The influence of negative and affective symptoms on anhedonia self-report in schizophrenia

Isaac Jarratt-Barnham [a,1], Youssuf Saleh [b,1], Masud Husain [b,d], Brian Kirkpatrick [c], Emilio Fernandez-Egea [a,e,*]

[a] Department of Psychiatry and Behavioural and Clinical Neuroscience Institute, University of Cambridge, Cambridge, UK
[b] Nuffield Department of Clinical Neurosciences, John Radcliffe Hospital, Oxford, UK.
[c] Department of Psychiatry and Behavioral Sciences, University of Nevada, Reno School of Medicine, Reno, NV, USA
[d] Department of Experimental Psychology (MH, PL), University of Oxford, Oxford, UK.
[e] Cambridgeshire and Peterborough NHS Foundation Trust, Cambridge, UK.

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ABSTRACT

Background: Anhedonia, a symptom prevalent in schizophrenia patients, is thought to arise either within negative symptomatology or from secondary sources, such as depression. The common co-occurrence of these diseases complicates the assessment of anhedonia in schizophrenia.
Method: In a sample of 40 outpatients with chronic schizophrenia, we explored both the validity of the Snaith-Hamilton Pleasure Scale (SHAPS) self-report for anhedonia assessment and those factors influenced its scoring. We assessed negative symptoms using the Brief Negative Symptom Scale (BNSS), depression symptoms using the Calgary Depression Scale for Schizophrenia (CDSS) and cognitive impairment using the Brief Assessment of Cognition in Schizophrenia (BACS), before exploring associations between these scales.
Results: The SHAPS was validated for use in schizophrenia. SHAPS scores were not associated with negative symptoms or cognitive impairment, but were linked to a single Depression symptom: Hopelessness ($r = 0.52$, $p < 0.001$).
Conclusions: SHAPS scores, therefore, appear to only reflect anticipatory anhedonia arising from the affective domain. We advocate the development of multi-faceted self-report measures to more holistically assess anhedonia in schizophrenia.

1. Introduction

Anhedonia – an impaired ability to experience pleasure [1] – features centrally in several psychiatric conditions, and significantly impacts quality of life [2]. It is a notable aspect of schizophrenia [3], where it is conceptualised as one of the disease's 'negative symptoms' (alongside amotivation, asociality, blunted affect and alogia) [4], and of Depression, where it is understood as one of two core features of the condition [5,6].

Such is anhedonia's importance in schizophrenia that it has been suggested to be one of only two features underpinning negative symptomology [7], though others have suggested that such conclusions may be premature [8]. Regardless, in both Schizophrenia and Depression, anhedonia is poorly understood [9]. It is only within the last few

decades that the symptom has become the subject of significant research.

Recent work has identified the presence of several distinct facets within the symptom. Anhedonia is conceptualised primarily as comprising of two aspects: 1) consummatory anhedonia – a reduction in pleasure arising from ongoing activities – and 2) anticipatory anhedonia – a reduced anticipation of future pleasure [10,11]. In schizophrenia, anhedonia is thought principally to comprise the latter; anticipatory impairment [12].

This deficit is often understood as an impaired ability to report past and projected future experiences [13]. This understanding is supported by substantial cognitive neuroscience research, which has demonstrated that anticipating future experience is dependent on neural processes linked to episodic memory [14], functions impaired in schizophrenia [15].

Chronic schizophrenia patients, however, frequently present not only with primary negative symptoms, but also with secondary, comorbid depression [16]. Not only are both these diseases strongly associated with anhedonia, but both these diagnoses are specifically linked to an anticipatory impairment [17]. The co-occurrence of these diseases

* Corresponding author.
 E-mail addresses: isaac.jarrattbarnham@stcatz.ox.ac.uk (I. Jarratt-Barnham), youssuf.saleh@ndcn.ox.ac.uk (Y. Saleh), ef280@cam.ac.uk (E. Fernandez-Egea).
 [1] These authors contributed equally to this manuscript.

significantly complicates the assessment of, and consequently the targeting of treatment for, anhedonia in schizophrenia.

Anhedonia's assessment in schizophrenia is also hampered by two features of scales used in the symptom's evaluation. Firstly, there exists a substantial heterogeneity in rating criteria across assessment tools [18]. For instance, anhedonia is rated alongside asociality in the Scale for the Assessment of Negative Symptoms (SANS) [19], rated individually by 5 distinct items in the Clinical Assessment Interview of Negative Symptoms (CAINS) [20] and is not featured at all in the negative subscale of the Positive and Negative Symptom Scale (PANSS) [21].

There is also a substantial lack of convergence between anhedonia measures [18]. Strauss and Gold found low convergence across clinician-rated assessments of anhedonia [22], and such assessments are only moderately associated with anhedonia self-report measures [23,24].

This variation across assessment measures complicates the study of anhedonia, and has prompted calls for work investigating whether different assessments in fact explore distinct aspects of the symptom [18].

In this work, we explore anhedonia assessment as conducted by the Snaith-Hamilton Pleasure Scale (SHAPS) [25]. The SHAPS is a widely used, 14-item self-report assessing anticipatory anhedonia. Each item begins 'I would', and is answered via four response categories ('Definitely Agree', 'Agree', 'Disagree', 'Strongly Disagree'). Higher scores indicate greater severity of anhedonia. The content of each item is intended to keep age, gender and cultural bias to a minimum.

The last decade has seen a revitalised interest in the SHAPS, with work validating it for use in a wide range of languages [26–30] and in a number of clinical populations. These include Parkinson's [29], major depression [31] and schizophrenia [30,32]. However, no work exists exploring the SHAPS' relationship to recent measures of negative symptomology that distinguish between anhedonia subtypes (e.g. the Brief Negative Symptom Scale), nor to Schizophrenia-specific affective disorder assessments (e.g. the Calgary Depression Scale). It is, therefore, unclear whether the SHAPS better reflects anhedonia associated with negative symptomology, or with secondary depression.

Here, we investigate the influences affecting anhedonia self-report in forty UK chronic schizophrenia patients by assessing the SHAPS' convergence with ratings of negative and affective symptoms. Additionally, we explore whether the SHAPS is associated with cognitive impairment, including memory deficit, as would be predicted were anhedonia in schizophrenia to arise as a result of an impaired ability to report projected future experiences [14,15].

2. Materials and methods

2.1. Design

This cross-sectional study was part of a larger, transdiagnostic, study of apathy and anhedonia (CHAPAS; 18/EE/0178) in schizophrenia.

2.2. Subjects

Participants were outpatients with chronic schizophrenia treated with atypical antipsychotics, recruited from in and around Cambridge, UK. Inclusion criteria were (1) being aged 18–65, (2) a diagnosis of chronic schizophrenia, and (3) clinical stability, defined as no alteration in antidepressant or antipsychotic medication within the last 8 weeks. All participants provided written consent.

2.3. Assessments

As part of the larger study, all participants were assessed using the following scales:

The SHAPS self-report assessed anhedonia and was scored ordinally ('Definitely Agree' = 1, 'Agree' = 2, 'Disagree' = 3, 'Strongly Disagree' =

4); an approach yielding greater internal consistency than Snaith's original scoring (either 'disagree' response = 1, either 'agree' response = 0) [30].

The clinician-rated Brief Negative Symptom Scale (BNSS) [4] assessed negative symptomatology. This 13-item measure contained 3 items assessing anhedonia, rating (1) consummatory anhedonia's frequency, (2) intensity, and (3) anticipatory anhedonia. Each item was scored 0–6, with 6 indicating greatest impairment.

The 9-item, clinician-rated Calgary Depression Scale in Schizophrenia (CDSS) [33] assessed affective symptoms, including circadian rhythms, emotional and cognitive symptoms. Both CDSS and BNSS ratings were blind to SHAPS results.

Cognitive assessments were conducted using the Brief Assessment of Cognition in Schizophrenia (BACS) [34]. Patients' BACS scores were compared to the general population's, matched for gender and age, and below are expressed as z-scores.

2.4. Statistical analyses

Analyses were performed using Matlab R2018b, except for factor analysis (performed using JASP 0.10.0.0.). We divided our analysis into 3 parts, assessing:

The SHAPS' internal consistency, using Cronbach's Alpha, and structure, using an exploratory factor analysis (EFA) with an orthogonal varimax rotation.

Relationship of SHAPS total score to (i) each BNSS subscore, (ii) each individual BNSS anhedonia item, (iii) CDSS total score, and (iv) each individual CDSS item, by performing bivariate correlations using Spearman's rank coefficient.

Relationship of SHAPS total score to BACS subscores reflecting patient memory; Verbal Memory, Symbol Coding, Digit Sequencing and Tower of London subscores, by performing bivariate correlations using Spearman's rank coefficient.

Table 1
Demographic and clinical features of our sample.

Gender (male) [n (%)]	36 (90)
Age [mean (SD)]	46.55 (10.17)
Illness duration (years) [mean (SD)]	24.65 (8.53)
BNSS scores [mean (SD)]	
Total	20.9 (17.25)
Anhedonia	4.65 (4.68)
Distress	2.05 (1.55)
Asociality	3.7 (3.1)
Avolition	3.28 (3.18)
Blunted affect	4.7 (5.0)
Alogia	3.3 (3.2)
BACS normalized Z-scores – corrected for gender and age in a healthy population [mean (SD)]	
Total	−1.4 (−1.34)
Verbal memory	−1.6 (1.38)
Symbol coding	−1.09 (0.85)
Digit sequencing	−0.83 (1.22)
Tower of London	−0.68 (1.34)
CDSS Total score [mean (SD)]	3.15 (3.14)
SHAPS Total score [mean (SD)]	23.4 (5.77)

BNSS indicates Brief Negative Symptoms Scale; BACS: Brief Assessment of Cognition in Schizophrenia; CDSS: Calgary Depression Scale for Schizophrenia; SHAPS: Snaith-Hamilton Pleasure Scale; SD, standard deviation.

3. Results

Our sample ($n = 40$) had a mean age of 46.35 years (sd = 10.12), and was 90% ($n = 36$) male. All patients were medicated using atypical antipsychotics. Table 1 reports sample characteristics and assessment descriptive statistics. There were no differences between obtained mean assessment scores and those reported in previous work: BNSS; [4,35]; CDSS: [36]; SHAPS: [27,30].

The SHAPS achieved a Cronbach's Alpha of 0.76, indicating good internal consistency, and a Kaiser-Meyer-Olkin score of 0.77, indicating that our sample was of sufficient size for factor analyses [37]. EFA analysis identified two factors with eigenvalues exceeding 1. A screeplot suggested a two-factor structure underpinning our data.

SHAPS total was not significantly associated with any BNSS subscale total; anhedonia ($r = 0.13$, $p = 0.42$), alogia ($r = 0.039$, $p = 0.81$), blunting ($r = 0.066$, $p = 0.69$), asociality ($r = -0.091$, $p = 0.58$), distress ($r = 0.14$, $p = 0.4$) or avolition ($r = 0.030$, $p = 0.85$), nor with individual anhedonia subscale items (consummatory anhedonia frequency ($r = 0.15$, $p = 0.35$), intensity ($r = 0.12$, $p = 0.47$) or anticipatory anhedonia ($r = 0.08$, $p = 0.64$)). There was also no significant association with CDSS total score ($r = 0.27$, $p = 0.091$).

However, SHAPS total was significantly correlated with a single CDSS item: 'Hopelessness' ($r = 0.52$, $p < 0.001$). This correlation remained significant even after correction for multiple comparisons using the Bonferroni Correction ($\alpha = 0.05/23 = 0.0022$, $0.001 < 0.0022$). The Hopelessness item reads: "How do you see the future for yourself? Can you see any future, or has life seemed quite hopeless? Have you given up or does there still seem some reason for trying?".

BACS scores were missing for 4 patients, leaving a sample of 36 (33 male, mean age = 46.97, sd = 9.57). No significant associations between SHAPS total and BACS subscores were found: Verbal Memory ($r = -0.0036$, $p = 0.98$), Symbol Coding ($r = 0.07$, $p = 0.68$), Digit Sequencing ($r = 0.036$, $p = 0.83$), Tower of London ($r = -0.073$, $p = 0.67$).

4. Discussion

This study examined the influences determining anticipatory anhedonia self-report scores in a sample of chronic schizophrenia outpatients. The SHAPS showed good internal consistency, suggesting it successfully explored patient anhedonia. The two-factor SHAPS structure we identified does not replicate those results previously obtained, which have instead reported either a one-factor or a three-factor structures for the measure [30,38]. Such work, however, was conducted on samples markedly different from our own (e.g. in general psychiatric or healthy samples).

SHAPS assessment was unrelated to both negative symptomology assessment (BNSS) and memory impairment, but was significantly associated with one depression symptom: Hopelessness.

The lack of significant association between BNSS and SHAPS scores suggests that the SHAPS does not capture anhedonia arising from the core schizophrenic disorder. Absence of significant association with cognitive impairment also supports this conclusion, as a deficit in episodic memory would be expected were negative symptoms responsible for anhedonia identified by the SHAPS.

This lack of association is in contrast to previous findings, which have identified correlations between negative symptom measures and SHAPS scores [32,39]. Our analysis, however, is the first to investigate the SHAPS in relation to the BNSS specifically, and indeed the first to assess the SHAPS' relationship with any second generation negative symptom measure.

However, an alternative interpretation of the lack of correlation between the SHAPS and BNSS might point to conceptual differences between BNSS and SHAPS items. Whilst the BNSS asks patients to generate and evaluate personal experiences, the SHAPS instead provides a specific list of experiences for evaluation. Plausibly, therefore, the SHAPS might ask patients to estimate future enjoyment of experiences they have never had, resulting in inaccurate estimates and disparity between SHAPS and BNSS scores.

That said, we consider the experiences listed in the SHAPS so ubiquitous (e.g. 'I would enjoy a cup of tea or coffee or my favourite drink'), that patients are very likely to have had them. Therefore, the SHAPS and BNSS are not notably conceptually different, both requiring patients to estimate their future enjoyment of an experience based on its past enjoyment.

The significant association we identified between SHAPS and CDSS Hopelessness deserves further consideration, particularly in the context of the challenging living conditions faced by chronic schizophrenia patients. Due to social isolation, poor physical health and financial difficulties, these individuals often experience poor quality of life [40]. Such exposure to social defeat [41] may present as hopelessness and lack of anticipatory anhedonia, as identified by the CDSS and SHAPS.

Our findings highlight the complexity of assessing symptoms, like anhedonia, which are multifaceted and present in several clinical entities. Whilst we replicate work showing the SHAPS to successfully assess anhedonia in schizophrenia [30], we also identified the SHAPS as only exploring a single facet of the symptom, anticipatory affective anhedonia. The ability of the SHAPS to holistically assess anhedonia in chronic schizophrenia may, therefore, be limited. This highlights the need to development of novel scales with both the capacity to validly assess multiple aspects of anhedonia, and able to evaluate the symptom transdiagnostically, which should be a focus of future work.

Our study is limited, however, by its small sample size and by the utilisation of only a single clinician to conduct clinician-rated patient assessment. Larger samples and multiple raters would benefit future exploration of the influences determining anhedonia self-report.

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