ABSTRACT

Aim: The present study aimed to test the construct validity and internal consistency of the Social Cognition Screening Questionnaire (SCSQ)[1] (Japanese version).

Methods: We first tested whether the subscale scores and the total score of the SCSQ could discriminate patients with schizophrenia from normal controls. Next, we tested the internal consistency. Finally, we investigated the relationship between the subscale scores and other measures of social cognition and social functioning that were presumed to correspond to the subscale's scores, including the Hinting task, the Ambiguous Intentions Hostility Questionnaire (AIHQ), the Beck Cognitive Insight Scale (BCIS) and the Social Functioning Scale (SFS).

Results: The subscale scores and the total score appeared to show more robust between-group differences than other measures of social cognition, such as the AIHQ and the Hinting task. The total score distinguished the

patients from normal controls with the area under the receiver-operator characteristics (ROC) curve being 0.84, which was fairly well. The Cronbach's alpha for the four subscales was 0.72, which was considered acceptable. In terms of criterion-related validity, theory of mind, metacognition and hostility bias subscale scores showed significant correlations with the Hinting task, BCIS and AIHQ, respectively. Moreover, the theory of mind subscale score showed a significant correlation with four domain scores of the SFS. The present results indicated good construct validity and internal consistency of the SCSQ.

Conclusions: Although this is an interim report with a small sample size, the SCSQ holds promise as an efficient measure for social cognition.

Key words: schizophrenia, social cognition, theory of mind, attributional bias, metacognition

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INTRODUCTION

Schizophrenia is a chronic, severe, and disabling illness that affects

approximately 1% of individuals in the population.[2] It is characterized by a

combination of positive, negative, and affective symptoms. There is growing

evidence that social cognition may serve as a mediator between

neurocognition and functional outcome.[3-7]

Social cognition refers to the cognitive and emotional functions

required to understand and predict other people's mental state and

behavior.[8,9] Schizophrenia patients experience substantial social cognition

deficits across multiple domains. The most commonly studied domains

involve emotion perception, social perception, attributional bias,

metacognition, and theory of mind (ToM).[10] There are a number of

assessment tools to measure social cognition which were developed outside

Japan; however, there are very few that have been verified in Japan.

Furthermore, as far as we know, there are no social cognition instruments

which can measure multiple domains within one test. Taking into

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consideration the complex and multiple domains of social cognition, it can be a heavy burden on the patient to be administered many tests to achieve an estimate of his or her social cognitive functioning.

Roberts et al. developed the Social Cognition Screening Questionnaire (SCSQ) [1] to measure multiple domains of social cognition and differentiate performance in these domains from non-social cognition. The SCSQ includes subscales measuring the non-social domains of verbal memory and schematic inference, as well as the social cognitive domains of ToM, metacognition, and hostile attributional bias. It takes 15 to 20 minutes to complete the test, it is objectively scored, and is feasible to be used in clinical settings. Roberts et al.[1] verified the validity of the scale by testing the convergent, discriminant and ecological validity using established measures of ToM, attributional bias, metacognition, verbal memory and social functioning. They found fairly strong convergent and discriminant validity in all domains. The results also showed good ecological validity in the domains of ToM and hostility bias but not in the metacognition. They also found that all four domains of SCSQ significantly discriminated between schizophrenia patients and normal controls. They concluded that

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the SCSQ has promise as a broad and efficient measure of social cognition in schizophrenia. The present study aimed to test the validity of the Japanese version of SCSQ.

ToM is the ability to characterize the mental states of other people and to consider them in explaining or predicting people's behavior,[11] and is widely measured using the Hinting task.[12] Schematic inference refers to the ability to infer what is occurring in a specific situation from uncertain and ambiguous context information. This is somewhat similar to ToM, however, it is not associated with interpersonal mentalizing, and therefore the SCSQ's schematic inference subscale is not expected to correlate with ToM measures.

Metacognition refers to cognition about one's own cognition. such as, "How well do I understand what is happening in my own mind?" Metacognitive deficits in schizophrenia include decreased ability to evaluate the accuracy of one's own judgments, often due to overconfidence in their accuracy. This domain may share similar underlying causes with "jumping to conclusions" [13] and "bias against disconfirmatory evidence" [14], which have also been observed in schizophrenia. It then follows that cognitive insight, which is a capacity to reflect upon the self's thought processes from the

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imagined perspective of another, will be impaired in schizophrenia patients with poor metacognition. Poor cognitive insight in schizophrenia patients can be assessed with the Beck cognitive insight scale (BCIS),[15] the Japanese version of which has been already validated.[16]

Attributional bias refers to individuals' tendencies in explaining the causes of events. There are three main types that have been studied; the first is situational, in which people infer that the event is due to situational factors; the second is external-personal, in which people attribute the event to others; and the third is internal-personal, in which people attribute the event to oneself. Schizophrenia subjects tend to show a stronger bias towards external-personal style when explaining negative events, and towards internal-personal style when explaining positive events.[17] There is a correlation between persecutory ideation and external-personal attributional bias.[17] The Ambiguous Intentions Hostility Questionnaire (AIHQ) is one of the most widely used measures for assessing attributional bias in schizophrenia.[18]

Although we have very few validated tests for assessing social

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cognition in Japan, we examined the validity of the SCSQ subscales of ToM, metacognition and hostility bias by investigating their correlation with translated versions of the Hinting task,[12] BCIS, [16] AIHQ[17] and Social Functioning Scale (SFS),[19] respectively. We expect the findings of the present study to help establish validated assessment tools to evaluate social cognition of schizophrenia patients in Japan and facilitate the development of a social cognition training program in Japan, such as Social Cognition and Interaction Training (SCIT),[20] originally developed in the United States.

METHODS

Subjects

The sample consisted of 105 participants: 52 individuals with schizophrenia and 53 normal control participants who were native Japanese and had no history of psychiatric disorders. Schizophrenia patients were diagnosed by clinicians according to DSM-IV Diagnostic criteria. The patients were recruited from the National Center of Neurology and

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Psychiatry, Teikyo University School of Medicine, Tottori University,

Fukushima Medical University, and Osaka Psychiatric Medical Center.

Normal controls were recruited from the local community. They were

matched with schizophrenia patients of the same age and sex (Table1). There

were between-group differences in years of education and estimated IQ using

the Japanese Adult Reading Test (JART).[21] The severity of symptoms in the

patients was relatively mild, as can be seen by the mean scores of the

Positive and Negative Syndrome Scale (PANSS).[22] All but one patient were

taking antipsychotic medication.

Written consent was obtained from all participants and the protocol

was approved by the Ethical Committee of each participating site.

Back-translation of social cognition measures

To develop a Japanese version of the SCSQ, professionals specializing

in mental health translated the original SCSQ from English to Japanese.

Afterward, a person isolated from the first group of translators performed a

back-translation. Modifications of some terms were made to fit local culture.

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We performed the same procedure for the Hinting task and the AIHQ. All

back-translations were supervised and approved by one of the persons who

developed the tests.

Measures

Social cognition measures

A. Social Cognition Screening Questionnaire (SCSQ)

The SCSQ contains 5 subscales: verbal memory, schematic inference,

ToM, metacognition, and hostility bias. The task comprises 10 short

vignettes presenting an interaction between a fictional character and the

study participant. Each vignette was read aloud by the tester. If the subject

requested, the vignette was repeated once. The tester then had the subject

respond 'Yes' or 'No' to three questions about the vignette, addressing verbal

memory, schematic inference, and ToM. ToM items were designed to assess

both ToM and hostile attributional bias. Questions were presented in a

random order, and subjects were then asked to rate their confidence level in

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their answer to the last question.

Scoring for the verbal memory, schematic inference and ToM subscales reflect the sum of correct answers (range 0-10; higher scores indicate better performance). Scoring for the hostility bias scale was the sum of instances in which the subject erroneously inferred that the vignette character had negative thoughts or feelings toward the subject (range 0-5; higher scores indicate greater bias). As for the metacognition scores; if the subject answered correctly on the last question a score of 1 is given; if the subject answered incorrectly on the last question a score of 0 is given if he / she answered that he / she was "very sure", 0.33 for "pretty sure", 0.66 for "a little unsure", and 1 for "not sure at all". The metacognition score is obtained by summing up the scores for the 10 vignettes (range 0-10; higher scores indicate better metacognitive ability). <u>The total score was calculated as the sum of all the subscales except for hostility bias scale because the items used for calculating the scores overlapped with those used for TOM scores.</u> The SCSQ was administered to both schizophrenia and normal control subjects (see Appendix 1 for a sample item).

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B. Ambiguous Intentions Hostility Questionnaire (AIHQ)

Attributional bias was assessed using the AIHQ.[18] Subjects read a

series of 15 vignettes describing social situations with negative outcomes and

answer questions about the intentions of the characters and how subjects

themselves would respond to the situation. The vignettes involved three

categories of situations, which were considered to be "accidental",

"intentional", or "ambiguous" in terms of the cause of the negative outcomes.

Following Combs et al.,[18] we focused on scores of ambiguous situations for

analyses and computed three summary scores: hostility bias, aggression bias,

and blame scores (see Appendix 2 for a sample item).

C. The Hinting task

The Hinting task is a measure of ToM. Subjects are required to infer

real intentions behind indirect speech.[12] The task comprises 10 short

passages presenting an interaction between two characters ending with one

of the characters uttering a hint. Each passage was read aloud by the tester.

The subject was then asked what the character really meant when he / she

uttered the hint. If the subject failed to give the correct response, an even

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more obvious hint was added to the story and the subject was asked again. A correct response was therefore scored as 2 or 1, depending on when the response was given The score is obtained by summing the score for each response (see Appendix 3 for a sample item).

D. Beck Cognitive Insight Scale (BCIS)

The BCIS is a measure of cognitive insight, which is linked to metacognition. It measures the extent to which subjects agree with statements pertaining to how certain they are of the accuracy of their judgments. Two subscale scores are produced; self-reflectiveness and self-certainty. While higher scores on the former indicate higher level of cognitive insight, higher scores on the latter indicate lower level of cognitive insight.[15] A composite score obtained by subtracting the self-certainty scores from the self-reflectiveness scores was adopted for analysis. The Japanese version of the BCIS was validated in a previous study.[16] As some questions are related to insight about mental illness, the BCIS was administered only to schizophrenia patients.

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Social functioning

We adopted the Social Functioning Scale (SFS) developed by

Birchwood et al.,[19] which is a measure assessing social functioning across 7

domains: (1) social engagement, (2) interpersonal communication, (3)

independence-performance, (4) recreation, (5) social activities, (6)

independence-competence, and (7) occupation, with higher scores indicating

a higher level of functioning. The domain score was computed by summing

the item scores in each domain. The total score was the sum of 7 domain

scores. In the present study, we used self-report rather than informant

interview for only the schizophrenia patients.

Statistical analysis

A Mann-Whitney-Wilcoxon rank-sum test was used to explore

between-group differences for SCSQ subscale scores and the Hinting task

scores. As the subjects were neither allowed to read the task sentences

themselves nor hear the task sentences more than twice, SCSQ subscale

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scores may well be affected by verbal memory ability. Therefore, if a significant between-group difference in verbal memory was found, a one-way ANCOVA using subscale scores of verbal memory in the SCSQ as a covariate was performed for each subscale's scores to test the effect of group. To examine between-group differences in AIHQ scores, we conducted a mixed model analysis of variance (ANOVA) with 3 situations (intentional, ambiguous, and accidental) as a within-subjects factor, group as a between-subjects factor, and each subscale's scores of AIHQ (hostility bias, blame score, and aggression bias) as dependent measures. Secondary analyses were performed whenever a significant interaction between the factors was obtained. In addition, in order to estimate the sensitivity and specificity of the SCSQ total score in distinguishing patients from normal controls, we set a cut-off score based on receiver-operator characteristics (ROC) curve analysis.

As for internal consistency, we excluded hostility bias to avoid redundancy because the items used to calculate the score overlapped with those used in TOM scores. Cronbach's alpha was thus calculated using the four subscales.

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Spearman's rho was calculated for the schizophrenia patients to examine the correlation of the SCSQ subscale scores and other indices to investigate the SCSQ's convergent, discriminant and ecological validity.

We hypothesized that schizophrenia patients should score significantly lower in the SCSQ subscales and the Hinting task, and higher in the AIHQ subscales in ambiguous situations than normal controls. In terms of the construct validity of the SCSQ, we hypothesized that there should be positive correlations among the following: a) SCSQ ToM subscale and the Hinting task scores, but not between SCSQ schematic inference subscale scores and Hinting task scores; b) SCSQ hostility bias and AIHQ hostility, aggression bias, and blame scores, c) SCSQ metacognition subscale scores and BCIS composite scores and d) social cognitive subscale scores of the SCSQ and SFS scores.

RESULTS

Between-group comparison of social cognition

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SCSQ

There were significant between-group differences <u>for all SCSQ</u>

<u>subscales and the total scores</u> (Table 2). As there was a significant

between-group difference in the verbal memory subscale, one-way ANCOVA

using verbal memory subscale's scores as a covariate was performed for each

subscale's scores. Main effects of group remained significant for schematic

inference (F [1, 103] = 24.49, P < 0.0001), theory of mind (F [1, 103] = 50.05, P

< 0.0001), metacognition (F [1, 103] = 6.43, P < 0.05), hostility bias (F [1, 103]

= 10.75, P < 0.005) <u>and total scores (F [1, 104] = 71.94, P < 0.0001),</u> indicating

that these differences were present above and beyond the effects of verbal

memory impairment in schizophrenia.

<u>The ROC curve analysis for the total score indicated that a cut-off</u>

<u>point of 34.0 would provide a sensitivity of 0.87 and a specificity of 0.69.</u>

<u>Moreover, the area under the ROC curve was 0.84.</u>

AIHQ

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Hostility bias: A mixed model ANOVA revealed a significant main effect of situation (F [2, 206] = 192.45, P < 0.0001, G-G corrected), and a significant interaction between group and situation (F [2, 206] = 12.83, P < 0.0001, G-G corrected). A secondary analysis for each situation revealed a significant main effect of group only in the intentional situations. Hostility bias was stronger in normal controls compared with schizophrenia patients in intentional situations (Table 2).

Blame score: There was a significant main effect of situation (F [2, 206] = 253.46, P < 0.0001, G-G corrected), and a significant interaction between group and situation (F [2, 206] = 8.29, P < 0.001, G-G corrected). Similar to the hostility bias scale, the blame score was stronger in normal controls compared with schizophrenia patients in intentional situations (Table 2).

Aggression bias: There was a significant main effect of situation (F [2, 206] = 13.47, P < 0.0001); however, there was neither a significant effect of group (F [1,103] = 0.14, n.s.) nor a significant interaction between group and situation (F [2, 206] = 1.58, n.s.) (Table 2).

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The Hinting task

Schizophrenia patients scored significantly lower than normal controls (Table 2).

Internal consistency

Cronbach's alpha for the SCSQ total score, including verbal memory, schematic inference, TOM and metacognition, was 0.72.

Convergent and discriminant validity

Construct validity findings are summarized in Tables 3 and 4.

Regarding ToM, a significant correlation was obtained between the

SCSQ ToM subscale and the Hinting task. Regarding hostility bias, there was a significant correlation between the SCSQ hostility bias and the AIHQ hostility bias, blame scores, and aggression bias. Regarding metacognition, there was a significant correlation between the SCSQ metacognition subscale and the BCIS composite scale. There were also significant negative correlations between SCSQ ToM subscale and the AIHQ blame scores and aggression bias, and also between SCSQ verbal memory subscale and AIHQ aggression bias. Finally, the SCSQ schematic inference subscale did not correlate with any measures of social cognition except for a weak negative correlation with the AIHQ blame scores.

Ecological validity

As for the relationship between the SCSQ and social functioning, ToM subscale scores showed significant positive correlations with the scores of four domains of social functioning, including social engagement, interpersonal communication, recreation, and occupation; metacognition subscale scores showed positive correlations with the domain scores of

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recreation and occupation; hostility bias subscale scores were negatively

correlated with the domain score of social engagement; total scores were

positively correlated with the domain score of occupation (Table 4).

DISCUSSION

Between-group differences

The SCSQ showed more robust between-group differences than our

other measures of social cognition, the AIHQ and the Hinting task. A recent

meta-analysis showed that patients with schizophrenia performed worse

than normal controls across all domains of social cognition, with a relatively

large effect size shown in social perception (1.04), ToM (0.96), and emotion

processing (0.89).[23] In the present study, the effect size of SCSQ ToM subscale

scores (1.36) exceeded both the effect size of ToM in the above study and of

the Hinting task in the present study (0.72). As for attributional bias, the

effect size shown for SCSQ hostility bias was 0.69, whereas none of the AIHQ

scores in ambiguous situations showed a significant between-group

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