



Clinical Symptoms, Social Cognition Correlated with Domains of Social Functioning in Chronic Schizophrenia

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Background: Social and vocational dysfunctions of schizophrenic patients have generally been considered to result from their illness. Clinical symptoms and social cognition have a great impact on social functioning. The present study aimed to examine the relationship between clinical symptoms, social cognition and domains of social functioning in patients diagnosed with schizophrenia. **Methods:** Sixty schizophrenic patients were included in the study. All subjects participated in a semi-structured interview and a battery of assessments, including: a Positive and Negative Syndrome Scale (PANSS), a categories test, a Benton facial recognition test, and assessment exercises of picture completion, picture arrangement, object assembly and personal social performance. **Results:** Negative symptoms, duration of illness and picture arrangement were positively and negatively associated with socially useful activities respectively ($r = .49$, $r = .25$, $r = -.32$). Benton Facial Recognition Test (BFRT) and picture arrangement was negatively associated with personal and social relationship ($r = -.60$, $r = -.20$), while two domains of PANSS, including negative symptoms and general psychopathology were positively associated with personal and social relationship ($r = .40$, $r = .25$). Negative symptoms and picture arrangement were positively and negatively correlated with self-care respectively ($r = .58$, $r = -.41$). Only negative symptoms were positively correlated with disturbing, aggressive behavior ($r = .48$). **Conclusions:** Multiple regression analysis revealed that negative symptoms, picture arrangement, BFRT, duration of illness and general psychopathology were associated with socially useful activities, personal and social relationships, self-care, disturbing and aggressive behavior of social functioning. Chronic schizophrenic inpatients could receive treatments or interventions geared to improving their clinical symptoms and social functioning.

Key words: clinical symptoms, social cognition, social functioning, schizophrenia

INTRODUCTION

Schizophrenic patients are commonly diagnosed with symptoms categorized as positive, negative and disorganized. Among all the symptoms, social and vocational dysfunctions were found to greatly decrease their quality of life and significantly restrict the extent of their recovery.¹ Although definitions may vary in schizophrenic studies, social functioning has often been referred to as interpersonal skills, behaviors in community (eg, skill ratings while shopping), independent living (eg, self-care

skills, grooming, etc), social interactions in laboratory settings (eg, role-play tests), and social problem-solving skills.² According to some studies, a decline in social functioning represents a field independent from negative and positive symptoms.³⁻⁵

Several researchers have found negative and disorganized symptoms to be correlated with social dysfunctions and lower levels of social competence; these symptoms could be more strongly related than cognitive test scores in the community functioning of schizophrenic outpatients.^{6,7} However, positive symptoms in contrast were not significantly related to social dysfunction.^{8,9}

In the mid-1990s, social cognition became a high-priority in the study of schizophrenia because it was thought to be a factor that could partially explain the deterioration of social functioning in persons suffering from schizophrenia. Defined as the ability to recognize mental operations and relations of oneself and others, social cognition is the underlying skill for social interactions.¹⁰ The domains of social cognition fit into several areas, including

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theory of mind,¹¹ social perception,¹² social knowledge,¹³ emotional processing¹⁴ and attributional bias.¹⁵ Meta-analyses indicated that patients with schizophrenia have significant and stable impairments of social cognition that were not moderated by IQ, gender or age.¹⁶ Sergi *et al.*¹⁷ stated that social cognition represents separable cognitive domains in the neurocognition of outpatients with schizophrenia or schizoaffective disorder. Specifically, it has been demonstrated that social cognition is distinct from neurocognition and negative symptoms.^{17,18} The categories test, Benton Facial Recognition Test¹⁹ and three subtests of WAIS-III, including picture arrangement, picture completion, and object assembly have been used to assess aspects of social cognition.^{20,21} The categories test is highly effective in assessing a person's social schema in making classifications.²²

Past research has indicated that social cognition may serve as a core symptom in schizophrenia²³ and may be associated with poor functional ability.^{24,25} Generally, social cognition has been categorized within the set of processes and cognitive abilities required to understand, interpret, perceive and generate responses in a social context and in social interaction.^{24,26-28} Mirabilio *et al.*²⁹ showed that global functioning was the strongest predictor of social reasoning among schizophrenic outpatients; however, other neurocognitive abilities, attention and context reasoning had no predictive effect on social reasoning.

Up to present, few studies have explored the degree or manner in which clinical symptoms and social cognition relate to the domains of social functioning in chronic schizophrenic inpatients. Thus, the aim of this study was to examine the relationship between clinical symptoms, social cognition and the dimensional descriptors of social functioning among schizophrenia.

METHODS

Subjects

Subjects consisted of schizophrenics, with either paranoid or residual subtypes, diagnosed by senior doctors according to DSM-IV criteria. We recruited inpatients from the chronic ward and day-care at the department of psychiatry at the Zuoying Branch of Kaohsiung Armed Forces General Hospital. Subjects with acute psychotic symptoms and those who were illiterate, reported substance abuse or had showed any neuropsychological disorder in the preceding 6 months were excluded. Chronic ward inpatient and day-care patients differed in that the latter was able to go home after daily programs provided

by therapists (there were no programs on weekends; the content of programs included social skills training, newspaper reading, cooking training, shopping training, and simple exercise training). Both sets of patients received the same programs. Additionally, all patients were required to have adequate basic daily functions in that they could take care of themselves based on progress of medical record in the preceding six months. All subjects were invited to attend this study and to sign an informed-consent form. A semi-structured interview and a battery of assessments were given to each subject by the same senior psychologist, including: a Positive and Negative Syndrome Scale (PANSS), a categories test and a Benton facial recognition test. Subjects also participated in the assessment of picture completion, picture arrangement, object assembly and a personal social performance scale. All patients were taking antipsychotic medication at the time of assessment: 13 (21.7%) were on atypical and 47 (78.3%) on typical antipsychotics.

Measurement

1. The Positive and Negative Syndrome Scale (PANSS)

Clinical symptoms were used to assess current levels of schizophrenia-related symptoms using the Positive and Negative Syndrome Scale (PANSS). Clinically trained staff completed the 33-item rating scale to assess the pathological symptoms of the schizophrenia patient. The semi-structured interview scale was scored across three subscales: positive, negative and general psychopathology. Each subscale was scored for seven rating points from 1 (absent) to 7 (extreme).³⁰

2. Categories Test

The categories test, known as a classification method, was designed to evaluate an individual's cognitive flexibility. The test consisted of form 1 and form 2, each form providing information about six individual. The user could freely choose between which forms to administer and each form contained two panels. The response of each panel had to meet the basic guidelines provided in the administration instructions and the range of scores was from 0 points to 2 points within an 8-minute time limit. In order to receive 2 points, subjects had to divide the six individuals into two groups, each group having at least two people; two distinct groups were required. The subject received 1 point when grouping only one individual in one distinct group versus all others. The raw scores were transferred to T scores. Visual stimuli were displayed on two durable cards, each of which presented six boxes containing a digital photograph of a person and

information (e.g., name, occupation and place of birth) about that person. The test had good reliability and validity.²²

3. Benton Facial Recognition Test (BFRT)

This test was designed to measure facial identity recognition. Participants were shown a photo of a target face, along with six other faces. The test had two parts and included 22 items. In the first part (short form), the participants had to identify which one of the six faces was the same person as the target face. In the second part (long form), the participants had to identify which three of the six faces were the same person as the target face. Evidence for the reliability of this measure had been presented. Scoring combined the two forms with adjustment according to age and education.³¹

4. Subtests of Wechsler Adult Intelligence Scale-Third Edition (WAIS-III)

WAIS-III is the third edition of the WAIS, the first edition having come out in 1955, and the revised edition (WAIS-R) having come out in 1981.³² It had good reliability and validity. Three subtests were used to evaluate social cognition.

- (1) Picture Arrangement: This included 10 sets of interpersonal small pictures, where the subject was required to arrange them into a logical story.
- (2) Picture Completion: This had 20 small pictures, each with one vital detail missing. Subjects were required to point out the missing item within a limited time.
- (3) Object Assembly: This included five items, each item being a “cut-up” object, like a puzzle.

5. Personal Social Performance (PSP)

The scale was used to measure the patients' current level of functioning.³³ The total PSP score ranged from 0 to 100 and was derived from the combined severity of 4 domains; higher scores indicating better social functioning: (a) socially useful activities, (b) personal and social relationships, (c) self-care, and (d) disturbing and aggressive behavior, each domain scoring from 1 (absent) to 6 (very severe) and higher scores indicating poor performance.

Statistical analysis

Statistical analysis was performed using Statistical Product and Service Solutions (SPSS12.0). Clinical assessments were analyzed using Spearman correlation. Comparisons between the chronic ward group and day-

care group were made using the independent samples t-test. Stepwise regression analyses were performed to explore the relationship between clinical symptoms, social cognition and social functioning.

RESULTS

The 60 schizophrenic patients in the study had an average age of 43.4 years (SD=11.1) and an average duration of illness of 18.68 years (SD=9.63). There were more males than females ($n=17$), but no significant differences among variables were found between the genders. Their education level consisted mostly of junior high school (31.7%) and senior high school (38.3%). Of the sample, 60% were single. The average of positive, negative and general psychopathology, domains of PANSS was 12.83(SD=3.07), 17.23(SD=4.99), 30.95(SD=6.89) respectively. The average of categories test, Benton facial recognition test, picture arrangement, picture completion and object assembly was 35.51(SD=9.85), 57.28(SD=10.34), 7.10(SD=2.84), 5.70(SD=2.15), 5.80(SD=2.68) respectively. The average of socially useful activities, personal and social relationships, self-care, disturbing and aggressive behavior, domains of PSP was 2.68(SD=0.77), 2.46(SD=0.56), 2.10(SD=0.85), 1.15(SD=0.36) respectively. There were no significant differences in age, medication, onset of illness, duration of illness and educational level between the chronic ward patients and day-care patients. For all patients, the equivalent dosage of typical and atypical antipsychotic medication converted to chlorpromazine was $335 \text{ mg} \pm 53.12$.

Correlations of medication (equivalent dosage of antipsychotics converted to chlorpromazine), duration of illness, PANSS and variables of social cognition with four domains of social functioning are presented in Table 1.

The aim was to understand the extent to which clinical symptoms and social cognition were independently related to social functioning. Four stepwise multiple regression analyses were performed, allowing variables with significant correlations to enter the assessment and associate with the four domains of social functioning.

As summarized in Table 2, negative symptoms, picture arrangement and duration of illness were significantly associated with the subjects' ability of socially useful activities (adjusted $R^2=.37$, $p<.001$). Benton facial recognition test, negative symptoms, general psychopathology and picture arrangement emerged as significant contributors to personal and social relationships (adjusted

Table 1 Medication, duration of illness, clinical symptoms and social cognition correlates of four domains of social functioning (n=60)

Variables	Socially usefully activities	Personal and social relationships	Self-care	Disturbing and aggressive behavior	Total of PSP
1. Medication (equivalent dosage of antipsychotics converted to chlorpromazine)	.30	.53	.40	.43	.01
2. Duration of illness	.16	.10	.06	.17	-.13
PANSS					
3. Positive symptoms	.11	.22	.20	.09	-.21
4. Negative symptoms	.49**	.58**	.56**	.46**	-.61**
5.General psychopathology	.45**	.53**	.46**	.34**	-.53**
Social cognition					
6. Categories test	-.36**	-.41**	-.37**	-.24	.39*
7. Benton facial recognition test	-.39**	-.58**	-.33**	-.32*	.40**
8. Picture arrangement	-.46**	-.49**	-.58**	-.25*	.58**
9. Picture completion	-.21	-.33**	-.28*	-.11	.27*
10. Object assembly	-.24	-.26*	-.26*	-.13	.25

* $p < .05$ ** $p < .01$

$R^2=.55$, $p<.001$). A 47% variance of self-care could be accounted for by negative symptoms and picture arrangement (adjusted $R^2=.47$, $p<.001$). Only negative symptoms were significantly associated with disturbing and aggressive behaviors (adjusted $R^2=.22$, $p<.001$). 55% of the PSP total score variance could be explained by negative symptoms, picture arrangement and general psychopathology (adjusted $R^2=.55$, $p<.001$). Table 2 presents the details of beta weights of each contributing variable. Positive symptoms and medication were also entered into the regression analyses, but no significance was found in any domains of social function.

DISCUSSION

Negative symptoms, which were associated with performance impairments in four domains of social functioning, appeared to be the strongest predictors of current social functioning. The results of this study were consistent with previous studies and indicated that schizophrenic patients with more severe negative symptoms had a diminishing ability among different aspects

of social functioning.^{6,34} Positive symptoms were not greatly related to domains of social functioning in this study, confirming the results of past findings.^{8,9} In contrast, Kawata and Revivki³⁵ found that both negative and positive symptoms were associated with the PSP scale among schizophrenic and schizoaffective patients living in the community. The difference in findings may be due to the use of unique group characteristics (including subtypes of schizophrenia), in which we recruited only patients with paranoid and residual subtypes in the present study. Additionally, the difference in results may also be because the source of individual assessment for the patients' PSP was different between studies. General psychopathology of clinical symptoms was found to correlate only with personal and social relationships, suggesting that schizophrenic patients may have greater uncomfortable feelings, and psychomotor retardation when having to socially interact with others. Inconsistent with previous findings,³⁴ we found that the duration of illness significantly correlated with the poor performance of socially useful activities; in other words, the longer the duration the worse the performance.

Table 2 Multiple regressions predicting four domains of social functioning scores from PANSS, and social cognition (n=60)

Measure of social function	Contributing PANSS and social cognition	Beta	t	ΔR^2	F change
Socially useful activities	Negative symptoms	.49	4.39* * *	.24	19.27* * *
	Picture arrangement	-.32	-2.80* *	.09	7.86* *
	Duration of illness	.25	2.51*	.06	6.31*
Personal and social relationships	Benton facial recognition test	-.60	-5.73***	.36	32.84***
	Negative symptoms	.40	3.93***	.13	15.44***
	General psychopathology	.25	2.51*	.05	6.29*
Self-care	Picture arrangement	-.20	-2.07*	.03	4.31*
	Negative symptoms	.58	5.47***	.30	29.93***
	Picture arrangement	-.41	-4.12***	.15	17.02***
Disturbing and aggressive behavior	Negative symptoms	.48	4.26***	.23	18.18***
Total of PSP	Negative symptoms	-.64	-6.42***	.41	41.24***
	Picture arrangement	.37	3.90***	.12	15.24***
	General psychopathology	-.20	-2.12*	.03	4.49*

* $p < .05$ ** $p < .01$ *** $p < .001$

Picture arrangement was related to three domains: socially useful activities, personal and social relationships, and self-care of social functioning. Within these three domains of social functioning, picture arrangement required subjects to have a basic knowledge of social situations and understanding of different social behaviors; thus, picture arrangement reflected more variance in self-care and socially useful activities than personal and social relationships. On the other hand, self-care and socially useful activities required an awareness of the roles, rules and goals that characterize social situations.^{36,37}

A strong association was found between scores of the Benton facial recognition test and personal and social relationships, accounting for 36% of the variance in personal and social relationships; lower scores in facial recognition among schizophrenic patients were related to poor dysfunction and misinterpretation of social interaction. These skills serve important for achieving adequate social competence and linking a person's identity as a recognizable face within multi-modal information about a familiar person.³⁸

In the present study, although picture completion and object assembly correlated with some aspects of social functioning, the regression model found otherwise; none of them were significant contributors. Possibly, the social content of picture arrangement required more knowledge of common social situations and analysis of social situations and behaviors than other variables.^{18,39} Categories Test was also used to evaluate patients' social cognition;

however, no association was found with any domains of social functioning. It is probable that the test showing six different individuals for patients to make judgments on was based on restricted rules rather than focusing on emotional or social context reasoning, which might have little impact on social functioning.

The cross-sectional nature of our study did not allow us to test the causal effect of clinical symptoms and social cognition on social function of chronic schizophrenia. Further work is needed to determine if the same relationships among the variables will be found among other population, and prospective longitudinal studies, using a larger sample size, a control group for comparison, other functional ability measures and a measure of premorbid social function should be conducted. Given the impact of clinical symptoms on social functioning, a greater emphasis should be placed on developing effective treatments for alleviating clinical symptoms, such as affect recognition^{40,41} and emotion management training,⁴² cognitive enhancement therapy,⁴³ as well as social cognition and interaction training,⁴⁴ which have been proven to improve social cognition among schizophrenia patients.

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DISCLOSURE

All authors declare that this study has no competing financial interests.

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