important dimensions of psychotic symptoms. Further, these scales enable the measurement of distress, a key target of psychological intervention. However, the scale might benefit from further study to clarify the factor structure. We suggest a simplified version of the scales could be used in clinical practice.

Acknowledgements

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