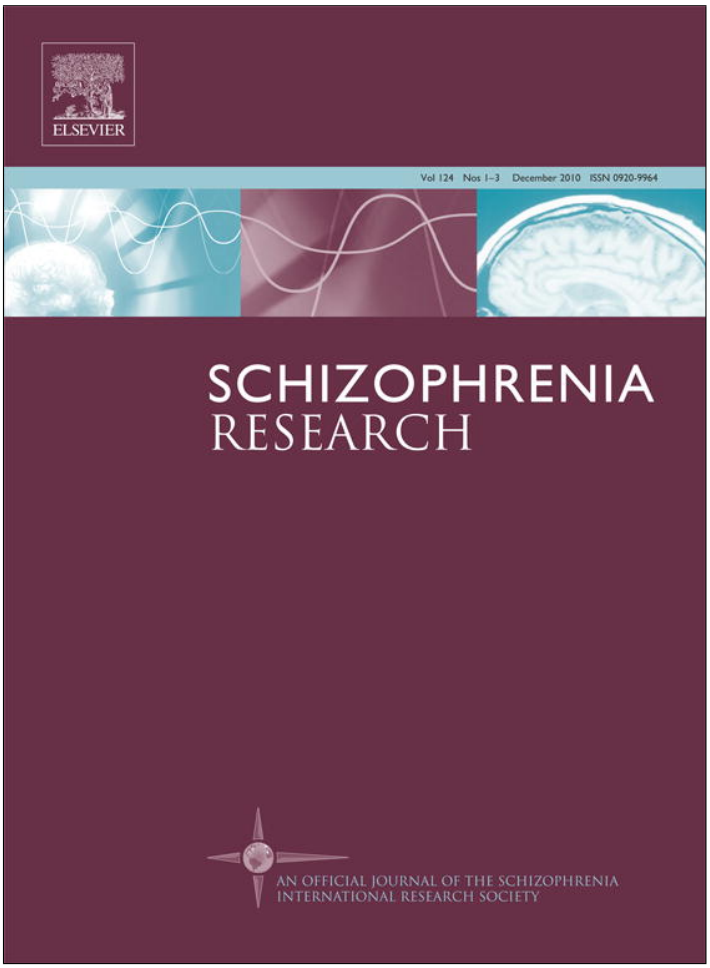

Schizophrenia Research 124 (2010) 36–42

Contents lists available at ScienceDirect

Schizophrenia Research

journal homepage: www.elsevier.com/locate/schres

Initial development and preliminary validation of a new negative symptom measure: The Clinical Assessment Interview for Negative Symptoms (CAINS)

Courtney Forbes [a], Jack J. Blanchard [a,*], Melanie Bennett [b], William P. Horan [c], Ann Kring [d], Raquel Gur [e]

[a] University of Maryland, College Park, MD 20742-4411, United States
[b] University of Maryland School of Medicine, Los Angeles, CA, United States
[c] Department of Psychiatry, University of California, Los Angeles, CA, United States
[d] Department of Psychology, University of California, Berkeley, CA, United States
[e] Department of Psychiatry, University of Pennsylvania, Philadelphia, PA, United States

ARTICLE INFO

Article history:
Received 2 July 2010
Received in revised form 23 August 2010
Accepted 27 August 2010
Available online 24 September 2010

Keywords:
Negative symptoms
Clinical ratings
Assessment

ABSTRACT

As part of an ongoing scale development process, this study provides an initial examination of the psychometric properties and validity of a new interview-based negative symptom instrument, the Clinical Assessment Interview for Negative Symptoms (CAINS), in outpatients with schizophrenia or schizoaffective disorder ($N = 37$). The scale was designed to address limitations of existing measures and to comprehensively assess five consensus-based negative symptoms: asociality, avolition, anhedonia (consummatory and anticipatory), affective flattening, and alogia. Results indicated satisfactory internal consistency reliability for the total CAINS scale score and promising inter-rater agreement, with clear areas identified in need of improvement. Convergent validity was evident in general agreement between the CAINS and alternative negative symptom measures. Further, CAINS subscales significantly correlated with relevant self-report emotional experience measures as well as with social functioning. Discriminant validity of the CAINS was strongly supported by its small, non-significant relations with positive symptoms, general psychiatric symptoms, and depression. These preliminary data on an early beta-version of the CAINS provide initial support for this new assessment approach to negative symptoms and suggest directions for further scale development.

1. Introduction

Negative symptoms are common and highly disabling clinical features of schizophrenia (Kirkpatrick et al., 2006). Despite their clear functional significance, pharmacological treatments developed for schizophrenia over the past several decades do not adequately address negative symptoms (Leucht et al., 2009; Montgomery and van Zwieten-Boot, 2007) and there are no medications with a specific indication for negative symptoms. Although psychosocial interventions have promise for possibly ameliorating negative symptoms, again the effects (especially when considering methodologically rigorous studies) of these treatments are limited (Kurtz and Mueser, 2008; Wykes et al., 2008). Thus, negative symptoms are widely recognized as a critical unmet treatment need that substantially limits functional recovery.

Building on the recent success of the NIMH-Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS) process for facilitating treatments that address the disabling cognitive deficits of schizophrenia (Green et al., 2004), the NIMH sponsored a consensus development conference to identify obstacles to the development of new treatments for negative symptoms and to formulate recommendations to

* Corresponding author. Department of Psychology, Biology-Psychology Building, University of Maryland, College Park, MD 20742-4411, United States. Tel.: +1 301 405 8438; fax: +1 301 314 9566.
E-mail address: jblanchard@psyc.umd.edu (J.J. Blanchard).

0920-9964/$ – see front matter © 2010 Elsevier B.V. All rights reserved.
doi:10.1016/j.schres.2010.08.039

address them (Kirkpatrick et al., 2006). Among the diverse participants, there was a broad consensus that conceptual and psychometric limitations of existing negative symptom assessment measures constitute a major impediment to treatment development efforts. The chief recommendation was to develop a new negative symptoms measure. As part of the workgroup established to implement this recommendation, we initiated an iterative, data-driven process to develop and validate a next-generation negative symptom rating scale (Blanchard et al., in press). In this paper, we report an initial psychometric and validation study of the first version of a new instrument, the Clinical Assessment Interview for Negative Symptoms (CAINS-beta; Blanchard et al., in press).

Definitions of negative symptoms typically involve the decrease or lack of a normal function (e.g., Alphs et al., 1989; Andreasen, 1982; Kay et al., 1987; Kirkpatrick et al., 1989). The specific domains of normal functioning that are considered can vary across assessment measures but typically include: affective experience, either focused on reduced pleasure (i.e., anhedonia) or on a broader reduction in the range and intensity of both positive and negative emotions; interest in and motivation for productive activities, or sense of purpose (relating to avolition or apathy); social drive or interest and desire for affiliation (relating to asociality); expressive or communicative behaviors, including diminished facial expression, decreased gestures, and decreased vocal intonation (all aspects of flat or blunted affect), and diminished verbal production or reduced spontaneous speech (alogia). Although the above would indicate that aspects of the negative symptom construct clearly relate to experiential deficits (i.e., emotional experience, interest, motivation, sense of purpose, desire for social affiliation), existing clinical measures of negative symptoms differ markedly in what information is considered and how these different forms of information are considered in rating symptom severity (Blanchard et al., in press). Critically, some existing scales are overly reliant on behavioral or performance deficits and do not always consider other factors relevant to assessing experiential deficits that are core to the definitions of some negative symptoms.

The CAINS was designed to address these and other limitations of negative symptom measures described in the literature (Blanchard et al., in press; Horan et al., 2006), including problems in item content, overlap with measures of functioning, and limited coverage of context and internal experience. Items probe for experiential deficits as well as other relevant information including actual behavior and environmental context. Thus, for example, details of social difficulties (e.g., isolation secondary to family rejection) are considered along with the patient's report of their desire for family contact. Moreover, the CAINS incorporates contemporary research findings in social and affective neuroscience into the overall conceptualization of negative symptoms. The CAINS is a semi-structured interview with extensive prompts and follow-up queries provided for each item, as well as clear anchors for ratings, addressing concerns regarding the lack of structure and interviewer guidance in earlier negative symptom measures.

The CAINS assesses the five consensus sub-domains that were determined by extensive review of the empirical literature (Kirkpatrick et al., 2006; Blanchard and Cohen, 2006): asociality, avolition, anhedonia, blunted affect, and alogia. The first three domains are rated based on aspects of the interviewee's reported subjective experience, as well as frequency of engagement in relevant activities. Specifically, asociality items assess the degree to which close social bonds are valued and desired, as well as frequency of social interactions in family relationships, romantic relationships, and friendships. Avolition items assess level of interest and motivation, as well as initiation and persistence of behavior across social activity, work/vocational/school, recreation, and self-care. Anhedonia items assess consummatory pleasure (intensity and frequency of pleasurable experiences) and anticipatory pleasures (intensity of expected pleasurable experience) in social activities, physical sensations, and recreational/vocational activities. The last two domains, blunted affect and alogia are rated based on observable behaviors displayed during the interview. Blunted affect items are rated based on behaviors observed throughout the interview, as well as from prompts specifically designed to elicit both positive and negative emotions. Ratings for alogia include quantity of speech and amount of spontaneous elaboration.

Although our starting point was the five domains suggested by the consensus statement (Kirkpatrick et al., 2006), it is important to recognize that the latent structure of negative symptoms remains to be determined (Blanchard and Cohen, 2006). Whether the CAINS items support a five factor structure is ultimately a matter of empirical testing. Thus, the current domains, while conceptually cohesive, are properly considered tentative. Relatedly, in developing the CAINS we sought to include a broad range of potentially relevant item content to ensure comprehensive assessment of key content domains. This intentionally led to a relatively lengthy scale that would then be carefully examined empirically to determine which items should be eliminated, modified, or retained. Item refinements, scale revisions, and validation are based on an empirically-based series of steps prior to this scale's ultimate adoption for use in psychopathology research and clinical trials.

The current study is an initial assessment of an early beta-version of the CAINS, the first step of a larger multi-site, data-driven scale development process carried out through the NIMH-funded *Collaboration to Advance Negative Symptom Assessment in Schizophrenia* (CANSAS; Blanchard et al., in press). This initial report evaluates the reliability (inter-rater agreement, internal consistency) as well as convergent and discriminant validity of the CAINS beta-version.

2. Methods

2.1. Participants

Participants were 37 people with schizophrenia ($n=26$) or schizoaffective disorder ($n=11$) between the ages of 18 and 65 recruited from outpatient mental health clinics. Individuals with schizoaffective disorder were included to ensure a full range of symptoms and to adequately represent the patient populations for whom this negative symptom assessment instrument would be appropriate. All participants were receiving psychiatric medications as determined by their treatment team. Exclusion criteria were: 1) history of

neurological disorder or head trauma with loss of consciousness, 2) mental retardation as indicated by a chart review, or 3) inability to effectively participate in the protocol assessments due to intoxication or psychiatric symptoms. To help ensure generalizability, we did not exclude for history of substance use disorder (56% of the sample had a lifetime substance use disorder). The sample was 81% male, 89% African-American, 8.1% White, 2.7% Asian, with a mean age of 46.86 years ($SD = 8.86$) and a mean of 11.95 years of education ($SD = 1.93$). Most of the sample had never been married (54%) or were divorced or separated (22%) and 84% were currently receiving disability benefits. All were currently taking antipsychotic medications.

2.2. Procedures

Study procedures were approved by the University of Maryland, School of Medicine and the University of Maryland, College Park Institutional Review Boards. Following completion of informed consent, participants completed two sessions of research assessments (each lasting about 2 h) that were scheduled up to a week apart and were administered by different doctoral- or masters-level assessors. At the first session, participants completed a diagnostic interview, interview-based assessments of general psychiatric symptoms and negative symptoms, and self-report ratings of social functioning. At the second session, a second, independent rater (blind to the results of the first assessment) administered the CAINS beta-version, an interview-based assessment of depression, and self-report ratings of pleasure. All symptom assessments focused on the week prior to the interview. Assessments for this study were conducted between May 2007 and June 2008.

The three clinical raters had masters-level graduate training in clinical psychology and raters received further training in symptom assessments that included review of relevant instrument manuals and observation and ratings of a library of videotaped assessments. Raters subsequently conducted practice evaluations with all assessments reviewed by a doctoral-level faculty member. Following confirmation of rater competency across videotaped and in-person interviews, raters were credentialed to conduct independent evaluations. All assessments were videotaped for the purposes of ongoing supervision throughout the study. A subset of CAINS videos were later evaluated by an independent rater to determine inter-rater agreement for this new instrument.

2.3. Measures

The *Structured Clinical Interview for DSM-IV* (First et al., 2001; Williams et al., 1992) was used to establish schizophrenia and schizoaffective diagnoses, utilizing all available information (patient report, medical records, and treatment providers).

The Clinical Assessment Interview for Negative Symptoms, beta-version (CAINS-beta; Blanchard et al., in press) is a 23-item interview designed to assess the severity of negative symptoms. All items were scored on a 7-point scale (0–6) with higher scores reflecting greater pathology. CAINS ratings are based solely on the clinical interview. For items assessing intensity of pleasure (items 1, 3, 4, 6, 7, and 9) anchors were rated from 0 (*strong or very intense pleasure*) to 6 (*no pleasure*). All other items used anchors from 0 (*no impairment*) to 6 (*severe deficit*). Items were summed to create five provisional subscales: anhedonia (9 items), avolition (4 items), asociality (3 items), blunted affect (5 items) and alogia (2 items).

The *Brief Psychiatric Rating Scale* (BPRS; Overall and Gorham, 1962), expanded 20-item version, was used to measure clinical symptomatology. Items were rated on a seven point scale, ranging from "not reported" to "very severe". We selected 3 subscale scores to address discriminant and convergent validity, based on the factor structure supported by Lachar et al. (2004): Positive symptoms (suspiciousness, grandiosity, conceptual disorganization, hallucinatory behavior, unusual thought content, and disorientation), affective symptoms (somatic concern, anxiety, guilt feelings, depressive mood, and tension), and negative symptoms (emotional withdrawal, motor retardation, and blunted affect — with the additional item of poverty of speech added to this scale given its inclusion in our 20-item version of the BPRS).

The *Calgary Depression Scale for Schizophrenia* (CDSS; Addington, et al., 1990, 1996), is a 9-item, semi-structured interview for depressive symptoms. Items are measured on 4-point scales ranging from "absent" to "severe". Due to scheduling and time constraints, three participants were unable to complete the CDSS ($N = 34$).

The *Scale for the Assessment of Negative Symptoms* (SANS; Andreasen, 1984) includes four subscales: affective flattening or blunting, alogia, avolition–apathy, and anhedonia–asociality. Subscale scores were based on the sum of the constituent items (global scores were excluded because of redundancy) which are each on a 5-point scale.

The *Temporal Experience of Pleasure Scale* (TEPS; Gard et al., 2006) is an 18-item self-report measure that assesses trait dispositions in anticipatory and consummatory experiences of pleasure. Items are rated on 6-point scales ranging from "very false for me" to "very true for me". All items were read aloud by the assessor and participants had a copy of the scale anchors to choose their response. Due to scheduling and time constraints, three participants were unable to complete the TEPS ($N = 34$).

The *Social Functioning Scale* (SFS; Birchwood et al., 1990) is designed to assess social functioning in people with serious mental illness. It provides measures of performance of daily living skills, social engagement/withdrawal, and recreation. Items were summed to yield a total functioning score.

2.4. Data analysis

Analyses were conducted to examine the psychometric properties and validity of the CAINS-beta. First, item-level descriptive statistics and subscale-level statistics (internal consistency reliability) were examined. Second, inter-rater agreement at the subscale level was assessed. Third, convergent validity was evaluated by examining whether the CAINS putative subscales demonstrated significant correlations with corresponding measures of negative symptoms from the SANS and BPRS, as well as measures of pleasure and community functioning. Fourth, discriminant validity was assessed by examining correlations between the CAINS

subscales and measures of positive and affective symptoms, which were expected to be small.

3. Results

3.1. Item-level and subscale analyses for CAINS

Item and subscale means for the CAINS-beta are presented in Table 1. A few notable patterns are evident in these data, especially within the anhedonia items. Specifically, pleasure intensity item means (experienced and expected) were all below 1.74 on a 7-point scale. Similarly, pleasure frequency item means were all below .40. These results raise questions about the item anchors used in assessing anhedonia, in particular their skew towards nonpathological ratings in this sample. Other items showed generally higher mean scores, larger score ranges, and no apparent floor or ceiling effects. Table 1 also presents internal consistency reliability estimates (Cronbach's alpha) for the CAINS-beta subscales and total scale score. Although internal consistency was good for anhedonia, blunted affect, alogia, and the total CAINS score, low internal consistency was evident for asociality and avolition.

Table 1
Item and subscale statistics for the Clinical Assessment Interview for Negative Symptoms ($N = 37$).

	M	*SD*	Range	Scale alpha
Item 1: Social, pleasure intensity	1.11	.94	0–4	
Item 2: Social, frequency	.19	.74	0–4	
Item 3: Anticipated social, pleasure	1.30	1.29	0–6	
Item 4: Physical, pleasure intensity	.73	1.22	0–6	
Item 5: Physical, frequency	.22	1.03	0–6	
Item 6: Anticipated physical, pleasure	.65	.86	0–2	
Item 7: Recreational/vocational, pleasure	1.05	1.13	0–4	
Item 8: Recreational/vocational, frequency	.35	.82	0–3	
Item 9: Anticipated recreational/vocational pleasure	.95	1.25	0–6	
Anhedonia subscale score	6.54	5.39	0–30	.74
Item 10: Family	1.62	1.36	0–6	
Item 11: Romantic	2.70	1.98	0–6	
Item 12: Friends	3.08	1.69	0–6	
Asociality subscale score	7.41	3.31	2–15	.32
Item 13: Social	2.38	1.46	0–6	
Item 14: Vocational/school	1.65	1.69	0–6	
Item 15: Recreation	1.81	1.35	0–5	
Item 16: Self–care	1.35	1.38	0–5	
Avolition subscale score	7.19	3.66	0–15	.47
Item 17: Facial expression	1.92	1.82	0–6	
Item 18: Vocal expression	1.51	1.97	0–6	
Item 19: Expressive gestures	1.62	1.80	0–6	
Item 20: Eye contact	1.08	1.26	0–4	
Item 21: Spontaneous movement	1.30	1.53	0–4	
Blunted affect subscale score	7.43	6.62	0–23	.84
Item 22: Quantity of speech	.76	1.26	0–5	
Item 23: Spontaneous elaboration	1.19	1.58	0–5	
Alogia subscale score	1.95	2.76	0–10	.93
CAINS total score	30.51	15.29	7–65	.84

Note: All items were scored on a 7-point scale (0–6) with higher scores reflecting greater pathology. For items assessing intensity of pleasure (items 1, 3, 4, 6, 7, and 9) anchors were rated from 0 (*strong or very intense pleasure*) to 6 (*no pleasure*). All other items used anchors from 0 (*no impairment*) to 6 (*severe deficit*). Range reflects the actual range of ratings from current sample.

3.2. Inter-rater agreement

Fifteen of the videotaped CAINS assessments were rated by a second rater blind to the original symptom ratings. Good inter-rater agreement was obtained for anhedonia (ICC = .92), asociality (ICC = .93) and blunted affect (ICC = .72). Lower rater agreement was found for avolition (ICC = .53) and alogia (ICC = .48), indicating that these items require further attention to improve rater agreement.

3.3. Convergent validity

Descriptive statistics for the other symptom assessments and for self-reported pleasure and social functioning are presented in Table 2. Convergent validity of the CAINS-beta subscales was first examined by computing correlations with existing negative symptom measures (the SANS and BPRS negative symptom subscale), which are presented in Table 3. In general the pattern of correlations indicates good convergent validity with the highest correlations for those scales tapping similar domains across measures. The anhedonia scale from the CAINS-beta was only modestly correlated with the SANS anhedonia–asociality scale ($r = .31$, $p = .06$), likely reflecting the differing approaches and content of these scales. The alogia scales from the CAINS-beta and SANS were not correlated and may reflect the different item content included in these measures. Specifically, the SANS alogia scale includes poverty of content as well as blocking — symptoms not considered in the CAINS because of their possible association with thought disorder. In order to more directly examine this issue we recomputed a SANS alogia score without these items (i.e., based only on poverty of speech and increased latency of response). The CAINS-beta alogia scale was significantly correlated with this trimmed SANS alogia score ($r = .33$, $p < .05$).

The BPRS negative symptom subscale was significantly correlated with avolition, blunted affect, and alogia from the CAINS-beta but not with anhedonia and asociality. This

Table 2
Descriptive statistics for measures of symptoms, pleasure, and social functioning ($N = 37$).

	M	*SD*
SANS		
Anhedonia–asociality	7.03	4.13
Avolition–apathy	8.46	2.91
Blunted affect	5.73	5.64
Alogia	1.57	2.40
BPRS		
Negative symptoms	7.19	3.54
Positive symptoms	13.81	5.80
Affect symptoms	11.08	5.11
Calgary [a]		
Depression	1.97	2.28
TEPS [a]		
Anticipatory	46.92	8.72
Consummatory	35.67	6.03
SFS		
Functioning total score	126.61	22.44

Note: SANS = Scale for the Assessment of Negative Symptoms, BPRS = Brief Psychiatric Rating Scale; Calgary = Calgary Depression Scale for Schizophrenia, TEPS = Temporal Experience of Pleasure Scale, SFS = Social Functioning Scale.
[a] Due to missing data, $N = 34$.

Table 3
Convergent validity: correlations between CAINS-beta and other independently rated negative symptom measures.

	SANS				BPRS
	Anhedonia–asociality	Avolition–apathy	Blunted affect	Alogia	Negative symptoms
CAINS					
Anhedonia	.31 [a]	.16	.01	−.04	−.04
Asociality	.54 [b]	−.06	.25	.01	.17
Avolition	.47 [b]	.50 [b]	.37 [c]	.12	.48 [c]
Blunted affect	.38 [c]	.24	.62 [b]	.20	.58 [b]
Alogia	.45 [b]	.11	.53 [b]	.18	.53 [b]

Note. CAINS = Assessment Interview for Negative Symptoms; SANS = Scale for the Assessment of Negative Symptoms, BPRS = Brief Psychiatric Rating Scale.
[a] $p = .06$.
[b] $p < .005$.
[c] $p < .05$.

pattern of correlations is generally consistent with the BRPS negative symptom items largely tapping expressive and behavioral deficits within the interview.

Self-reported pleasure and social functioning measures were used as further indicators of convergent validity for the CAINS. The CAINS-beta anhedonia subscale was negatively correlated with both the anticipatory ($r = -.42$, $p < .05$) and consummatory ($r = -.36$, $p < .05$) pleasure scales from the TEPS. None of the other CAINS-beta subscales significantly correlated with scores on the TEPS (all $ps > .05$). The anhedonia–asociality scale of the SANS was correlated with TEPS anticipatory pleasure scale ($r = -.47$, $p < .01$) but not with consummatory pleasure ($r = .10$, $p > .05$). This pattern suggests that the CAINS is successfully tapping a broader array of hedonic deficits (both anticipatory and consummatory pleasure) in a way that is not evident with the SANS.

Social functioning, as rated with the SFS, was significantly correlated with the CAINS-beta subscales of anhedonia ($r = -.44$, $p < .01$), avolition ($r = -.50$, $p < .005$), and alogia ($r = -.37$, $p < .05$). Other CAINS-beta subscales were not significantly correlated with social functioning. These results indicate that the CAINS is meaningfully associated, but not redundant with social functioning. As expected, the SANS asociality–anhedonia ($r = -.45$, $p < .01$), and avolition–apathy ($r = -.49$, $p < .005$) scales were strongly correlated with self-reported social functioning.

3.4. Discriminant validity

Discriminant validity of the CAINS-beta was examined in correlations between this measure and other measures of non-negative symptomatology (BPRS and CDSS). CAINS-beta subscales were not significantly related to BPRS positive symptoms (range $rs = -.11$ to .12, all $ps > .05$), BPRS affective symptoms (range $rs = -.10$ to .17, all $ps > .05$), or depression ratings from the CDSS (range $rs = -.15$ to .21, all $ps > .05$). These results indicate excellent discriminant validity of the CAINS and demonstrate that the CAINS scale scores are not influenced by other forms of symptomatology.

4. Discussion

As part of an ongoing scale development effort, this study was conducted to provide an initial test of a new approach to negative symptom assessment. This preliminary study of a beta-version of the CAINS sought to provide initial feedback on the scale's psychometric properties as well as convergent and discriminant validity. Overall, the results provide initial support for the feasibility and validity of this approach to assessing negatives symptoms, but also highlight several key considerations for optimal assessment of negative symptoms.

The internal consistency of the full scale score was encouraging (alpha = .84) as was the internal consistency for the anhedonia (.74), blunted affect (.84) and alogia (.93) scales. Item-level statistics suggested some areas of concern within the anhedonia items assessing the frequency and intensity of pleasurable activities, experienced or expected. With regard to frequency, we employed anchors that attempted to encompass a range of severity with objective anchor descriptors referring to specific numbers of events experienced. The challenge was how to properly distinguish pathological thresholds in anchors without the availability of normative data. It appears that the initial frequency anchors utilized referents that were not sufficiently sensitive to pathology. For intensity ratings interviewers probed for participants' descriptions of the intensity of the most pleasurable event experienced or expected. This proved challenging in that many patients utilized limited verbal descriptors ("it was okay") to describe their affective experience despite extensive probing. This raises the question of how to properly assess the intensity of pleasurable experience in a population that may have limited vocabulary or restricted speech output. To address these issues, in the latest revised version of the CAINS we have modified anchors so that higher frequency thresholds are required to achieve nonpathological ratings, and employed an alternative intensity rating approach that incorporates a Likert-scale with clear verbal anchors. Despite the previously mentioned limitations, other results from the anhedonia scale were actually quite encouraging.

Internal consistency for the avolition and asociality scales was not adequate, indicating the need to re-evaluate the item content of these scales. Our attempt to be comprehensive in the facets assessed within each of these domains may have led to item heterogeneity and lower coherence across these items. This is evident in asociality where items tapping family relations, romantic partners, and friendships can lead to very different results (e.g., healthy and intimate relationships with relatives but absent or highly problematic relationships in other domains). Future revisions to the CAINS will consider how best to integrate information across different social domains to yield improved scale consistency. Further,

structural analyses may suggest the integration of subscales such that internal consistency can be further improved (e.g., integrating items across anhedonia, asociality, and avolition into a single scale as suggested by some prior factor analytic research; Blanchard and Cohen, 2006).

Inter-rater agreement was encouraging for anhedonia, asociality, and blunted affect (all ICCs above .70). These preliminary data are especially encouraging given that this was the first field test of the new scale and the item content, interview probes, and provisional manual were all in the development phase at the time this study was conducted. However, inter-rater agreement for avolition and alogia clearly indicates the need for additional work on these scales. Avolition and alogia are content domains that have shown particular difficulties with rater agreement in studies of other negative symptom scales (e.g., Mueser et al. (1994) reported ICCs for these SANS scales that were below .40). One factor that may have contributed to lower inter-rater agreement is the use of 7-point item ratings in this beta-version of the CAINS; raters indicated that they often found it challenging to make fine-grained distinctions described across the full 7-point ranges. We have addressed these issues in revising item content, interview probes, item anchors, and manual instructions for these domains within a revised CAINS.

There was good evidence of convergent validity for the CAINS-beta. With the exception of alogia, correlations between the CAINS and related scales across the SANS and BPRS were moderate to high (range $rs = .31$ to .62). This is especially encouraging given that SANS and CAINS ratings were conducted by independent raters. Although high correlations were obtained across negative symptom ratings, it was also clear that similar scales were not redundant across the interview measures. For example, the, CAINS anhedonia scale was only correlated .31 with the SANS anhedonia–asociality scale. In addition, the CAINS anhedonia subscale significantly correlated with self-reports of both consummatory and anticipatory pleasure, whereas the SANS anhedonia–asociality scale was only correlated with anticipatory pleasure (replicating findings of Gard et al. (2007)). This is consistent with our attempt to broaden the assessment of hedonic experience in rating anhedonia. With regard to social functioning, higher anhedonia, avolition, and alogia scales were significantly but moderately associated with poorer self-reported community functioning. This pattern of results is critical in that the CAINS attempts to avoid providing a redundant rating of social functioning or success and focuses on internal deficits in pleasure and motivation. The CAINS retained an association with functioning despite this differing approach, which may be more interpretable than the potentially circular finding of SANS ratings showing a relationship with functioning.

Discriminant validity of the beta-version is very good. In every case, there was no association between these other symptom domains and the CAINS-beta scales. Again, these results were obtained even though the BPRS ratings were conducted by a rater other than the CAINS interviewer. These findings suggest that the new instrument is not contaminated with symptom content that is conceptually distinct from negative symptoms.

In summary, this preliminary study offers promising results for a novel assessment approach to negative symptoms. While highly informative for providing an initial test of this new measurement approach, and useful for suggesting needed improvements in the CAINS, this study is limited by several methodological considerations. First, the size, demographics (i.e., largely male and African-American), and clinical characteristics (stabilized outpatients) of the sample raise questions about the generalizability of the findings. Second, the CAINS subscales used in the present analyses were based on *a priori* domains suggested by the NIMH consensus statement (Kirkpatrick et al., 2006). The true latent structure of the CAINS items may differ from this pentagonal arrangement (Blanchard and Cohen, 2006) and this structural question will need to be examined quantitatively. Third, the assessment of social functioning, while relying on a well-validated measure, was limited to patient self-report and thus CAINS relations to clinician or informant ratings, or to behavioral assessments of capacity or ability (e.g., social skill), are uncertain. Fourth, we did not assess medication motor side-effects and are thus unable to address how these might relate to negative symptom assessments in this sample. It is important to emphasize that this is just the first stage of an ongoing iterative process of scale development (Blanchard et al., in press). The CAINS has now been revised and is currently undergoing extensive evaluation in an NIMH-funded multi-site trial, the *Collaboration to Advance Negative Symptom Assessment in Schizophrenia* (CANSAS; Blanchard et al., in press). This research program will provide two additional studies involving over 400 patients and lead to further scale refinement. Ultimately, this data-driven scale development will yield a next-generation negative symptom scale for use in basic psychopathology studies and in clinical treatment trials.

Role of funding source

This work was supported by the VA Capitol Healthcare Network Mental Illness Research Education and Clinical Center (MIRECC, A.S. Bellack, Ph.D., Director) and the National Institute of Mental Health (K02-MH079231 and R01-MH082839 to JJB; RO1-MH082890 to AMK; R01-MH082782 to WPH; and R01-MH82783 to RG). Courtney Forbes was supported by a Pre-Doctoral Associated Health Rehabilitation Research Fellowship from the Department of Veterans' Affairs. Funding sources had no role in study design or in the collection, analysis and interpretation of data; or in the writing of this report.

Contributors

Drs. Forbes, Blanchard, and Bennett contributed to the study design, data collection, data analysis and interpretation, and writing of this report. Drs. Horan, Kring, and Gur contributed to the study design, interpretation of data analysis, and writing of this report.

Conflict of interest

Dr. Blanchard has received honorarium from Merck for consultation. Dr. Gur has received investigator initiated grants from Astra Zeneca and Pfizer; honorarium from Astra Zeneca and Pfizer for a lecture and from Merck for consultation.

Acknowledgements

The authors gratefully acknowledge Amy Wilson and Bryann Baker for their participation in data collection.

References

Addington, D., Addington, J., Schissel, B., 1990. A depression rating scale for schizophrenics. Schizophr. Res. 3, 247–251.

Addington, D., Addington, J., Atkinson, M., 1996. A psychometric comparison of the Calgary depression scale for schizophrenia and the Hamilton depression rating scale. Schizophr. Res. 19, 205–212.

Alphs, L.D., Summerfelt, A., Lann, H., Muller, R.J., 1989. The negative symptom assessment: a new instrument to assess negative symptoms in schizophrenia. Psychopharmacol. Bull. 25, 159–163.
Andreasen, N.C., 1982. Negative symptoms in schizophrenia: definition and reliability. Arch. Gen. Psychiatry 39, 784–788.
Andreasen, N.C., 1984. The Scale for the Assessment of Negative Symptoms (SANS). The University of Iowa, Iowa City, IA.
Birchwood, M., Smith, J., Cochran, R., Wetton, S., Copestake, S., 1990. The social functioning scale: the development and validation of a new scale of social adjustment for use in family intervention programs with schizophrenic patients. Br. J. Psychiatry 157, 853–859.
Blanchard, J.J., Cohen, A.S., 2006. The structure of negative symptoms within schizophrenia: implications for assessment. Schizophr. Bull. 32 (2), 238–245.
Blanchard, J.J., Kring, A.M., Horan, W.P., Gur, R., in press. Toward the next generation of negative symptom assessments: the collaboration for the advancement of negative symptom assessment in schizophrenia. Schizophr. Bull. doi:10.1093/schbul/sbq104.
First, M., Spitzer, R., Gibbon, M., Williams, J., 2001. Structured Clinical Interview for DSM-IV Axis I Disorders — Patient Edition (SCID-I/P). Biometrics Research Department, New York State Psychiatric Institute, New York.
Gard, D.E., Germans-Gard, M., Kring, A.M., John, O.P., 2006. Anticipatory and consummatory components of the experience of pleasure: a scale development study. J. Pers. 40, 1086–1102.
Gard, D.E., Kring, A.M., Gard, M.G., Horan, W.P., Green, M.F., 2007. Anhedonia in schizophrenia: distinctions between anticipatory and consummatory pleasure. Schizophr. Res. 93, 253–260.
Green, M.F., Nuechterlein, K.H., Gold, J.M., Barch, D.M., Cohen, J., Essock, S., Fenton, W.S., Frese, F., Goldberg, T.E., Heaton, R.K., Keefe, R.S., Kern, R.S., Kraemer, H., Stover, E., Weinberger, D.R., Zalcman, S., Marder, S.R., 2004. Approaching a consensus cognitive battery for clinical trials in schizophrenia: the NIMH-MATRICS conference to select cognitive domains and test criteria. Biol. Psychiatry 56 (5), 301–307.
Horan, W.P., Kring, A.M., Blanchard, J.J., 2006. Anhedonia in schizophrenia: a review of assessment strategies. Schizophr. Bull. 32 (2), 259–273.
Kay, S.R., Fiszbein, A., Opler, L.A., 1987. The positive and negative syndrome scale (PANSS) for schizophrenia. Schizophr. Bull. 13, 261–271.
Kirkpatrick, B., Buchanan, R.W., McKenney, P.D., Alphs, L.D., Carpenter, W., 1989. The schedule for the deficit syndrome: an instrument for research in schizophrenia. Psychiatry Res. 30, 119–123.
Kirkpatrick, B., Fenton, W., Carpenter, W.T., Marder, S.R., 2006. The NIMH-MATRICS consensus statement on negative symptoms. Schizophr. Bull. 32, 296–303.
Kurtz, M., Mueser, K., 2008. A meta-analysis of controlled research on social skills training for schizophrenia. J. Consult. Clin. Psychol. 76, 491–504.
Lachar, D., Espadas, A., Bailey, S.E., 2004. The Brief Psychiatric Rating Scale: contemporary applications. In: Maruish, M. (Ed.), The Use of Psychological Testing for Treatment Planning and Outcomes Assessment: Instruments for Adults, Vol. 3. Lawrence Erlbaum Associates Inc., Mahwah, NJ, pp. 153–190.
Leucht, S., Arbter, D., Engel, R., Kissling, W., Davis, J., 2009. How effective are second-generation antipsychotic drugs? A meta-analysis of placebo-controlled trials. Mol. Psychiatry 14, 429–447.
Montgomery, S.A., van Zwieten-Boot, B., 2007. ECNP consensus meeting. Negative, depressive, and cognitive symptoms of schizophrenia. Nice, March 2004. Eur. Neuropsychopharmacol. 17 (1), 70–77, ISSN 0924-977X. doi:10.1016/j.euroneuro.2006.05.004.
Mueser, K.T., Sayers, S.L., Schooler, N.R., Mance, R.M., Haas, G.L., 1994. A multisite investigation of the reliability of the Scale for the Assessment of Negative Symptoms. Am. J. Psychiatry 151, 1453–1462.
Overall, J.E., Gorham, D.R., 1962. The Brief Psychiatric Rating Scale. Psychol. Rep. 10, 799–812.
Williams, J.B.W., Gibbon, M.F., First, M.B., Spitzer, R.L., Davies, M., Borus, J., Howes, M.J., Kane, J., Pope, H.G., Rounsaville, B., Wittchen, H., 1992. The Structured Clinical Interview for DSM-III-R (SCID): multisite test–retest reliability. Arch. Gen. Psychiatry 42, 630–636.
Wykes, T., Steel, C., Everitt, B., Tarrier, N., 2008. Cognitive behavior therapy for schizophrenia: effect sizes, clinical models, and methodological rigor. Schizophr. Bull. 34, 523–537.