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Clinical utility of the Calgary Depression Scale for Schizophrenia in individuals at ultra-high risk of psychosis

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ABSTRACT

There is a pressing need for reliable and valid rating scales to assess and measure depression in individuals at ultra-high risk (UHR) of psychosis. The aim of this study was to examine the clinical utility of the Calgary Depression Scale for Schizophrenia (CDSS) in individuals at UHR of psychosis. 167 individuals at UHR of psychosis were included as participants in this study. The Structured Clinical Interview for DSM-IV Axis I Disorders, CDSS, Beck Anxiety Inventory and Global Assessment of Functioning were administered. A receiver operating characteristic (ROC) curve analysis and factor analyses were performed. Cronbach's alpha was computed. Correlations between CDSS factor scores and other clinical variables were examined. The median CDSS total score was 5.0 (IQR 1.0–9.0). The area under ROC curve was 0.886 and Cronbach's alpha was 0.855. A score of 7 on the CDSS yielded the highest sensitivity and specificity in detecting depression in UHR individuals. Exploratory factor analysis of the CDSS yielded two factors: depression-hopelessness and self depreciation-guilt, which was confirmed by confirmatory factor analysis. Further analysis showed that the depression-hopelessness factor predicted functioning; whereas the self depreciation-guilt factor was related to the severity of the attenuated psychotic symptoms. In conclusion, the CDSS demonstrates good psychometric properties when used to evaluate depression in individuals at UHR of psychosis. Our study results also support a two-factor structure of the CDSS in UHR individuals.

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1. Introduction

A significant proportion of individuals at ultra-high risk (UHR) of psychosis have been reported to have depressive disorders, especially major depressive disorder (MDD) (Fusar-Poli et al., 2014a; Hui et al., 2013; Rosen et al., 2006). Comorbid depression has been found to be associated with poor global functioning, distress (Fusar-Poli et al., 2014a), as well as persistence of paranoia (Salokangas et al., 2016) and conversion to psychosis (Salokangas et al., 2012; Yung et al., 2004) in individuals with at-risk mental state. Therefore, there is a pressing need for reliable and valid rating scales to assess and measure depression in individuals at UHR of psychosis.

The Calgary Depression Scale for Schizophrenia (CDSS) has been used extensively to assess the severity of depression in schizophrenia. Since its development (Addington et al., 1993; Addington et al., 1992; Addington et al., 1990), it has been tested to demonstrate excellent psychometric properties including high internal consistency, inter-rater reliability, sensitivity, specificity, and discriminant and convergent validity (Addington et al., 1996; Addington et al., 1993). Previous

studies have reported the CDSS to have 2 to 3 factors, with weak correlations between these factors and the positive and negative symptoms of schizophrenia (Addington et al., 1996; Maggini and Raballo, 2006; Rabany et al., 2013; Schennach et al., 2012). It has also been reported to have advantages over other depression rating scales like Hamilton Depression Rating Scale (HDRS) and the Beck Depression Inventory (BDI) (Addington et al., 1996; Collins et al., 1996; Kim et al., 2006; Müller et al., 2005). Additionally, depressive symptoms rated on the CDSS have been found to be strongly correlated to patient-rated illness severity in schizophrenia (Fervaha et al., 2015). Various translated versions of the CDSS have been validated for use in different populations of patients with schizophrenia (Bressan et al., 1998; Sarró et al., 2004; Schuetz et al., 2001; Xiao et al., 2009).

Along these lines, Addington et al. (2014) investigated the reliability and validity of the CDSS in a sample of youth at clinical high risk of psychosis (CHR), and reported that it was a reliable and valid tool to assess depression in individuals at CHR for psychosis. A score of 6 on the CDSS was suggested by the authors to be the valid cut off for MDD, with sensitivity of 75% and specificity of 79%. However, they did not investigate the factor structure of the CDSS in assessing depression in individuals at UHR of psychosis.

Other depression rating scales have also been investigated for use in this population. A study by DeVylder et al. (2014) compared the

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psychometric properties of the BDI, HDRS and the “dysphoric mood” item of the Scale of Prodromal Symptoms (SOPS) in assessing depressive symptoms in a CHR cohort. Their study results suggested that both BDI and HDRS had clinical utility in high risk individuals and each of these assesses different aspects of depression.

So far, few studies have investigated the use of depression rating scales in individuals at UHR of psychosis. The aim of this study was to examine the clinical utility of the CDSS in individuals at UHR of psychosis. We assessed the psychometric properties of the CDSS in assessing depression in individuals with UHR of psychosis. We also suggested a cut-off score on the CDSS for MDD in this population.

2. Materials and methods

2.1. Setting and study participants

The Longitudinal Youth at Risk Study (LYRIKS) is a prospective, observational study conducted in Singapore on youths at UHR for psychosis, which commenced in Singapore in 2008. It aimed to comprehensively assess a group of UHR individuals and identify clinical, social, neuropsychological and biological risk factors associated with this population. Recruitment adopted a hybrid approach and both help-seeking and nonhelp-seeking individuals were approached for this study. Participants were recruited from psychiatric services within the Institute of Mental Health in Singapore, community mental health and social agencies, and healthcare providers in public and private service, or were self-referred.

A total of 173 UHR participants were recruited. Participants were recruited if they were aged from 14 to 29, and assessed to be UHR on the Comprehensive Assessment of At-Risk Mental State (CAARMS) (Yung et al., 2005). Participants were excluded if they (i) had a past or current history of psychosis or mental retardation, (ii) were currently using illicit substances, (iii) were taking mood stabilizers (iv) had previous cumulative antipsychotic exposure of >5 mg haloperidol per day for 3 weeks (or equivalent) were on an antipsychotic at the point of recruitment, or (v) had medical causes associated with their symptoms.

The follow-up period for all participants was 24 months and assessments were done at 6 monthly intervals. Data collected at baseline was used for this study.

Ethics approval for this study was provided by the National Healthcare Group's Domain Specific Review Board. Written informed consent or assent was obtained from all participants. Out of the 173 participants recruited, six withdrew and hence, did not rate on the CDSS; therefore, the total sample used for this study was 167.

2.2. Clinical assessments

The CAARMS is a semi-structured interview used to evaluate if an individual meets the UHR criteria. The positive symptom subscale of CAARMS was used in LYRIKS, which assesses four attenuated psychotic symptoms (APS) domains; Unusual Thought Content (UTC), Non-bizarre Ideas (NBI), Perceptual Abnormalities (PA), and Disorganized Speech (DS). Each symptom was rated for the maximum intensity (I), and frequency and duration (F) over the last one year. The CAARMS composite score was calculated according to the formula: $(I_{UTC} * F_{UTC}) + (I_{NBI} * F_{NBI}) + (I_{PA} * F_{PA}) + (I_{DS} * F_{DS})$ (Lim et al., 2015; Morrison et al., 2012).

The Structured Clinical Interview for DSM IV Axis I Disorders (SCID-I) was used to identify any current comorbid psychiatric disorders (First et al., 2002). UHR participants were further assessed on the Calgary Depression Scale for Schizophrenia (CDSS) (Addington et al., 1990), Beck Anxiety Inventory (BAI) (Beck et al., 1988), and Global Assessment of Functioning (GAF) (Luborsky, 1962). All the assessments were performed by trained psychometricians. Supervision was provided by a research clinician and at monthly rater meetings.

2.3. Statistical analysis

Descriptive statistics were used for socio-demographic data. The CDSS total score was skewed so we have presented the median and interquartile range (IQR) for it. A receiver operating characteristic (ROC) curve analysis was used to demonstrate the ability of the CDSS to differentiate between those with and without MDD. Youden's index (Perkins and Schisterman, 2005; Youden, 1950) was used to find the optimum cut off for the CDSS total score. Cronbach's alpha was computed to assess the internal consistency of the CDSS (Cronbach, 1951). Exploratory factor analysis (EFA) was performed on the CDSS. Geomin rotation was used as items were correlated. Only items with loading of >0.4 were included in a factor (Osborne and Costello, 2009). The number of factors was determined by the goodness of fit indices like RMSEA, CFI/TLI and SRMR. Confirmatory factor analysis (CFA) was performed and goodness of fit indices like RMSEA, CFI/TLI and SRMR were evaluated again. Spearman's correlation coefficient was used to assess the correlations between the CDSS total score and CAARMS composite score, BAI total score and GAF score; as well as between the CDSS factor scores and these variables. Partial correlations were also computed to assess the associations after controlling the other factor score. Binary logistic regression was used to find the association between baseline CDSS scores and incident depression at 24 months of follow-up, with age, gender, ethnicity and treatment with antidepressants as covariates. All statistical analyses, except factor analyses of the CDSS were performed using IBM SPSS Statistics 23; factor analyses were done using M-Plus.

3. Results

3.1. Socio-demographic characteristics

The mean age of the participants was 21.4 (SD = 3.47) years and majority were males (n = 114, 68.3%). Chinese (n = 121, 72.5%) was the most common ethnic group followed by Malays (n = 25, 15.0%), Indians (n = 16, 9.6%) and others (n = 5, 3.0%). Most of the participants were help-seeking (n = 130, 77.8%).

3.2. Clinical characteristics

Almost one-third of the UHR participants were found to have a current depressive disorder (see Table 1). The median CDSS total score for the entire sample was 5.0 (IQR 1.0–9.0). The CDSS total score for participants with current MDD ranged from 3.0 to 23.0. The median and IQR of the CDSS scores for various depressive disorders are presented in Table 1. The mean CAARMS composite score was 24.43 (SD = 15.10), the mean BAI score was 20.19 (SD = 13.42), whereas the mean GAF score was 57.39 (SD = 11.72).

Ninety four (56.3%) of the UHR participants and 72 (55.4%) of the help seeking UHR participants were prescribed antidepressants. Most of the UHR participants were on selective serotonin re-uptake inhibitors (n = 85, 50.9%); 7 (4.2%) of them were on two types of antidepressants. Twenty two (13.2%) of them were prescribed benzodiazepines.

Table 1
Current depressive disorders in UHR individuals.

Current diagnoses	Frequency		CDSS total scores	
	n	%	Median	IQR
Any depressive disorder	51	30.5	9.0	7.0–13.0
Major depressive disorder	38	22.8	10.0	7.8–14.5
Dysthymic disorder	13	7.8	6.0	3.5–11.0
Depressive disorder NOS	1	0.6	4.00	NA
No depressive disorder	116	69.5	3.0	1.0–7.0

UHR, ultra high-risk. CDSS, Calgary Depression Scale for Schizophrenia. IQR, interquartile range. Depressive disorder NOS, depressive disorder not otherwise specified.

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