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ORIGINAL ARTICLE

Establishing Clinical Cutoff Values for the Beck Cognitive Insight Scale

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Abstract
Cognitive insight represents the ability to reflect on and criticize beliefs and thoughts, and is impaired in individuals with psychosis, relative to healthy controls. The Beck Cognitive Insight Scale is the most widely used tool to assess cognitive insight. While some studies have attempted to develop diagnostic cutoffs, clinical cutoffs differentiating levels of cognitive insight have not yet been established. We identified two clinical profiles within our psychosis sample (N = 385). Profiles represented low and high cognitive insight and were based on functioning and IQ. Composite index scores at the 33rd percentile in the low cluster and the 66th percentile in the high cluster were calculated. Composite index scores of three or lower represent low cognitive insight, between four and nine is considered moderate, and ten or above represents good cognitive insight. Clinical cutoffs will better orient clinicians and will facilitate the development of targeted interventions to improve cognitive insight.

Keywords BCIS · Cognition · Psychosis · Schizophrenia · Self-reflection · Confidence

Introduction

The Beck Cognitive Insight Scale (BCIS; Beck et al. 2004) is the most widely used tool in both research and clinical settings to assess cognitive insight in schizophrenia and related psychoses (Van Camp et al. 2017), though there is currently no consensus regarding clinical cutoffs for the scale. The primary objective of the current work was to develop clinical cutoff values for the BCIS anchored in clinical profiles, which represents both an important contribution to the cognitive insight literature, and to the clinical interpretation of the scale. Our secondary objective was to replicate previous findings proposed by Misdrahi et al. (2014), wherein authors suggested high cutoff values for the BCIS composite index and the self-reflectiveness subscale.

Cognitive insight is operationally defined as the degree to which one is able and willing to reflect on their thoughts and criticize the validity of their beliefs (Beck et al. 2004). The BCIS is a 15-item self-report consisting of two subscales: (1) self-reflectiveness (nine items), which measures objectivity, self-reflection, and openness to feedback, and (2) self-certainty (six items), which measures over-confidence and mental flexibility. Overall, cognitive insight is calculated using a composite index, with higher self-reflectiveness relative to self-certainty being indicative of greater cognitive insight. The BCIS has demonstrated reliability and validity in several studies investigating individuals with schizophrenia spectrum disorders (Bora et al. 2007; Favrod et al. 2008; Pedrelli et al. 2004).

Impaired cognitive insight is prevalent in schizophrenia and is thought to perpetuate the development and maintenance of delusions and hallucinations (Beck et al. 2008, 2004). It has predictive value in reducing psychotic symptoms in cognitive behavioral therapy and predicts better response to psychosocial treatment (Granholm et al. 2005; Perivoliotis et al. 2010; Premkumar et al. 2011). It may also facilitate one's ability to incorporate feedback, and to consider alternative ways of thinking (Benoit et al. 2016; de Vos et al. 2015). Conversely, increased cognitive insight is also related to increased anxiety, depression, and the internalization of stigma (Colis et al. 2006; Mak and Wu 2006; Palmer

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et al. 2015). The paradoxical nature of these implications speaks to the construct's complexity and important contribution in patient outcome, which in turn lends credence to the valuable role the BCIS (as the most widely used assessment tool) could play in treatment.

Much research has been devoted to identifying the clinical correlates of cognitive insight. Evidence suggests the construct is symptom-related; diminished cognitive insight has been repeatedly linked with active delusions (Beck et al. 2004; Buchy et al. 2009a, b; Engh et al. 2009; Warman et al. 2007), hallucinations (Engh et al. 2009), and negative symptoms (Bora et al. 2007; Tranulis et al. 2008). More specifically, research has demonstrated that patients scoring higher on the self-certainty subscale present with higher levels of active positive symptoms of psychosis (Beck et al. 2004; Engh et al. 2009; Pedrelli et al. 2004; Warman et al. 2007), though perhaps not during their first episode of psychosis (FEP; Buchy et al. 2009a; Tranulis et al. 2008).

Another approach is neurocognitive-related; patients with greater neurocognitive capacity consistently score higher on the self-reflectiveness subscale (Buchy et al. 2009a, b; Giusti et al. 2013; Raffard et al. 2013). Prior research also suggested that in individuals with a FEP, more specific cognitive deficits in the areas of memory and verbal learning may contribute to increasing self-certainty and the inability to accurately reflect on prior experiences (Lepage et al. 2008). Further, results from a meta-analysis conducted by Nair et al. (2014) revealed a relationship between cognitive insight and IQ, suggesting it may rely on higher-level cognitive functioning. Finally, recent work conducted by Bredemeier et al. (2018) suggested that reductions in cognitive insight preceded diminished neurocognitive performance, and likewise that increases in cognitive insight preceded improved neurocognitive performance in adults with schizophrenia or schizoaffective disorder. When taken together, one could conceptualize that an individual presenting with less active symptoms and greater cognitive capacity may be better able to reflect upon and self-check their thoughts and beliefs while understanding that these beliefs could be influenced by illness, and as such represent the clinical profile of an individual we would expect to possess greater cognitive insight.

The overarching purpose of the current work was to develop clinical cutoff values for the BCIS. Given the construct's complexity and many important clinical considerations, cutoffs will facilitate the clinical interpretation of results on the BCIS, both a measure of cognitive insight and metacognition, as self-reflectiveness can be construed as part of metacognitive processes (Béland and Lepage 2017). In addition to the ability to assess fitness and response to intervention, developing such cutoff values would be advantageous such that a better understanding of an individual's degree of cognitive insight may influence course of therapeutic intervention. For example, Colis et al. (2006) suggested that individuals screened using the BCIS and whom present with low cognitive insight may require psychotropic medication adjustments in an attempt to stabilize symptoms before beginning psychotherapy. Clinical cutoffs may also facilitate the development and interpretation of the treatment effects of interventions targeting cognitive insight and metacognition; clinicians may prefer to target cognitive insight in an attempt to improve mental flexibility and openness to feedback when laying the groundwork during the early stages of psychotherapy. Cutoffs may also help to reduce heterogeneity in psychosocial group intervention by allowing clinicians and researchers to form more cohesive groups based on the BCIS. Finally, establishing cutoffs may also facilitate communication with treatment teams; individuals with higher levels of cognitive insight are likely better able to verbalize their experience in therapy and their beliefs and views surrounding their mental illness.

Three studies have attempted to develop cutoffs for the composite index (Kao et al. 2011; Martin et al. 2010; Misdrahi et al. 2014). Martin et al. (2010) observed that patients scored lower on the composite index, and were significantly less self-reflective and more self-certain than healthy controls, though ROC curve analysis did not indicate a diagnostic cutoff. Kao et al. (2011) reported that a composite index score of three differentiated psychiatric from non-psychiatric individuals in a Taiwanese sample. Importantly, neither study considered the impact of symptom severity (Van Camp et al. 2017). Finally, Misdrahi et al. (2014) developed low, moderate, and high cognitive insight categories. Using the composite index and self-reflectiveness scores, the clinical sample was categorized into tertiles, comparing those with the highest cognitive insight scores to those displaying low and moderate scores. A score of eight or above on the composite index indicated high cognitive insight. A score above 16 indicated high self-reflectiveness. Authors did not report the low or moderate cut off values. In sum, cutoff values that consider a patient's clinical profile have not yet been established.

Our primary aim was to develop clinical cutoffs for the BCIS composite index anchored in patient clinical profiles. Clinical profiles were based on the previously identified correlates of cognitive insight presented in our review of the literature (positive and negative symptoms/functioning, depression, neurocognition, and IQ). Our large sample of individuals with first- and multiple-episode psychosis (FEP and MEP, respectively) brought a broad distribution of illness severity, age, and current symptomatology. We initially ran correlational analysis between the composite index and the clinical correlates of cognitive insight. Variables related to the composite index were then included in a cluster analysis to classify the clinical sample according to their clinical profile. It was determined a priori to only include variables

correlating with the composite index in our cluster analysis, though we hypothesized based on previous findings, that participants with a schizophrenia spectrum disorder displaying more severe positive and negative symptoms, more neurocognitive deficits, greater depression and lower IQ scores would display lower composite index scores. We opted for a pre-determined number of two clusters to facilitate interpretation; two clusters, representing high and low cognitive insight, was considered the most parsimonious solution and was thus most likely to have heuristic value from a clinical perspective. With established low and high cutoff values, clinicians may more aptly recognize the need to modify treatment, either when clients present with low cognitive insight, and conversely in individuals that may be more open to receiving corrective feedback. We subsequently investigated whether the two groups significantly differed on the three measures of the BCIS. We hypothesized that one cluster (low cognitive insight group) would demonstrate significantly lower self-reflectiveness and higher self-certainty, translating into lower composite index scores than the other cluster (high cognitive insight group).

Finally, to our knowledge, no normative data has been published other than the relatively small sample of Misdrahi et al. (2014). As such, as a secondary aim we attempted to replicate the high cognitive insight cutoff value for the composite index, as well as the high cutoff value for the self-reflectiveness scale proposed by Misdrahi et al. (2014). We adopted the authors' approach and subsequently divided our clinical sample for both the composite index and self-reflectiveness distributions into tertiles, whereby the 66th percentile represented the high cutoff value for each distribution. We hypothesized that our distributions would also represent the same composite index cutoff value of eight and a self-reflectiveness high cutoff value of above 16. Importantly, Misdrahi et al. (2014) did not publish low or moderate cutoff values for the composite index, which remains the primary objective of the current work.

Method

Participants

All clinical participants were diagnosed with a schizophrenia spectrum disorder per the Structured Clinical Interview for DSM-IV (First et al. 1997). Eligibility included fluency in either English or French; exclusions were (1) current diagnosis of substance-induced psychosis, (2) an IQ below 70, (3) substance dependency, and (4) neurological disorder. FEP participants were recruited from the Prevention and Early Intervention Program for Psychoses clinic in Montreal, Quebec, Canada (PEPP-Montreal; see Iyer et al. 2015) and had been treated for a FEP within 5 years prior to participation. MEP participants were recruited from various in- and out-patient clinics of the Douglas Mental Health University Institute (DMHUI) located in Montreal and had been receiving psychiatric treatment for a minimum of four years. FEP and MEP participants were combined to allow for greater range on age (between 18 and 50 years old), IQ, socioeconomic status (SES), and clinical symptomology.

Healthy controls were recruited via posters and on-line advertising from within the local catchment area and were matched to FEP and MEP groups on age, sex, and level of education. Exclusion criteria were the same as the clinical sample and additionally included personal or family history of psychiatric illness. All participants provided written informed consent prior to study participation, in a manner respecting ethical approval by the DMHUI research ethics board.

Demographic and Clinical Assessments

All participants reported their age, sex, language, and years of education. Family SES was calculated for all participants using the Hollingshead two-factor index of social position (Hollingshead 1957). All participants also completed the Calgary Depression Scale (Addington et al. 1990) used to assess presence of clinical depression, and the BCIS (Beck et al. 2004). Clinical participants additionally completed a clinical evaluation, which included the Scale for Assessment of Positive Symptoms (SAPS; Andreasen 1984b) and the Scale to Assess Negative Symptoms (SANS; Andreasen 1984a). The SANS, typically used to assess negative symptoms, was used here as an index of global functioning and is herein referred to as "functioning". If one considers how negative symptoms are defined in the SANS (hygiene, occupational impersistence, physical anergia, loss of interest in activities, sexual interest and intimacy) it is arguably tapping into functioning in addition to negative symptoms. Indeed, several authors have reported a strong correlation between negative symptoms and functional outcome (Fervaha et al. 2014; Milev et al. 2005; Rabinowitz et al. 2011).

Neuropsychological Assessments

Full-scale IQ was calculated for all participants using either the Wechsler Abbreviated Scale of Intelligence (Wechsler 1999) or an abbreviated version of the Wechsler Adult Intelligence Scale (Wechsler 1997). A subsample of clinical and healthy control participants (n = 265) completed the CogState Schizophrenia Battery designed to assess the cognitive dimensions suggested by the MATRICS consensus (Pietrzak et al. 2009).

Design

Data used in the current analysis was collected from several research studies conducted at our laboratory investigating psychosis in FEP and MEP populations; further information about our research projects can be obtained by contacting the corresponding author. Only data from the first administration of the BCIS were included in the analysis.

Statistical Analysis

Means, standard deviations, and ranges for all demographic, clinical variables, and BCIS self-reflectiveness, self-certainty, and composite index scores were calculated. For all analyses, tests' assumptions were verified, the alpha level was set at 0.05, tests were two-tailed and were performed using the IBM SPSS software. Independent samples *t* tests were used for variables that were normally distributed (self-reflectiveness subscale), and Mann–Whitney *U* tests were used for those that were not (self-certainty subscale, composite index). When appropriate, Bonferroni's correction for multiple comparisons was used (Field 2009).

Replication of Misdrahi et al. (2014)

In an attempt to replicate the high cutoff values for the composite index and self-reflectiveness subscale proposed by Misdrahi et al. (2014), the composite index and self-reflectiveness distributions were divided into low and high categories based on the cumulative percentage of each value's position within the 33rd and 66th percentiles. After categorizing the distribution of scores for the composite index and the self-reflectiveness scale, the value representing the 66th percentile was considered the high cutoff.

Identification of Clinical Cutoff Values for the Composite Index

Spearman's rho correlations for non-normal distributions were calculated between composite index scores and the known correlates of cognitive insight (positive symptoms, functioning, depression levels, cognitive capacity, and IQ).

Variables significantly correlating with the BCIS composite index (functioning and IQ) were included in a clustering analysis to classify patients according to their clinical profile. The SPSS TwoStep cluster analysis method was used to allow for both continuous and categorical variables (Everitt et al. 2011). The principle of cluster analysis is to aggregate subjects with similar profiles into homogeneous subgroups that differ from each other (Everitt et al. 2011). The predetermined number of clusters was set at two to facilitate the interpretation and development of the low and high cutoff values: the lower functioning, lower IQ cluster would represent the low cutoff and the higher functioning, higher IQ cluster would represent the high cognitive insight cutoff.

Independent samples *t* tests were then conducted on the BCIS scores to investigate whether the identified clusters significantly differed from each other. The two identified clusters exhibited extensive overlap in the ranges of the composite index scores. Subsequently, we opted to develop three category levels of cognitive insight (low, moderate, high) in lieu of low and high to account for the overlap. To develop three category levels, we adopted the method proposed by Misdrahi et al. (2014): the 33rd and 66th percentiles were calculated for each of the two clusters to identify subjects within the lowest and highest tertiles in each cluster. The 33rd percentile of the cluster with expected lower cognitive insight was used as the low cognitive insight cutoff. The 66th percentile of the cluster with expected higher cognitive insight was used as the high cognitive insight cutoff. The range of values between the low and high cognitive insight cutoffs represent moderate cognitive insight levels.

Validation of Clinical Cutoff Values for the Composite Index

All clinical participants were categorized into either low, moderate, or high cognitive insight. ANOVAs and post hoc comparisons [Bonferroni's correction for homogeneous variances and Games–Howell's correction for heterogeneous variances (Field 2009)] were conducted to investigate whether our cognitive insight groups were significantly different from each other on self-reflectiveness, self-certainty, and composite index scores. Additional ANOVAs (for continuous variables) and Kruskal–Wallis (for categorical variables) were also conducted on positive and negative (functioning) symptoms, depression, cognitive capacity, and IQ to further investigate the clinical differences between our three groups.

Supplementary Analysis

As a final validation step, discriminant function analysis was conducted to investigate whether SAPS and SANS total scores, CogState total score, depression, and IQ could correctly predict patients' membership to their attributed cognitive insight group (low, moderate, high) (Tabachnick 2013).

An additional TwoStep cluster analysis was conducted using all of the potential correlates of cognitive insight previously identified in our introduction. This step was conducted to verify our results using all of the potential correlates in comparison to the more data-driven approach, which included only the variables found to be correlating with the composite index, described above. The same analytical steps were conducted until results were non-significant. All results are available in Supplementary Material.

Results

Table 1 presents means, standard deviations, and ranges for all demographic and clinical variables, and BCIS self-certainty, self-reflectiveness, and composite index scores. Results from an independent samples *t* test revealed that patients had significantly higher self-reflectiveness scores than healthy controls ($t(531) = -5.84$, $p \leq .001$). Mann–Whitney *U* tests indicated that self-certainty subscale scores did not differ for patients (Mdn = 7) and controls (Mdn = 8), $U = -0.046$, $p = .963$, however, patients (Mdn = 5) had significantly higher composite index scores than controls (Mdn = 3), $U = -4.42$, $p \leq .001$. There were

Table 1 Demographic, clinical, and cognitive insight measures for all participants

	Clinical sample (N = 385)			Healthy controls (N = 148)		
	Mean	SD	Range	Mean	SD	Range
Demographic characteristics						
Age	30.1	9.2	18–59	29.4	8.3	18–50
Years of education	11.7 (n = 383)	2.5	4–22	13.8 (n = 147)	2.4	9–22
Full IQ	96.5 (n = 379)	14	70–140	109.5 (n = 145)	13.8	72–149
	n	%		n	%	
Sex						
Male	275	74.1		99	66.9	
Female	110	28.6		49	33.1	
Family socioeconomic status						
Lower	36	9.4		11	7.4	
Lower-middle	76	19.7		38	25.7	
Middle	114	29.6		46	31.1	
Upper-middle	50	13		34	23	
Upper	19	4.9		15	10.1	
Total N	295	76.7		144	97.3	
Antipsychotic						
Yes	345	89.6		0	–	
No	1	0.3		148	100	
Total N	346	–		148	–	
Illness phase						
First-episode	203	52.8		–	–	
Multiple-episode	182	47.2		–	–	
Hospitalization status						
Inpatient	13	–	–	–	–	
Outpatient	127	–	–	–	–	
	Mean	SD	Range	Mean	SD	Range
Clinical measures						
SAPS total	13.9	14.9	0–85	–	–	–
SANS total	23	11.7	0–59	–	–	–
CDS total	3.4 (n = 380)	3.5	0–19	0.7 (n = 72)	1.3	0–7
CogState total	− 1.01 (n = 265)	0.9	− 5 to 1	− 0.16 (n = 89)	0.6	− 3 to 1
BCIS						
Self-reflectiveness	13	4.4	1–26	10.7	3.5	2–20
Self-certainty	7.7	3.3	0–18	7.5	2.8	1–13
Composite index	5.3	5.7	− 11 to 22	3.2	4.6	− 6 to 16

Hospitalization is based on a subsample of clinical participants; there were no statistical differences between in- and out-patients on clinical or BCIS measures

SAPS Scale to Assess Positive Symptoms, *SANS* Scale to Assess Negative Symptoms, *CDS* the Calgary Depression Scale, *CogState* CogState Schizophrenia Battery and is based on a subsample of clinical and healthy control participants, *BCIS* Beck Cognitive Insight Scale

no significant differences between FEP and MEP patients on the three measures of the BCIS (all p values > .05).

Norms Replication

The 33rd and 66th percentiles of the composite index were represented by values of 3 and 7.76, which was rounded to 8. The 33rd and 66th percentiles of the self-reflectiveness subscale were represented by values of 11 and 15. The BCIS composite index cutoff value indicating good cognitive insight replicated what had been previously proposed by Misdrahi et al. (2014), however the high cutoff value for self-reflectiveness was not replicated.

Identification of Clinical Cutoff Values for the Composite Index

Functioning and IQ significantly correlated with the BCIS composite index (Table 2). Given that two subjects with very different clinical presentations can have the same SANS total score, we dichotomized this variable using the severity remission criteria proposed by Andreasen et al. (2005). The proposed remittance temporal criterion of 6 months (Andreasen et al. 2005) was not implemented as our analysis was conducted on baseline data. Importantly, the same results were obtained using the continuous SANS variable. This dichotomized variable was thus included in the cluster analysis in lieu of total scores. Our results did not indicate a relationship between the composite index and positive symptoms, cognition, and depression levels, as expected.

Results of the clustering analysis were satisfactory, yielding a good silhouette coefficient of 0.7 per the criteria of Kaufman and Rousseeuw (1990). The silhouette coefficient is indicative of the degree of intra-cluster homogeneity and between-cluster difference. 319 patients were classified into cluster A (85.3%) and 55 patients were classified into cluster B (14.7%). Patients in cluster A had lower functioning and lower IQ, while patients in cluster B had higher functioning and higher IQ.

Results of the independent samples *t* tests revealed that the two clusters differed significantly on the BCIS self-reflectiveness score ($t(372) = -3.93$, $p < .001$, Cohen's $d = 0.59$) and on the composite index ($t(372) = -3.17$, $p = .002$, Cohen's $d = 0.54$). There was no difference between clusters on self-certainty ($t(372) = 0.31$, $p = .76$, Cohen's $d = 0.05$). Patients in cluster A had a mean self-reflectiveness, self-certainty, and composite index of 12.65 (SD = 4.3, range 2–26), 7.78 (SD = 3.3, range 0–18) and 4.87 (SD = 5.8, range −11 to 20), respectively, while mean scores for patients in cluster B were 15.11 (SD = 4.1, range 3–25), 7.64 (SD = 2.9, range 1–15) and 7.47 (SD = 4.8, range −3 to 22).

In cluster A, the values of the 33rd and 66th percentiles were 2.6 and 7 respectfully. In cluster B, these values were 5 and 9. The distribution of scores for each cluster is presented in Fig. 1. We are proposing that 33% of patients with the lowest composite index scores in cluster A represent those with low cognitive insight. Accordingly, 33% of patients with the highest composite index scores classified in cluster B represent those with high cognitive insight. Furthermore, we suggest that the remaining patients represent those with moderate cognitive insight.

Our proposed cutoff values for the BCIS composite index are presented in Table 3. We also rounded the value for the 33rd percentile in cluster A.

Validation of Clinical Cutoff Values for the Composite Index

Based on our proposed cutoffs, 138 patients were in the low cognitive insight group, 158 in the moderate group, and 78 were in the high cognitive insight group. Results from the ANOVA on the BCIS scores indicated the groups significantly differed from each other on both

Table 2 Correlation matrix representing Beck Cognitive Insight Scale composite index scores and known correlates of cognitive insight for the clinical sample

Measure	1	2	3	4	5
1. BCIS composite index	–				
2. CogState total score	0.081	–			
3. Depression total score	0.073	0.073	–		
4. Negative symptoms total score	−0.158**	−0.158*	0.223**	–	
5. Positive symptoms total score	−0.069	−0.304**	0.269**	0.240**	–
6. IQ	0.184**	0.637**	0.047	−0.139**	−0.162**

BCIS: Beck Cognitive Insight Scale; depression measured with Calgary Depression Scale for schizophrenia; negative symptoms measured with Scale to Assess Negative Symptoms; positive symptoms measured with Scale to Assess Positive Symptoms; IQ measured using either the Wechsler Abbreviated Scale of Intelligence (WASI) or an abbreviated version of the Wechsler Adult Intelligence Scale—third edition (WAIS III). Variables significantly correlating with the BCIS composite index were included in a clustering analysis to classify individuals according to their clinical profile

N = 385; *p < .05; **p < .01 using Bonferroni's correction for multiple comparisons (0.05/6 = 0.0083)

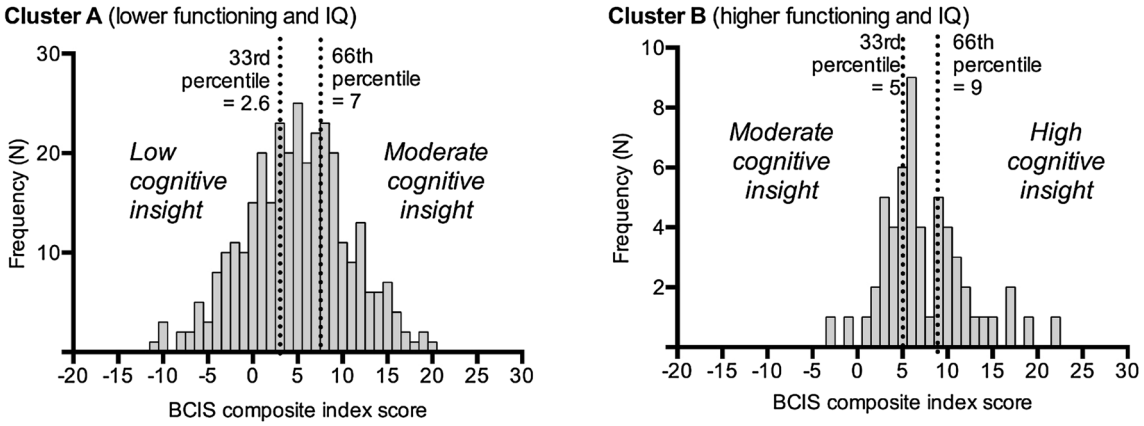

Fig. 1 Distribution of BCIS composite index scores for each cluster using the clinical sample (N = 385). The 33rd and 66th percentiles for each cluster are indicated by dotted lines. Cluster A includes patients with poorer functioning and lower IQ scores, while individuals in cluster B show better functioning and higher IQ scores

Table 3 Identified clinical cutoffs for the composite index of the Beck Cognitive Insight Scale (BCIS)

Cognitive insight level category	Proposed clinical cutoff
Low	3 or below
Moderate	Between 4 and 9
High	10 or above

For use with individuals with schizophrenia spectrum disorders

subscales and the composite index [self-reflectiveness: ($F(2,371) = 238.55$, $p < .001$, partial $\eta^2 = 0.56$); self-certainty: ($F(2,371) = 85.11$, $p < .001$, partial $\eta^2 = 0.32$); composite index: ($F(2,371) = 707.35$, $p < .001$, partial $\eta^2 = 0.71$); for post hoc comparisons, all p values < .001, using the Games–Howell correction for multiple comparisons]. These results are illustrated in Fig. 2. As expected, patients in the low cognitive insight group show the lowest levels of

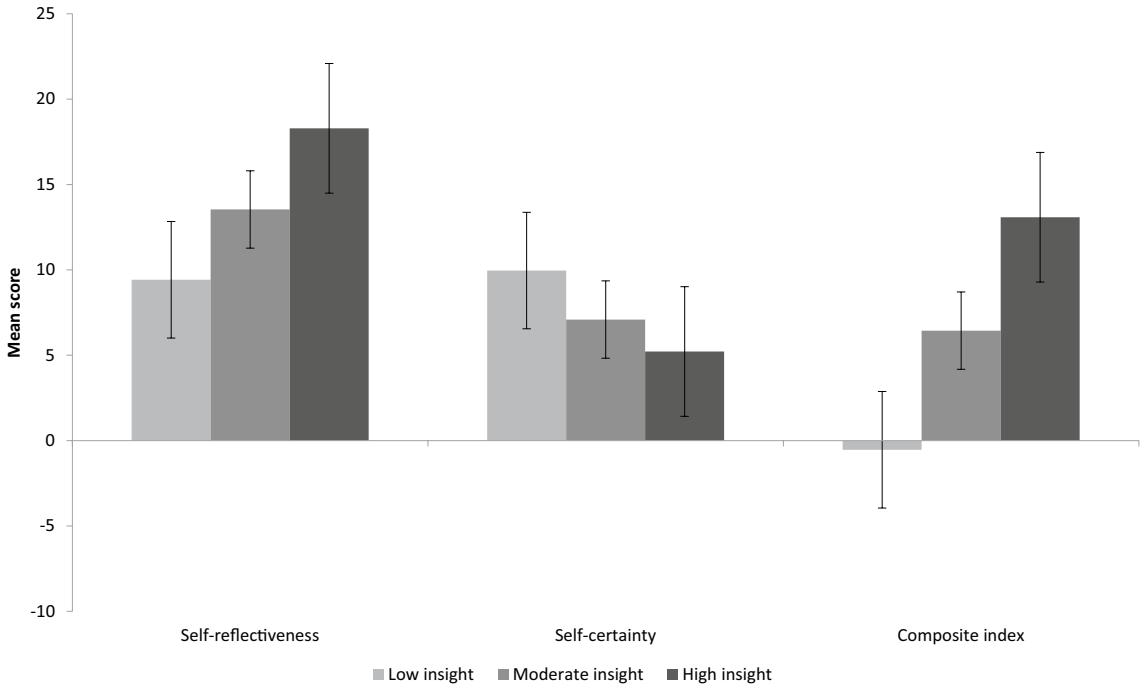

Fig. 2 Mean scores on the BCIS self-reflectiveness, self-certainty, and composite index for each cognitive insight group (low, moderate, high) for the clinical sample (N = 385). Each group is significantly different from each other on every measure

self-reflectiveness, the highest levels of self-certainty, and the lowest composite index scores. Accordingly, patients in the high cognitive insight group show the highest self-reflectiveness, lowest self-certainty, and the highest composite index scores. Finally, patients in the moderate cognitive insight group show intermediate values.

Results from the ANOVA on the other relevant clinical variables suggested that clinical participants in the low cognitive insight group have (1) significantly lower IQ scores than those in the high cognitive insight group ($F(2,371) = 7.80$, $p < .001$, post-hoc $p < .001$), (2) significantly poorer functioning than those in the moderate and high cognitive insight groups (the same results were obtained when using the dichotomized SANS remission variable; ($F(2,371) = 5.43$, $p < .005$, post-hoc all p values $< .03$), and (3) significantly poorer cognitive capacities than those in the high cognitive insight group ($F(2,371) = 3.39$, $p < .04$, post-hoc $p < .03$).

Discussion

Summary of Findings

The current study focused on developing clinical cutoffs for the BCIS for use with individuals with psychosis. Our results suggest that composite index scores of three or below represent low cognitive insight, between four and nine are moderate, and ten or above indicate high cognitive insight. These findings reflect a clinical reality: it follows that individuals with lower IQ, poorer cognitive capacity, and poorer functioning would present with lower cognitive insight, and vice-versa.

Clinical Correlates of Cognitive Insight

Our results as indicated in Table 1 revealed that positive symptom severity was not correlated with overall cognitive insight. As such, individuals with varying degrees of cognitive insight whom may also be severely delusional, may too recognize that their beliefs are likely due to illness. Taken in the context of previous findings (Beck et al. 2004, 2008) purporting cognitive insight mediates the development and maintenance of positive symptoms, our results suggest the relationship between symptom severity and cognitive insight may be less to do with overall cognitive insight. Perhaps this relationship is related more to self-reflectiveness, as suggested by Engh et al. (2009).

In line with previous findings (Nair et al. 2014) our results also suggest a positive relationship between IQ and cognitive insight. We did not however find a relationship between depression levels and overall cognitive insight, which may be unsurprising given the mixed findings present in the literature. Beck et al. (2004) did not find a correlation between any subscales of the BCIS and depression levels, nor did Pedrelli et al. (2004). However, a recent meta-analysis conducted by Palmer et al. (2015) revealed a small yet significant relationship, mostly driven by self-reflectiveness. These results are cautionary given the small number of studies (16) and sample sizes included in the meta-analysis. Nonetheless, our results should be considered in light of these mixed findings, particularly given our large and varied sample.

Finally, we approached our analysis considering both all the previously identified candidate correlates of cognitive insight, and also from a more data-driven perspective (only those correlating with the composite index) to develop our cutoffs. We thus ascertain that clinical profile alone does not dictate cognitive insight.

Replication of Misdrahi et al. (2014)

A secondary aim was to replicate the findings of Misdrahi et al. (2014), whose results indicated a composite index cutoff of eight and above, and a value above 16 for high self-reflectiveness. These findings were based on their entire sample which included only French-speaking, remitted outpatients. Despite these limitations, we did replicate a cutoff of eight on the composite index, and we found that a value of 15 indicated high self-reflectiveness, which did not replicate prior results. Misdrahi et al. (2014) did not report low composite index cutoffs, though we found the low cutoff value to be three, which interestingly was also the value reported by Kao et al. (2011). This replication is interesting though we maintain the approach is improved with the precision and added value of considering clinical correlates.

Clinical Implications and Interventions

Several important implications stem from identifying clinical cutoffs for the BCIS, particularly with respect to the potential impact on course of treatment. Phalen et al. (2015) reported higher levels of self-certainty may positively influence quality of life and play a protective role against threats to self-esteem and pain in individuals with severe symptoms. Clinicians administering the BCIS at intake will better understand whether poor cognitive insight is present, and may then choose to target self-reflectiveness rather than challenging their clients' beliefs when initially engaging in treatment (Phalen et al. 2015). Research has also revealed an important relationship with anxiety, such that patients may become more anxious as their ability to recognize and reflect about their illness improves (Colis et al. 2006). Should clinicians begin to see improvement during treatment, this can be confirmed using the proposed cutoffs. Cognitive insight is also linked to self-stigma (Mak and Wu 2006), such that

psychosis patients with greater cognitive insight also tend to be more apt at recognizing the stigma associated with mental illness. Clinicians who better understand their client's degree of cognitive insight can effectively pinpoint interventions to reduce the internalization of this stigma.

Implementing BCIS clinical cutoffs will also facilitate interventions targeted at improving cognitive insight, the efficacy of which can be tested more exhaustively if improvements are defined in conjunction with clinical interpretation. Research has suggested that improvements in cognitive insight may lead individuals with psychosis to live more autonomously with respect to social and vocational functioning. Favrod et al. (2008) reported that individuals living independently had higher cognitive insight, and were more self-reflective than those living in nursing homes. Perhaps interventions targeting cognitive insight could also facilitate patients' independence when managed appropriately with treating teams.

Strengths and Limitations

The current study has several important strengths, including what may be the largest patient BCIS dataset encompassing all schizophrenia spectrum disorders and both illness stages. Our sample is comprised of both in- and out-patients with varying degrees of functionality and active positive symptoms, and includes males and females, level of education, and SES. Healthy controls were also aptly matched to the clinical sample on age, sex, and level of education.

The present study also has some important limitations. While Beck et al. (2004) proposed the scale for use in the general population, suggesting it should discriminate those with and without psychotic disorder, our results indicated that patients had significantly higher self-reflectiveness and composite index scores than healthy controls. Importantly, there have been mixed findings with respect to the BCIS' reliability for use in healthy populations. Engh et al. (2007) reported no significant differences on self-reflectiveness or self-certainty between groups, and further, patients' scores on self-reflectiveness were also higher than that of healthy controls. It follows that having no history of mental illness may indeed be problematic when interpreting some BCIS items related to bizarre experiences. Further, the original publication compared a psychosis population to individuals with major depressive disorder, arguably not the same as a comparison to healthy controls. Finally, the mean scores of our patient sample fall within the average reported by several authors (Beck et al. 2004; Bora et al. 2007; Colis et al. 2006; Favrod et al. 2008; Giusti et al. 2013; Kao et al. 2011; Martin et al. 2010). Another important limitation to note is that while the current work had a diverse age range from young to middle-aged adults, the oldest clinical participant was 59 years old. As such, the proposed cutoffs may not generalize to the geriatric psychosis population. A final limitation to consider is the small number of participants in cluster B (N = 55) as compared to cluster A (N = 319). This is not surprising given that a large proportion of psychosis patients display problematic cognitive insight. Thus, while this difference may present a statistical limitation (our clinical profiles were not of comparable size) it is the proportion expected given the prevalence of the phenomenon.

Conclusions

In this study, we proposed clinical cutoffs for the BCIS, which will facilitate its clinical interpretation. Our proposed cutoffs will help inform course of treatment, and may be used to address the known issue of heterogeneity in psychosocial group intervention. Future research should include replication and validation of our proposed cutoff values. Finally, it would be interesting to explore whether the proposed high cognitive insight cutoff is indeed clinically meaningful with respect to predicting better response to psychosocial treatment.

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Compliance with Ethical Standards

Conflict of Interest Danielle Penney, Geneviève Sauvé, Rhida Joober, Ashok K. Malla and Martin Lepage declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

Animal Rights This article does not contain any studies with animals performed by any of the authors.

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