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Factor Structure of Emotional Intelligence in Schizophrenia

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Abstract

Social cognition, which includes emotional intelligence, is impaired in schizophrenia. The Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT) is a widely-used assessment of emotional intelligence, with a four-factor structure in healthy individual. However, a recent factor analysis in schizophrenia patients revealed a two-factor structure of the MSCEIT. The current study aimed to replicate this finding in a larger, more diverse, schizophrenia sample ($n = 194$). Our findings revealed an identical two-factor structure as in the previously-reported study, indicating that emotional intelligence is organized in a different manner in schizophrenia than it is in healthy controls.

Keywords

schizophrenia; MSCEIT; emotional intelligence; factor analysis

1. Introduction

Deficits in social cognition are a core feature among individuals with schizophrenia and key determinants of functional outcome (Couture et al., 2006; Fett et al., 2011; Mancuso et al., 2011). One critical area of social cognition is emotion processing, also called emotional intelligence, which involves the ability to process emotions in one's self and others to guide thinking and behavior (Mayer *et al.*, 2008). There are few standardized and well-normed measures of emotional intelligence, and probably the most-established is the Mayer-Salovey-Caruso Emotional Intelligence Test (MSCEIT).

Factor-analytic studies in healthy participants support a 4-factor model of the MSCEIT (referred to as four "branches"): perceiving emotions, facilitating thought, understanding emotions, and managing emotions, each measured by two subtests (Mayer et al., 1997;

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Conflicts of Interest

Disclosure: Drs. Lin and Wynn have no financial or ethical conflict of interests to report. Dr. Green is an Officer in MATRICS Assessment, Inc., but he receives no financial compensation for his role in the company or from the sale of the MATRICS Consensus Cognitive Battery.

Contributors

Roles: Drs. Lin, Wynn, and Green were responsible for the conceptualization of the paper. Drs. Lin, Helleman and Wynn analyzed all data. All authors wrote and approved the final manuscript.

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Mayer et al., 2003). One branch of the MSCEIT, managing emotions, was evaluated and selected by the National Institute of Mental Health Initiative, Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS), (Green et al., 2005) as the representative test for social cognition in clinical trials (Nuechterlein et al., 2008). In addition to the four-factor solution, the MSCEIT yields a two factor solution consisting of an experiential (emotion perception and facilitation) and strategic (emotion understanding and management) factor for healthy controls (Mayer et al., 2003).

The few studies that examined the MSCEIT in schizophrenia find deficits compared to healthy controls (Kee et al., 2009) or compared to published norms (Eack et al., 2010). These studies in schizophrenia show that the MSCEIT has good reliability and validity, has small to medium correlations with symptoms (Eack et al., 2010; Kee et al., 2009; Nuechterlein et al., 2008), and is stable across phases of illness in schizophrenia (Green et al., in press).

It is useful to know if the structure emotional intelligence changes with illness. The number of separable factors in a broad area like emotional intelligence suggests the number of underlying constructs that account for performance. In psychopathology, this number or pattern of factors could be altered, which may provide clues to underlying dysfunction. Only one previous study examined the factor structure of MSCEIT in schizophrenia (Eack et al., 2010) and found a two-factor solution that differed both from the four-factor and two-factor (experiential and strategic) solutions seen in a large normative study (Mayer and Salovey, 1997; Mayer et al., 2003). The two factors found by Eack et al. included one factor comprised of emotion perception and understanding, and a second factor comprised of emotion facilitation and management. This finding raises the provocative question of whether schizophrenia patients have a different factor structure for emotional intelligence than healthy controls. Confidence in the interpretation is limited because the sample size in Eack et al. was modest for a factor analysis ($n = 64$) and did not have much ethnic and racial diversity. The aim of the current brief report was to conduct an exploratory factor analysis of the structure of the MSCEIT in a much larger and more diverse sample of schizophrenia outpatients to determine if a similar factor structure to that of Eack et al. or Mayer et al., 2003 would be replicated.

2. Methods

2.1 Participants

One-hundred ninety-four stabilized outpatients with schizophrenia ($n = 174$) or schizoaffective disorder ($n = 20$) participated in the study. Patients were recruited from outpatient treatment clinics at the Veterans Affairs Greater Los Angeles Healthcare System (VAGLAHS) and through presentations at community residences. Patients met criteria based on the Structured Clinical Interview for DSM-IV Axis I Disorders (First et al., 1997). Exclusion criteria included being younger than 18 or older than 60 years, diagnosed with an active substance use disorder in the past 6 months, any identifiable neurological disorder, mental retardation, history of loss of consciousness for more than one hour, or insufficient fluency in English. All participants had the capacity to give informed consent and provided written informed consent after all procedures were explained in accordance with procedures approved by the Institutional Review Boards at UCLA and VAGLAHS.

2.2 Mayer–Salovey–Caruso Emotional Intelligence Test (MSCEIT)

The MSCEIT consists of 141 items and assesses 8 different aspects of emotional intelligence, broken down into 4 separate branches. The first branch, Identifying Emotions, measures emotion perception in faces and pictures. The second branch, Facilitating Thought, measures which emotions are associated with which sensations and how mood affects

thinking and reasoning. The third branch, Understanding Emotions, measures the ability to comprehend changes and blends between and among emotions. The fourth branch, Managing Emotions, measures the ability to incorporate one's own emotions into decision making that involves oneself or other people. Branch scores and the eight individual task scores were obtained using the unadjusted normative ratings for the MSCEIT (Mayer et al., 2003).

2.3 Clinical and Functional Capacity Ratings

Psychiatric symptoms during the previous two weeks were rated using the 24-item UCLA version of the Brief Psychiatric Rating Scale (BPRS) (Lukoff et al., 1986; Overall and Gorham, 1962) by a trained rater. For the BPRS we report the total scores, positive symptom scores, and negative symptom scores, agitation/mania, and depression/anxiety scores (Kopelowicz et al., 2008). Clinical assessments were conducted by interviewers trained to reliability through the Treatment Unit of the Department of Veterans Affairs VISN 22 Mental Illness Research, Education, and Clinical Center (MIRECC) based on previously reported procedures (Ventura et al., 1993; Ventura et al., 1998). We included a measure of functional capacity, the UCSD Performance-based Skills Assessment (UPSA) (Patterson et al., 2001), which involves simulations of daily activities (e.g., using public transportation, preparing a meal) and is highly correlated with neurocognitive measures (Green et al., 2011).

3. Results

3.1 Demographics and Symptom Ratings

Demographic data, clinical ratings, and performance scores on the MSCEIT (branches and subtests) are summarized in Table 1. The participants were predominantly male and roughly half were African-American. Participants were relatively chronic and exhibited mild levels of symptomatology.

3.2 Factor Analysis

Maximum likelihood estimation factor analysis, with varimax rotation, was used to examine the eight MSCEIT tasks. Only factors with eigenvalues greater than 1 were considered in the analysis. The factor analysis resulted in two eigenvalues greater than 1, thus only a two-factor solution was considered, seen in Table 2. The two-factor solution explained a cumulative 48.70% proportion of the variance, $\chi^2 (13, N = 194) = 25.44, p < 0.03$. Factor 1 consisted of the tasks in Branches 2 and 4 (facilitations, sensations, management, and relationships) with the highest loading on sensations. Factor 2 consisted of tasks in Branches 1 and 3 (faces, pictures, blends, and changes) with the highest loading on faces. Scores on the blends task cross-loaded on both factors. Factor 1 explained 37.27% and Factor 2 explained an additional 11.43% of the variance in the model. This factor structure of the MSCEIT consists of one factor broadly associated with the regulation and management of emotions, and another factor broadly associated with facial emotion perception. This is the same factor structure observed in Eack et al. 2010. When we compared the two-factor solution to a one-factor solution the two-factor solution provided a statistically significant improvement in model fit, $\Delta\chi^2 (7, n = 194) = 69.71, p < 0.001$. The inter-correlations among the eight task scores are presented in Table 3.

To determine whether age or gender influenced the factor structure, we regressed age and gender from each of the eight MSCEIT tasks, saved the unstandardized residuals, and reran the factor analysis. The exact same two-factor solution as above was observed.

3.3 MSCEIT correlations with functional capacity and symptoms

We examined the correlations between the four clinical symptom clusters assessed on the BPRS, the UPSA, and the four branch scores. The correlations were generally very low for the BPRS (all absolute values of r 's < 0.23), although some were significant due to the large sample size (see Table 4). The correlations were higher and significant for the UPSA and relatively consistent across the branches (all between 0.25–0.55).

4. Discussion

Our brief report revealed that schizophrenia patients' performance on the MSCEIT yielded two factors: a Regulation factor and a Perception factor. Our results replicate those of (Eack et al., 2010) to an impressive degree. The two factor solution is identical and the same task (blends) cross-loaded on the 2 factors in both studies. It is notable that the same results were found in our study and Eack et al. despite using patient samples that were rather different in racial composition, age, and illness duration. In addition, we found that correlations between clinical symptoms and MSCEIT branches were generally small.

The two-factor structure of the MSCEIT in schizophrenia patients in our study and in Eack et al. appears to be different than either the two- or four-factor solutions seen in healthy controls (Mayer and Salovey, 1997; Mayer et al., 2003). In a large sample of community subjects (over 2,000), the four factor solution yields four branches that progress from lower level (e.g. perceptual) to higher level (e.g., regulation) emotional operations (Mayer et al., 2008). The developers of the MSCEIT also found a two-factor solution (Mayer et al., 2003). One factor defined by branches 1 and 2 is called "Experiential." A second factor defined by branches 3 and 4 is called "Strategic." In some ways we and Eack et al. also found an Experiential and Strategic factors, but unlike the normative sample, the Experiential (or Perception) factor included branches 1 and 3; the Strategic (or Regulation) factor included factors 2 and 4. These results suggest that schizophrenia patients also have a division between lower-level, and higher-level emotion intelligence processes. However, branch 2 (Facilitation) is processed as higher-level, and branch 3 (Understanding) is processed as lower-level. The reason for the discrepancy in structure is not clear, but could be related to relative patient-control differences across tasks and branches. For example, our patient sample was closer to the normative sample in facial emotion perception, but substantially different in facilitation. At any rate, the current replication suggests that this atypical structure of emotional intelligence in schizophrenia is reliable.

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Table 1

Demographic Characteristics, Psychopathology, and MSCEIT performance

Variables	N (%), Mean (SD)
Demographics	
Age (y/o)	46.3 (9.6)
Sex (males/females)	127/67
Education (yrs)	12.7 (1.9)
Duration since first episode (yrs)	24.0 (11.2)
Race	
African-American	90 (46.4%)
Caucasian	85 (43.8%)
Asian	8 (4.1%)
Others	11 (5.7%)
BPRS scores	
Positive symptoms	2.2 (0.9)
Negative symptoms	1.8 (0.9)
Agitation/mania	1.3 (0.4)
Depression/anxiety	2.0 (0.8)
MSCEIT scores	
Branch 1: Perceiving Emotions	95.0 (16.3)
Faces	108.7 (29.8)
Pictures	95.2 (18.2)
Branch 2: Facilitating Thought	89.1 (16.1)
Facilitation	80.9 (11.8)
Sensations	89.9 (10.4)
Branch 3: Understanding Emotions	79.6 (11.5)
Changes	89.9 (11.5)
Blends	89.4 (13.0)
Branch 4: Managing Emotions	86.0 (10.2)
Emotion management	84.1 (11.2)
Emotional relationships	85.3 (9.8)

Table 2

Factor structure of the MSCEIT

MSCEIT	Standard Factor Loadings	
	Factor 1 “Regulation”	Factor 2 “Perception”
Branch 1: Perceiving Emotions		
Faces	.095	.901
Pictures	.317	.434
Branch 2: Facilitating Thought		
Facilitations	.552	.203
Sensations	.768	.212
Branch 3: Emotion Understanding		
Changes	.267	.582
Blends	.537	.535
Branch 4: Emotion Management		
Management	.591	.167
Relationships	.632	.209

Note: Factor loadings greater than 0.40 appear in boldface.

Rotation sums of squared loadings for 2-factor model = 48.70%

Table 3

Correlations among MSCEIT task scores

MSCEIT task scores	Faces	Pictures	Sensations	Facilitations	Blends	Changes	Emotion Management	Emotional Relations
Faces	1							
Pictures	.422**	1						
Sensation	.240**	.240**	1					
Facilitations	.268**	.368**	.447**	1				
Blends	.548**	.357**	.270**	.296**	1			
Changes	.534**	.383**	.391**	.520**	.459**	1		
Emotion Management	.185**	.274**	.493**	.450**	.356**	.416**	1	
Emotional Relations	.255**	.260**	.336**	.585**	.253*	.430**	.340**	1

*
p < 0.05,**
p < 0.01

Table 4

Correlations among MSCEIT Branch Scores, UPSA and BPRS Symptoms

	Branch 1	Branch 2	Branch 3	Branch 4
UPSA	0.25 **	0.35 **	0.55 **	0.41 **
BPRS Positive Symptoms	-0.17 *	-0.19 **	-0.23 **	-0.09
BPRS Negative Symptoms	0.15 *	0.05	0.00	-0.11
BPRS Agitation Symptoms	-0.04	-0.15 *	-0.10	-0.02
BPRS Depression Symptoms	-0.19 **	-0.09	0.00	0.07

UPSA = University of California Performance-based Skills Assessment

*
p < 0.05,**
p < 0.001