

Running Head: SPD in general population

Gender, cognitive, social functioning,
social cognition and social skills in
schizotypal personality disorder of general
population

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Abstract

Objective: The present study aims to explore the deficit of cognitive, social functioning, social cognition and social skill with the SPD of general population. Additionally, the relationship between social functioning and rejection sensitivity is also investigated.

Furthermore, this paper wants to explore how social functioning and rejection sensitivity can predict the score in the SPQ so as to build up the indirect relationship between SPQ score and rejection sensitivity. Lastly, gender effect on cognitive and social functioning will also be explored. To our knowledge, the present study is the first study using Hong Kong Cantonese version questionnaires to assess the impairment in cognitive, social functioning and social skills in general population.

Method: 213 university students completed the Schizotypal Personality Questionnaire (SPQ), the Sensitivity to Rejection Scale (SRS), the Social Adaptation Self-evaluation Scale (SASS), the Digit Symbol Substitution Test (DSST), the Brief Visuo-spatial Memory Test (BVMT), the self-description game, the Social Skill Inventory (SSI) and the Rejection Sensitivity Questionnaire (RSQ).

Results: In the present study, most measures can not find the deficits in cognitive functioning when comparing high SPQ group with low SPQ group. In social cognition, part of it can find there had the significant difference between high SPQ group and low SPQ group. The result shows that there is significantly positive correlation between RSQ and SRS. For

RSQ, it was negative significantly correlated to SASS. Linear regressions indicated that RSQ and SASS could predict the score in SPQ. In SRS, it was negative significantly correlated to SASS. Linear regressions indicated SASS and SRS could predict the score in SPQ. However, the present study can not find there have the gender by SPQ classification interaction effect on cognitive, social functioning, social cognition as well as social skills.

Conclusion: The present study can't find high SPQ group having the cognitive deficit when comparing with low SPQ group, but it can find that there was the social skill and social functioning deficits in high SPQ group when comparing with low SPQ group. It also establishes a new way to look for the score in SPQ which is the rejection sensitivity. However, the present study can not find the gender difference on cognitive, social functioning, social cognition and social skills in high SPQ group when comparing with low SPQ group.

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Introduction

Concept of schizotypal personality disorder

Kraepelin (1971) and Bleuler (1950), who were the pioneers to observe that non-psychotic relatives of schizophrenia patients displayed mild schizophrenia like symptoms and signs including deficits in cognitive, interpersonal, and affective domains. They used schizotypy concept to describe those people. A serious dysfunction in those domains might lead today to a diagnosis of schizotypal personality disorder (SPD) (American Psychiatric Association, 1994). On the other hand, schizotypal personality disorder could also refer to a serious condition in which a person usually had few to no close relationships. Such people preferred to stay at home rather than interact with other people, and experience extremely anxiety and upset in social situations (Mayo Foundation for Medical Education and Research, 2006).

People with schizotypal personality disorder didn't know how to get along with others and express their emotion appropriately. They might be social isolated and eventually developed distorted perceptions about how interpersonal relationships form. They might also demonstrate peculiar behaviors, respond inappropriately to social cues and hold odd beliefs. As a result, people with schizotypal personality disorder frequently found themselves swaying from one activity to the next, failing to connect with people in the life (Mayo Foundation for Medical Education and Research, 2006).

Concept of social functioning

There was the growing evidence that schizophrenia and SPD patients had the deficit in cognitive, social functioning and social skills. In that study, those domains were the main focus. Social functioning was the general term used to refer to the ability of individuals to meet societal defined roles such as homemaker, worker, student, spouse, family member or friend. In addition, individuals' satisfaction with their ability to meet these roles, their ability to care for themselves, and the extent of their leisure and recreational activities were often subsumed under the topic of social functioning (Mueser, Tarrier, 1998).

Concept of social skills

Social skills were the important intervention to improve the social functioning of the persons with schizophrenia and helped them to readapt the society. Therefore, the concept of social skill was described. In general, social skills could be divided into four areas: nonverbal skills, paralinguistic elements, verbal content and interactive balance (Bellack & Mueser, 1990). Bellack & Mueser said that :

“Nonverbal skills referred to behaviors such as eye contact, facial expression, use of gestures and body orientation that in combination conveying important information about an individual's mood and level of engagement during an interaction. Paralinguistic elements were the specific qualities of an individual's speech, such as voice tone, loudness, inflection etc (Bellack & Mueser, 1990). Verbal content was the specific

choice of words and phrasing, independent of the manner or style in which it is said.

Lastly, interactive balance referred to the skills necessary for maintaining a satisfactory give-and-take during a conversation". (Bellack & Mueser, pp. 80).

Liberman, DerRisi and Mueser (1989) defined social skill as all the behaviors that helped us to communicate our emotions and needs accurately and allowed us to achieve our interpersonal goals. Hersen and Bellack (1977) provided a more specific definition of social skills such as the ability to express both positive and negative feelings in the interpersonal relationship without suffering consequent loss of reinforcement.

Concept of cognitive functioning

Cognitive functioning affected a wide range of skills in the life. It included the main aspects insisting of verbal intelligence and language (VBL), spatial organization (SPT), verbal memory and learning (VBM), visual memory (VIM), short-term memory (STM), visual-motor-processing and attention (VSM), information processing and attention as well as abstraction or flexibility (ABS) (Saykin et al., 1994). VBL was the ability to use words and language (Liz Bogod,1998). Short Term Memory was the stage of memory where information was stored for up to 30 seconds before being forgotten or transferred to long term memory (Internal society for mental health, 1999). Spatial organization was the arrangement of different levels of objects (Fedstats,2006). VBM was the ability to learn and store the information about words and language. Visual memory was a part of memory preserving some characteristics of

our senses pertaining to visual experience (Wikipedia, 2007). Attention was the process of concentrating on specific objects and led to exclude the other irrelevant objects (Colman, 2001; Reber, 1995). Abstraction was the process of generalization by reducing the information content of a concept or an observable phenomenon, typically in order to retain only information which was relevant for a particular purpose (Wikipedia, 2007).

Social functioning in schizophrenia

Impaired social functioning was the main characteristic of schizophrenia (Kraepelin, 1971; Bleuler, 1950). Problems in social functioning were often included in criteria for the diagnosis of schizophrenia (APA, 1994). Social functioning was a good predictor of long-term outcome of schizophrenia (Johnstone et al., 1990; Jonsson et al., 1991). Schizophrenia inevitably had a negative impact on social functioning during the prodromal phase of the disorder (APA, 1994). In one study which revealed that older patients with schizophrenia were fewer engaging in social roles were married, were parents, or having occupations than control group. They also were more impaired in overall functioning, especially in the domains of leisure, extended family and marital roles than control group (Thomas, Shirley, William, et al., 1997). Several studies found that impaired social functioning of schizophrenia including lack of premorbid social competence (Phillips, 1953; Wittman, 1941) and prodromal functioning (Green, 1996; Hirsch & Jolley, 1989). Therefore, deficit in social functioning was the main feature of schizophrenia.

Social skills in schizophrenia and SPD

People with schizophrenia often experienced deterioration and difficulty in social relations, social withdrawal, and social isolation (American Psychiatric Association, 1987). Research revealed that patients with schizophrenia having the following inabilities such as to determine the emotional content of social situations (Morrison and Bellack, 1987; Morrison et al., 1988a), to decode the social cues in their environment (Schwartz-Place and Gilmore, 1980; Frith et al., 1983), to recognize expressions of facial affect, particularly positive emotions (Walker et al., 1980) and to recognize inappropriate behavior in others, but not in themselves (Carini and Nevid, 1992). Bellack, et al., (1990) evaluated the social skills such as nonverbal and paralinguistic components and verbal content in patients with schizophrenia and non-psychiatric patients. Patients with schizophrenia performed worse than non-psychiatric patients. One study found that schizophrenia patients were less skillful at managing conflict situations than control group (Bellack, Mueser, Wade, Sayers & Morrison, 1992). Mueser, et al., (1991) also reported that patients with schizophrenia performed worse on a social skills test involving expressing negative feelings and compromising compared to major affective disorder patients. Besides, Tracy and Stephen (2000) exhibited that persons with SPD performed significantly worse than control participants on a social role-play task.

Cognitive function in schizophrenia and SPD

Schizophrenic patients had cognitive deficits on tasks that involved attention, abstract

reasoning, language and memory (Braff et al., 1991; Saykin et al., 1991; Gold et al., 1997).

Some studies showed that there were the impairments in sustained attention, verbal learning, and executive functioning in schizophrenic patients, SPD patients, schizotypal volunteers and relatives of schizophrenic patients (Gold and Harvey, 1993; Siever et al., 1993b; Park and Holzman, 1993). The study displayed that schizophrenic patients had the poor performance in VSM, VBM, VBL, SPT, STM, SAT than the control group (Margot et al., 1997). In another study, it studied the difference between SPD subjects and control group in the cognitive function. The result revealed that SPD patients demonstrated working memory impairment compared to control group (Sonia et al., 2000). An extensive body of research had identified similarities in key cognitive impairments in both disorders, although the impairments in schizophrenia tended to be quantitatively more severe. On the other hand, both disorders also shared disturbances in attention, information processing (Rosvold et al., 1956; Neuchterlein, 1983; Cornblatt and Erlenmeyer-Kimling, 1985) that might contribute to the cognitive dysfunction. The neurocognitive research showed that frontal deficits were responsible for impairments in working memory and executive functioning in schizophrenia (Buchsbaum et al., 1997a). For SPD, increased frontal gray matter and a more extensive frontal activity attributed to the deficit in cognitive functioning (Koenigsberg et al., 2001 a).

The interrelationship among cognitive, social functioning and social skills

The relationship between social skill and cognitive functioning were examined by many

studies. The results revealed that poor cognitive functioning contributed to social skill impairment. One study reported that social skills performance was strongly correlated with memory on the Wechsler Memory Scale for patients with schizophrenia (Mueser, Bellack, Douglas & Wade, 1991). Another study also replicated the same result and discovered that social skill was related to both memory on the Wechsler memory Scale-Revised and intelligence in patients with schizophrenia. Even though using different measures to assess the cognitive functioning, the study still indicated that social skill was related to a wide range of cognitive measures including Wisconsin Card Sorting Task which was to assess the executive functioning, a combined version of the Continuous Performance Task and the Span of Apprehension Task which were used to measure information-processing and attention with a computer-driven battery, Cognitive Laboratory (Spaulding, Garbin, & Dras, 1989). On the other hand, the relationship between cognitive functioning and social functioning was also examined in many studies. In that field, social functioning was divided into three areas which were community outcome, social problem solving and skill acquisition (Green, 1996). Green (1996) reported that verbal memory which was one element of cognitive functioning could predict the community functioning, problem solving skills and skill acquisition. Addington & Addington (1999) also investigated the relationship between social functioning and cognitive functioning in the outpatients with schizophrenia. Results revealed that social problem solving was associated with verbal ability, verbal memory and conceptual flexibility. In 2 year

longitudinal study, it also illustrated that negative symptoms and cognitive functioning having the independent contribution to the impairments in social functioning of patients with schizophrenia (Dickerson et al., 1999).

Gender difference

Gender had also been shown to affect the clinical presentation of schizophrenia (Goldstein et al., 1998). Some studies suggested that schizophrenic men tended to manifest greater neuro-cognitive impairment than schizophrenic women in several domains of function (Goldstein et al., 1994,1995; Hoffet al., 1995). That putative sex differences in cognitive function variously explained as a function of the normal sexual dimorphism of the brain or the modulating effects of estrogen on dopamine systems (Lindamer et al., 1997; Goldstein et al., 2002). The primary difference in cognitive performance between male and female SPD patients appeared to be in verbal learning, where females' performance was relatively normal and males' performance was more comparable to schizophrenic subject (Goldberg et al., 1990). However, other studies indicated even greater abnormalities among women (Perlick et al., 1992; Lewine et al; 1996).

Gender was one of the most salient predictors of social adjustment and functioning in schizophrenia. Several studies found that females with schizophrenia were more likely to get married, had children and maintained social relationships both before and after the onset of schizophrenia (Salokangas & Stengard 1990; Goldstein, Tsuang & Faraone, 1989; Eaton, 1975;

Farina, Garmezy and Barry, 1963). The reasons for social functioning difference between male and female were the social roles and expectations as well as family tolerance of illness. Men being more drastically affected than women due to the unique role functions that were required of male. For example, Salokangas (1983) suggested that many women with schizophrenia continued to function adequately as homemakers, those women would be less able to function effectively outside the home in competitive paid employment. Moreover, families might be less tolerant of mental illness in males than females (Farina, 1981; Seeman, 1983a). Seeman (1983a) illustrated that families were more willing to accept the educational and occupational limitations of their daughters with schizophrenia, but expect their sons to achieve, regardless of the limitations that arose from his illness. Therefore, men with schizophrenia might be judged more harshly and be expected to achieve more than women with schizophrenia. As a result, men were more suffered by the schizophrenia in their social roles.

A lot of studies examined gender differences in social skill in patients with schizophrenia. Bellack et., (1990) evaluated social skills in a sample of patients with schizophrenia following treatment of an acute exacerbation and one year later and patients with affective disorder and non-patients controls. They were assessed at baseline. The study found there was the social skill difference between the diagnostic groups at baseline which revealed a significant gender-by-diagnosis interaction, as well as a significant main effect for diagnosis. The interaction was due to the poor social skills of males with schizophrenia compared to

non-patient controls, in contrast to females with schizophrenia who didn't differ from the non-patient controls. Penny, Mueser and North (1995) reported that female psychiatric patients had better social skills than males. In short, female with schizophrenia were more tolerated by family members and society as well as demonstrated better social skills than male.

Similarity between SPD and schizophrenia

In SPD and schizophrenia, many domains were similar such as the symptoms, genetics, psychophysiology and brain structures.

Symptomatology

Both SPD patients and schizophrenic patients displayed psychopathology that was characterized by positive or psychotic-like symptoms and negative or deficit-like symptoms.

Psychotic-like symptoms included ideas of reference, cognitive or perceptual distortions and magical thinking. Deficit-like symptoms involved social deficit or interpersonal problems and cognitive disorganization (Raine et al., 1994; Bergman et al., 1996).

Genetics

In general, family and twin studies suggested that the negative symptoms of SPD or other schizophrenia-related disorders might be most characteristic of schizotypal individuals with a genetic relationship to someone with schizophrenia (Tsuang et al., 2002; Torgersen et al., 2002). Both family and adoptive studies suggested a greater prevalence of SPD in the relatives of patients with schizophrenia than in comparison groups (Kendler 1985; Kendler et al., 1993;

Kety 1983; Kety et al., 1994). Family, twins, and adoptive studies had also demonstrated a genetic relationship between schizotypal personality disorder and schizophrenia, with an increased chance of schizotypal personality disorder in relatives of schizotypal probands (Baron et al., 1983; Gunderson et al., 1983; Kendler et al., 1981; Siever et al., 1990b) and an increase in schizophrenia-related disorders (Siever et al., 1990b) and schizophrenia itself in the families of patients with schizotypal personality disorder (Schulz et al., 1986; Battaglia et al., 1995). The likelihood of having a schizophrenic relative was comparable for probands diagnosed with either schizotypal personality disorder or schizophrenia (6.9% vs. 6.5%) (Kendler et al., 1993). Those observations suggested that schizotypal personality disorder and schizophrenia might share one or more genotypes. There was emerging evidence that the positive and negative symptoms might have independent heritability in schizophrenic patients (Siever & Davis, 2004). Twin studies revealed that there were at least two heritable factors in schizotypy: one related to the positive symptoms and the other related to the negative symptoms and cognitive impairment of schizophrenia (Siever & Davis, 2004).

Psychophysiology

Patients with SPD shared a number of psychophysiological abnormalities that could also be found in chronic schizophrenia. Patients with schizophrenia not only demonstrated impairment in smooth-pursuit tracking but also performed less accurately in anti-saccade and motion detection tasks (Holzman, 2000; Holzman, et al., 1995). Smooth-pursuit eye

movements were mediated by the frontal and temporal cortex as well as the brainstem, while motion detection was mediated by the inferior temporal cortex (Chen, et al., 1999). Those abnormalities were particularly correlated with the social deficits and interpersonal isolation of schizophrenic and SPD patients (Siever, et al., 1982). Schizophrenia and SPD patients also displayed the poor performance on a backward masking task that assessing the visual processing (Braff, et al., 2002; Cadenhead, et al., 1996).

Brain structures

In the brain structures, schizotypal personality disorder and schizophrenia also shared the common features. The laboratory (Siever et al., 2002) and others had shown lateral ventricular brain ratio (VBR) was increased in schizotypal personality disorder patients as in schizophrenic patients (Cazzulo et al., 1991; Siever et al., 1995; Buchsbaum et al., 1997b; Silverman et al., 1998). MRI studies identified specific structural abnormalities in schizotypal personality disorder patients similar to those seen in schizophrenia (Dickey et al., 2000), but generally of lesser magnitude. Functional and structural brain-imaging studies revealed a number of abnormalities in patients with schizophrenia, primarily in the frontal lobe, temporal lobe and cerebrospinal fluid (CSF) space. Besides, researches also found that CSF volumes were generally increased and cortical volumes reduced in SPD (Dickey, 2000; Buchsbaum, 1997). Volume reductions in the temporal cortex, particularly the superior temporal gyrus had among the most consistent structural changes reported in chronic schizophrenia (Wright, et al.,

2000; Davidsm, et al., 2003; Shenton, et al., 2001; Downhill, et al., 2001; Gur, et al., 2000; Hirayasu, et al., 2000). The reduced size of the temporal cortex also reported in SPD both in the superior temporal gyrus (Dickey et al., 1999) and Heschl's gyrus (Dickey et al., 2002), as well as in the inferior and middle temporal gyri (Downhill et al., 2001).

To conclude, SPD patients and schizophrenia patients shared same genes and their next generation had the high prevalence to develop the SPD and schizophrenia. Both showed abnormality in the brain areas such as the frontal lobe, temporal lobe, CSF etc. They also had the abnormal level of psychophysiology such as smooth-pursuit eye movements and backward masking.

Purposes of the present study

The present study is to explore the deficit of cognitive, social functioning and social skill with the SPD of general population. For the social functioning: Social Adaptation Self-evaluation Scale (SASS) assesses social function. Because there is no single or best method of measuring social skill (Curran, 1982), so in the present study Social Skill Inventory (SSI) is used to evaluate the basic social communication skills in the general population. Besides, in the present study, the deficit in social cognition was also explored. Social cognition is based on the information processing perspective in cognitive psychology (Ostrom, 1994). It is the ability to construct mental representations about others, oneself, and relations between others and oneself, facilitates skillful social interactions (Adolphs, 2001; Brothers, 1990). It

includes a wide range of abilities, such as recall, recognition, classification, reasoning, vision, text comprehension and audition (Ostrom, 1994).

Impairing in social functioning makes patients difficult to gain acceptance in familial and occupational settings (Bellack, Sayers, Mueser & Bennett, 1994; Bowen et al., 1994; Brugha, Wing, Brewin, MacCarthy & Lesage, 1993; Dworkin, 1992; Honeycutt & Belcher, 1991). The result often leads to social rejection. In addition, patients frequently manifest an aversion to social interaction that results in withdrawal from interpersonal contexts. Therefore, the relationship between social functioning and rejection sensitivity is investigated. In the present study, RSQ and SRS are used to assess the participants' rejection sensitivity, so the correlation between them is also examined. On the other hand, the present study also wants to explore how social functioning and rejection sensitivity can predict the score in the SPQ so as to build up the indirect relationship between SPQ score and rejection sensitivity. Furthermore, in the present study gender effect on cognitive and social functioning will also be investigated. To our knowledge, the present study was the first study using Hong Kong Cantonese version questionnaires to assess the impairment in cognitive, social functioning and social skills in general population.

Method

Participants

The total number of participants in this study was 213 (81 male and 132 female) ranging

in age from 18 to 49. The mean age was 20.46 (S.D = 2.51). All of them were from the City University of Hong Kong Year 1-3 who took part in that study for course credits. There was no history of mental disorder reported among all participants. In those participants, they were divided into two groups by using SPQ scores, the five-point total scores converted into 2-point scales: participants with scores that were 1 standard deviation higher than the mean score was categorized as “high SPQ group”, and participants with scores that were 1 standard deviation lower than the mean score was categorized as “low SPQ group”. High SPQ group consisted of 37 participants (15 male and 22 female) with a mean age of 20.1 years (S.D. = 2.5). Low SPQ group consisted of 36 participants (15 male and 21 female) with a mean age of 20.2 years (S.D. = 2.4). Written consent forms were given to all participants in this study. All of them are right-handed.

Questionnaires

Schizotypal Personality Questionnaire (SPQ; Raine,1991)

SPQ is a screening instrument used to identify schizotypal personality in adults and adolescents in both general and pathological population (Raine, 1991). There are total 74 items by using a 5-point agreement-disagreement scale. It is made up of nine schizotypal features as indicated by DSM-III-R criteria for SPD: idea of reference, excessive social anxiety, odd beliefs or magical thinking, unusual perceptual experiences, odd or eccentric behavior, no close friends, odd speech, constricted affect and suspiciousness. These nine schizotypal features can

also be grouped into three factors, they are cognitive-perceptual dysfunction, interpersonal deficit and disorganization. (Raine, 2006). Higher scores indicate higher schizotypal pathology.

Digit Symbol Substitution Test (DSST; Wechsler, 1955)

DSST is served as the tool to measure the subjects' general cognitive functioning. It is a standard subtest of the Wechsler Adult Intelligence Scale (WAIS) to assess the psychomotor performance, attention, remember ability and operate in complex symbols (Rosano, Kuller, Newman and Hirsch, 2006). It is a paper-and-pencil task that requires persons to copy the symbols corresponding to the numbers under each number as many as possible within 90 seconds. A higher score in the DSST implicates the more accuracy and speedy in the visuospatial processing skills.

Brief Visuo-spatial Memory Test (BVMT; Benedict, 1988)

BVMT is a psychological test that assesses visuospatial memory. In this test, there are three immediate recall trials, a delay task and a recognition task in which 12 figures will be shown one by one to the subjects and they need to distinguish which figure they see before or not by indicating the correct answers.

Self-description game

First, participants are asked to select 15 adjectives that best describing themselves from the list that contains 60 adjectives. After this they are requested to think a person who is their best friend and then select 15 adjectives as the targets. After is a 30 minutes delay. Next,

participants are requested to use their right hands to do the following experiment. If the adjectives appearing on the screen are the words that selected before to describe themselves, participants need to press the V button; if the adjectives are about their best friends, pressing B button and if the words are not describing themselves or their best friends, pressing Space button. Participants are instructed to try to press the button as accurately and as quickly as possible. Every press is followed immediately by another word. After that, participants need to use their left hands to do the above experiment one more time. The reaction time of pressing the buttons by different hand, hit number, false number and missing number are recorded for the purpose of analyzing. Reaction time is computed as the elapsed time between the presentation of an adjective and the participants' response.

The Social Adaptation Self-evaluation Scale (SASS; Bosc, Dubini and Polin, 1997)

SASS is a 21 items self-reported measurement to assess social functioning (Bosc et al., 1997). It explores the areas of work and leisure, family and extra-family relationships, intellectual interest, satisfaction in roles and patient self perception of his or her ability to manage and control his or her environment. The higher scores indicates the better social functioning (Bosc et al., 1997)

Social Skill Inventory (SSI; Riggo, 1989)

SSI is a 90 items self-reported measure designed to asses basic social communication skills of adults. It measures social skills in six domains and the total score reflects a global

level of social skill development indicative of overall social competence. It includes six domains, they are emotional expressivity (EE), emotional sensitivity (ES), emotional control (EC), social expressivity (SE), social sensitivity (SS), social control (SC). The higher score indicates the better performance in social skill.

Sensitivity to rejection scale (SRS; Mehrabian, 1994a)

SRS is a 24 items self-reported measurement to evaluate one's sensitivity to rejection in the social relationships. The scale can be used with participants aged 15 and older. It assesses the inter-correlated factors including avoidance of arguments and critical interaction, reluctance to express opinions because of fear of rejection, reluctance to make requests or to impose on others, easily hurt by negative feedback from others and fearing such feedback, reliance on familiar others and situations so as to avoid rejection. Higher scores indicate increased sensitivity to rejection.

Rejection Sensitivity Questionnaire (RSQ; Downey & Feldman, 1996)

RSQ is a 18 items self-reported measurement to investigate the rejection sensitivity of adult as generalized expectations and anxiety about expectation that when they seek acceptance and support from significant others they will probably be rejected, and they learn to place a particularly high value on avoiding such rejection. Each item depicts a hypothetical interpersonal situation involving a request directed by the respondent to a parent, professor, or romantic partner. Higher score of RSQ means higher degree of rejection sensitivity from

others.

Procedure

Upon arrival, participants were given the informed consent forms. Following that, they were instructed to fill the DSST questionnaire which was used to assess general cognitive functioning. In that test, participants had to do a practice by completing the first 10 items to ensure that they were known how to do. Then, they started to finish the test until the experimenter asked them to stop. As a matter of fact, they had 90 seconds to complete the task, but they didn't inform in advance. Next, the BVMT, was administered to participants to measure visuospatial memory. In the test, six figures arranged in a 2×3 matrix presenting to the participants for 10 seconds and then request them to recall the figures by drawing them in the corresponding location. After three immediate recall trials, there was a 25 minutes delay. During the delay task, participants went to play the self-description game which was used to assess the recognition memory by choosing the suitable adjectives for themselves and their best friends. Then there was also a 30 minutes delay in it. During the delay time, participants were requested to fill in five sets of questionnaire that insisting of SPQ (measures SPD), SASS (measures social functioning), SSI (assesses social skill), SRS and RSQ (assess rejection sensitivity). When the delay task was ended, participants went back to the BVMT to finish the rest tasks which were the delay recall and recognition tasks. After that, they went back to complete the unfinished questionnaires. When the self-description game's delay time was

passed, participants had to finish the remaining part of the game by using right hand and left hand respectively. Finally, they could go to fill the remaining questionnaires.

Hypotheses:

Hypothesis 1 - High SPQ group perform significantly worse in DSST than Low SPQ group

Hypothesis 2 - High SPQ group perform significantly worse in BVMT than Low SPQ group

Hypothesis 3 - High SPQ group perform significantly worse in self-description game than Low SPQ group

Hypothesis 4 - High SPQ group perform significantly worse in SASS than Low SPQ group

Hypothesis 5 - High SPQ group perform significantly worse in SSI than Low SPQ group

Hypothesis 6 - RSQ was positive correlated to SRS

Hypothesis 7 - RSQ was negative correlated with SASS

Hypothesis 8 - SRS was negative correlated with SASS

Hypothesis 9 - RSQ and SASS could significantly predict the score in SPQ

Hypothesis 10 - SRS and SASS could significantly predict the score in SPQ

Hypothesis 11- gender by SPQ classification had the interaction effect on DSST

Hypothesis 12 - gender by SPQ classification had the interaction effect on BVMT

Hypothesis 13 - gender by SPQ classification had the interaction effect on self-description game

Hypothesis 14 - gender by SPQ classification had the interaction effect on SASS

Hypothesis 15 - gender by SPQ classification had the interaction effect on SSI

Data analysis & statistics:

Statistical Package for Social Scientist (SPSS) 13.0 window version was used to analyze the data.

Hypothesis 1 - High SPQ group perform significantly worse in DSST than Low SPQ group

Independent-sample T Test was calculated to check whether there had the significant difference between High SPQ group and Low SPQ group in DSST.

Hypothesis 2 - High SPQ group perform significantly worse in BVMT than Low SPQ group

In BVMT, total score was used to measure the immediate visuospatial recall ability of participants and sensitivity calculating by hit and false rates was used to assess the delay visuospatial recall ability. Independent-sample T Test was calculated to see whether there had the significant difference between High SPQ group and Low SPQ group in immediate, delay visuospatial recall abilities.

Hypothesis 3 - High SPQ group perform significantly worse in self-description game than Low SPQ group

Independent-sample T Test was calculated to explore whether there had the significant difference between High SPQ group and Low SPQ group in self-description game. In self-description game, hit targets, false targets, right and left hand's reaction time on self-description, friend-description and other-description words was used to be the dependent variables in Independent-sample T Test.

Hypothesis 4 - high score group perform poor in SASS than low score groups

Independent-sample T Test was calculated to see whether there had the significant difference between High SPQ group and Low SPQ group in SASS.

Hypothesis 5 - high score group perform poor in social skills than low score group

Independent-sample T Test was calculated to check whether there had the significant different difference between High SPQ group and Low SPQ group in SSI and its six subscales.

Hypothesis 6 - RSQ was positive correlated to SRS

Pearson correlation was conducted to examine the relationship between RSQ and SRS since both of them were used to test the rejection sensitivity.

Hypothesis 7 - RSQ was negative correlated with SASS

Pearson correlation was conducted to examine the relationship between SASS, RSQ.

Hypothesis 8 - SRS was negative correlated with SASS

Pearson correlation was conducted to examine the relationship between SASS, SRS, and total SPQ scores.

Hypothesis 9 - RSQ and SASS could significantly predict the score in SPQ

Linear regression was computed to determine the relative strength of the SASS and RSQ to predict SPQ scores.

Hypothesis 10 - SRS and SASS could significantly predict the score in SPQ

Linear regression was computed to determine the relative strength of the SASS and SRS to predict total SPQ scores.

Hypothesis 11- gender by SPQ classification had the interaction effect on DSST

For hypotheses 6, Two-way analysis of variance was calculated to see the gender by SPQ classification had the interaction effect on DSST performance. In the two-way analysis of variance, gender and SPQ classification were the independent variables and DSST was the dependent variables.

Hypothesis 12 - gender by SPQ classification had the interaction effect on BVMT

Two-way analysis of variance was calculated to see the gender by SPQ classification had the interaction effect on BVMT performance. In the two-way analysis of variance, gender and SPQ classification were the independent variables and total scores, sensitivity of BVMT were the dependent variables.

Hypothesis 13 - gender by SPQ classification had the interaction effect on self-description game

Two-way analysis of variance was calculated to see the gender by SPQ classification had the interaction effect on self-description game. In it, gender and SPQ classification were the independent variables. Correct number of targets, incorrect number of targets, right and left hand's reaction time on self-description, friend-description and other-description words were as the dependent variables.

Hypothesis 14 - gender by SPQ classification had the interaction effect on SASS

Two-way analysis of variance was calculated to see the gender by SPQ classification had the interaction effect on SASS. In the two-way analysis of variance, gender and SPQ classification were the independent variables and SASS score was the dependent variables.

Hypothesis 15 - gender by SPQ classification had the interaction effect on SSI

Two-way analysis of variance was calculated to see the gender by SPQ classification had the interaction effect on SSI. In the two-way analysis of variance, gender and SPQ classification were the independent variables and SASS score was the dependent variables.

Result:

Hypothesis 1 - High SPQ group perform significantly worse in DSST than Low SPQ group

Based on the independent t-test, high SPQ group is not perform significantly worse than low SPQ group in DSST, $t(71)=-1.023$; $p>0.05$ (see Table 1).

Hypothesis 2 - High SPQ group perform significantly worse in BVMT than Low SPQ group

Based on the independent t-test, high SPQ group is not perform significantly worse than low SPQ group in total scores, $t(71)=.350$; $p>0.05$. T-test also shows that high SPQ group is not perform significantly worse than low SPQ group in sensitivity, $t(48.0)=-1.008$; $p>0.05$ (see Table 1).

Hypothesis 3 - High SPQ group perform significantly worse in self-description game than Low

SPQ group

Based on the independent t-test, high SPQ group is not perform significantly worse than low SPQ group by using right hand on reaction time of self-description words, $t(41)=.048$; $p>0.05$; on friend-description words, $t(41)=1.813$; $p>0.05$; on other-description words $t(41)=-.646$; $p>0.05$; on correct number of targets and incorrect number of targets of self-description words $t(41)=-.818$; $p>0.05$; $t(41)=-.578$; $p>0.05$ respectively; on correct number of targets and incorrect number of targets of other-description words $t(41)=.184$; $p>0.05$; $t(41)=-.539$; $p>0.05$ respectively. T-test also reveals that, high score group of high SPQ group was not perform significantly worse than low SPQ group by using left hand on reaction time of self-description words, $t(40.0)=-1.814$; $p>0.05$; on friend-description words, $t(41)=.603$; $p>0.05$; on correct number of targets and incorrect number of targets of self-description words $t(41)=1.006$; $p>0.05$; $t(41)=-1.089$; $p>0.05$ respectively; on correct number of targets and incorrect number of targets of other-description words $t(41)=.631$; $p>0.05$; $t(41)=-1.913$; $p>0.05$ respectively. However, t-test shows that high SPQ group performed significantly worse than low SPQ group by using right hand on correct number of targets and incorrect number of targets of friend-description words $t(41)=2.689$; $p<0.01$; $t(24.9)=-2.918$; $p<0.01$ respectively. By using left hand, high SPQ group performs significantly worse than low SPQ group on reaction time of other-description words $t(38.9)=-2.391$; $p<0.05$; on correct number of targets and incorrect number of targets of friend-description words t

(41)= 3.501; $p < 0.01$; $t(41) = -4.352$; $p < 0.01$ respectively (see Table 1.1).

Hypothesis 4 - High SPQ group perform significantly worse in SASS than Low SPQ group

Based on the independent t-test, high SPQ group performs significantly worse in SASS than low SPQ group, $t(71) = 3.859$; $p < 0.01$ (see Table 2).

Hypothesis 5 - High SPQ group performed significantly worse in SSI than Low SPQ group

Based on the independent t-test, high SPQ group perform significantly worse in SSI than low SPQ group, $t(71) = 2.942$; $p < 0.01$ (see Table 2). In six subscales, four out of six showed that high SPQ group performs worse than low SPQ group, they are emotional expressivity, $t(71) = 2.724$; $p < 0.01$; social expressivity, $t(71) = 3.561$; $p < 0.01$; social sensitivity, $t(71) = -5.645$; $p < 0.01$; social control, $t(71) = 7.025$; $p < 0.01$ (see Table 2).

Hypothesis 6 - RSQ was positive correlated to SRS

Based on bivariate correlation, it was found the RSQ was positive significantly correlated with SRS ($r = .301$, $p < 0.01$) (see Table 3).

Hypothesis 7 - RSQ was negative correlated with SASS

Based on bivariate correlation, it was found the RSQ was negative significantly related to SASS ($r = -.328$, $p < 0.01$) (see Table 4).

Hypothesis 8 - SRS was negative correlated with SASS

Based on bivariate correlation, it was found the SRS was negative significantly related to SASS ($r = -.153$, $p < 0.05$) (see Table 4).

Hypothesis 9 - RSQ and SASS could significantly predict the score in SPQ

Results from regression analysis support hypothesis 9. SASS and RSQ were significantly predict the score in SPQ in opposite direction with ($\beta = -.224$, $p < 0.01$) and ($\beta = .282$, $p < 0.01$) respectively. Altogether 17% of variability in the total SPQ scores was predicted by knowing SASS and RSQ scores [$R^2 = .171$, $F(212) = 21.668$, $p < 0.01$] (see Table 5).

Hypothesis 10 - SRS and SASS could significantly predict the score in SPQ

Result from regression analysis isn't support hypothesis 10. SRS and SASS were significantly predict the score in SPQ in opposite direction with ($\beta = .269$, $p < 0.01$) and ($\beta = -.275$, $p < 0.01$) respectively. Altogether 17% of variability in the total SPQ scores was predicted by knowing SASS and SRS scores [$R^2 = .171$, $F(212) = 21.660$, $p < 0.01$] (see Table 6).

Hypothesis 11- gender by SPQ classification had the interaction effect on DSST

Based on two-way ANOVA, it reveals that gender by SPQ classification don't have the interaction effect on DSST [$F(72) = .340$, $P > 0.05$] (see Table 7).

Hypothesis 12 - gender by SPQ classification had the interaction effect on BVMT

Based on two-way ANOVA, it reveals that gender by SPQ classification don't have the interaction effect on immediate visuospatial recall ability [$F(72) = .378$, $P > 0.05$]. It also showed that gender and total SPQ scores didn't have the interaction effect on delay visuospatial recall ability [$F(72) = .411$, $P > 0.05$] (see Table 7).

Hypothesis 13 - gender by SPQ classification had the interaction effect on self-description

game

Based on two-way ANOVA, it reveals that gender by SPQ classification don't have the interaction effect by using right hand on reaction time of self-description, words, [$F(42)=.321$, $P>0.05$] ; of friend-description words, [$F(42)=.2.323$, $P>0.05$] ; of other-description words [$F(42)=.339$, $P>0.05$]; correction number of targets on self-description, words, [$F(42)=1.325$, $P>0.05$] ; of friend-description words, [$F(42)=.597$, $P>0.05$] ; of other-description words [$F(42)=.205$, $P>0.05$]; incorrect number of targets on self-description, words, [$F(42)=3.364$, $P>0.05$] ; of friend-description words, [$F(42)=.248$, $P>0.05$] ; of other-description words [$F(42)=.818$, $P>0.05$]. By using left hand, the result was also the same. However, two-way ANOVA reveals that there was a statistically significant main effect of SPQ classification by using right hand on reaction time of friend-description words [$F(20)=4.787$, $P<0.05$] ; correct number of targets on friend-description words [$F(20)=5.758$, $P<0.05$] ; incorrect number of targets on friend-description words [$F(20)=8.457$, $P<0.01$] ; by using left hand on correct number of targets on friend-description words [$F(20)=10.376$, $P<0.01$] ; incorrect number of targets on friend-description words [$F(20)=16.358$, $P<0.01$] (see Table 7).

Hypothesis 14 - gender by SPQ classification had the interaction effect on SASS

Based on two-way ANOVA, it reveals that gender by SPQ classification didn't have the interaction effect on SASS [$F(72)=.412$, $P>0.05$], but there was a statistically significant main effect of SPQ classification on SASS [$F(35)=13.266$, $P<0.001$] (see Table 8).

Hypothesis 15 - gender by SPQ classification had the interaction effect on SSI

Based on two-way ANOVA, it reveals that gender by SPQ classification didn't have the interaction effect on SSI [$F(72)=1.310, P>0.05$], but there was a statistically significant main effect of SPQ classification on SSI [$F(35)=7.288, P<0.01$] (see Table 8).

Discussion

In the present study, most measures couldn't find the deficits in cognitive functioning when comparing high SPQ group with low SPQ group. The result wasn't consistent with the past studies since they found that people with SPD were significantly different than control group in most cognitive domain such as VSM, VIM, SPT etc (Margot et al., 1997). Thus, hypothesis 1 and 2 were rejected.

The reason for the present study didn't find the cognitive deficit in high SPQ group since they didn't appear to have the decreased frontal volumes which had been reported in schizophrenia and they appeared to be able to recruit additional frontal regions to accomplish cognitive tasks (Buschsbaum et al., 1997a). The presence of increased frontal gray matter and a more extensive frontal activity in SPD might thus explain the decreased magnitude of the cognitive deficit in SPD relative to schizophrenia. Chapman, et al., (1994) revealed that university students had higher cognitive functioning than general population might be the potential reason to explain why the present study couldn't find there was the deficit in cognitive functioning of high SPQ group.

In present study, self-description game was used to assess the recognition ability in social cognition. The result illustrated that high SPQ group had the poor ability to recognize other people rather than themselves when compared with low SPQ group. The finding was consisted with other finding in the social cognition in schizophrenia. One research showed that schizophrenia patients were more likely to recognize other people's inappropriate behavior than themselves when compared with the control group (Carini et al., 1992).

In social functioning, high SPQ group displayed the significant impairment in SASS than low SPQ group. Therefore, the hypothesis 4 was supported. In social skills, high SPQ group displayed the significant impairment in SSI scores than low SPQ group. Therefore, the present study provided the evidence to the researches that there was the social skill deficit in SPD patients.

The present study also investigated the relationship between SASS and rejection sensitivity. In that study, there had two measures to assess rejection sensitivity which were RSQ and SRS. Pearson correlation displayed that RSQ was positive significantly correlated with SRS. For RSQ, it was negative significantly correlated to SASS. Linear regressions indicated that RSQ and SASS could predict the score in SPQ. In SRS, it was negative significantly correlated to SASS. Linear regressions indicated SASS and SRS could predict the score in SPQ.

Gender difference

The present study couldn't find that gender by SPQ classification had the interaction effect on cognitive, social functioning and social skills. The present study wasn't consistent from the other studies. In the cognitive functioning, other study found that females had the better performance in verbal learning and memory (Kramer et al., 1988; Reite et al., 1993; Collaer and Hines, 1995) and men showed better visual spatial skills (Kimura, 1992; Reite et al., 1993). In the aspect of social functioning, other studies found that female perform better than men. In 5-10 years follow-up studies, three out of four studies reporting sex differences in social integration indicated better outcome for females (Kormendy & Schafer, 1983; Nyman, 1978; Salokangas, 1983; Nyman, 1978). One recent study reporting sex effects on measures of social functioning showed that males having greater downward social drift in terms of both occupational and social functioning than females. Downward social drift referred to a pattern of lower socioeconomic status achieved by individuals with schizophrenia as contrasted with levels of socioeconomic status achieved by their parents (Jones et al., 1993; Birtchnell, 1971).

The reason accounting for the present study was that gender differences in social functioning were not specific to schizophrenia, but rather, that women in all populations had superior social functioning as compared with men. Lewin and colleagues (1980) calculated childhood premorbid social competences scores of 141 psychiatric patients and 141 non-patient controls. The result exhibited that childhood social competence scores for people who

subsequently developed schizophrenia were poorer than the non-patients. Also, pre-schizophrenia males had worse premorbid social functioning as compared with pre-schizophrenia females. It was also found that males in the non-patient group had poorer childhood social competence scores than did the females in those groups, suggesting that gender differences in childhood social functioning might not be specific to schizophrenia.

For the social skills, the present study also couldn't find the gender differences in them. The finding was inconsistent with the previous studies. Some studies suggested that women with schizophrenia having better social skills than males. Four studies reported women had superior social skill (Bellack, Mueser et al., 1992; Mueser, Bellack, Morrison & Wade, 1990; Mueser, Blanchard & Bellack, 1995; Penny et al., 1995).

Limitation

The limitation of the present study was that in the DSST performance, participants didn't follow the instructions to fill the questionnaire even though the experimenter gave the clear instructions to them. That might influence the accuracy of the questionnaire on the cognitive performance.

Moreover, the present study only used two aspects of cognitive functioning and one measure for social cognition, they were not representative. More aspects of cognitive functioning, social cognition should be included in the study in order to provide a whole view in the cognitive functioning and social cognition.

Furthermore, the sample of present study was the healthy participants. Their cognitive and social functioning didn't greatly influence by the SPD. On the other hand, there were other variables that would influence the participants' performance in cognitive and social functioning as well as social skills as if the intelligence, personality of the participants etc.

Conclusion

The present study was to review the cognitive and social functioning as well as social skill in SPD patients by using different scales. Although the present study couldn't find high SPQ group having the cognitive deficit when comparing with low SPQ group, but it can find that there was the social skill and social functioning deficits in high SPQ group when comparing with low SPQ group. Therefore, social skills and social functioning were the better factors to predict the scores in SPQ of the general population. Besides, a new angle was provided to investigate the social functioning in SPD which was the rejection sensitivity. People with schizophrenia demonstrated deficits across a broad range of cognitive functions and their social skills deficits were thought to some extent to be caused by cognitive dysfunction. Several seminal papers pointed to the possibility that social cognitive deficits pertaining to emotion recognition or mental state attribution might be more important to explain social behavioral abnormalities than "non-social" cognitive impairments such as attention, memory, executive functioning or general intelligence (Penn et al., 1997; Pinkham et al., 2003; Green et al., 2005; Brüne, 2005), so in the further study, researchers could focus on

the social cognitive aspect of schizophrenia such as how rejection sensitivity affected the performance in cognitive functioning of SPD patients.

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Table 1

Comparison of cognitive measures between high SPQ group and low SPQ group

	High SPQ group (N=37)		Low SPQ group (N=36)		t
	Mean	SD	Mean	SD	
DSST	77.2	13.6	74.4	10.0	-1.023 N.S.
BVMT-total	30.7	2.9	31.0	3.0	0.350 N.S.
BVMT-sensitivity	0.5	0.7	0.3	1.5	-0.998 N.S.

Note: Note: N = number of participants; SD = Standard Deviation; BVMT-total = Brief visuospatial memory test

to test immediate visuospatial recall ability; BVMT-sensitivity = Brief visuospatial memory test to test delay

visuospatial recall ability; DSST = Digit symbol substitution test.

N.S. = Not Significant

Table 1.1

Comparison of social cognitive measures between high SPQ group and low SPQ group

	High SPQ group (N=25)		Low SPQ group (N=18)		t
	Mean	SD	Mean	SD	
S.D.G-r.t. on self (right)	1.2	0.5	1.2	0.6	0.048 N.S.
S.D.G-hit no. on self (right)	11.2	3.4	10.3	3.9	-0.818 N.S.
S.D.G- false no. on self (right)	3.0	3.1	3.6	4.3	0.578 N.S.
S.D.G-r.t on friend (right)	1.4	0.2	1.5	0.3	1.813 N.S.
S.D.G-hit no. on friend (right)	3.2	2.3	5.3	2.9	2.689**
S.D.G- false no. on friend (right)	10.7	2.0	8.1	3.4	-2.918 **
S.D.G- r.t. on other (right)	1.4	0.8	1.2	0.6	-0.646 N.S.
S.D.G-hit no. on other (right)	5.6	4.3	5.8	3.7	0.184 N.S.
S.D.G-false no. on other (right)	23.5	6.5	22.4	5.7	-0.539 N.S.
S.D.G-r.t. on self (left)	1.4	0.6	1.2	0.4	-1.814 N.S.
S.D.G-hit no. on self (left)	11.0	4.0	12.0	2.3	1.006 N.S.
S.D.G- false no. on self (left)	3.5	3.8	2.4	2.3	-1.089 N.S.
S.D.G-r.t. on friend (left)	1.3	0.2	1.3	0.3	0.603 N.S.
S.D.G-hit no. on friend (left)	2.3	1.9	5.0	3.1	3.501 **
S.D.G- false no. on friend (left)	12.4	2.1	9.0	3.0	-4.352 **

S.D.G-r.t. on other (left)	1.5	0.7	1.2	0.4	-2.391 *
S.D.G-hit no. on other (left)	5.2	4.5	6.1	5.3	0.631 N.S.
S.D.G-false no. on other (left)	24.6	5.8	20.9	6.7	-1.913 N.S.

Note: N = number of participants; SD = Standard Deviation; S.D.G- r.t. on self (right) = Self-description game of reaction time by using right hand on self-description words; S.D.G-hit no. on self (right) = Self-description game's correct number of targets by using right hand; S.D.G- false no. on self (right) = Self-description game's incorrect number of targets by using right hand; S.D.G- r.t. on friend (right) = Self-description game of reaction time by using right hand on friend-description words; S.D.G-hit no. on friend (right) = Self-description game's correct number of targets by using right hand; S.D.G- false no. on friend (right) = Self-description game's incorrect number of targets by using right hand; S.D.G- r.t. on other (right) = Self-description game of reaction time by using right hand on other-description words; S.D.G-hit no. on other (right) = Self-description game's correct number of targets by using right hand; S.D.G- false no. on other (right) = Self-description game's incorrect number of targets by using right hand; S.D.G- r.t. on self (left) = Self-description game of reaction time by using left hand on self-description words; S.D.G-hit no. on self (left) = Self-description game's correct number of targets by using left hand; S.D.G- false no. on self (left) = Self-description game's incorrect number of targets by using left hand; S.D.G- r.t. on friend (left) = Self-description game of reaction time by using left hand on friend-description words; S.D.G-hit no. on friend (left) = Self-description game's correct number of targets by using left hand; S.D.G- false no. on friend (left) = Self-description game's incorrect number of targets by using left hand; S.D.G- r.t. on other (left) = Self-description game of reaction time by using left hand on other-description words; S.D.G-hit no. on other (left) = Self-description game's correct number of targets by using left hand; S.D.G- false no. on other (left) = Self-description game's incorrect number of targets by using left hand. N.S. = Not Significant; ** $p < 0.001$; * $p < 0.05$

Table 2

Comparison of social functioning/social skills between high SPQ group and low SPQ group

	High SPQ group (N=37)		Low SPQ group (N=36)		t
	Mean	SD	Mean	SD	
SASS	37.5	5.6	42.1	4.6	3.859 **
Total SSI	263.2	24.4	281.8	29.5	2.942 **
EE – SSI	41.8	7.3	46.2	6.3	2.724 **
ES – SSI	45.6	7.4	46.6	9.2	0.523 N.S.
EC- SSI	45.8	6.9	47.2	5.3	0.960 N.S.
SE –SSI	36.9	9.0	44.7	9.8	3.561 **
SS – SSI	52.1	5.3	44.2	6.6	-5.645 **
SC – SSI	41.0	7.4	53.0	7.1	7.025 **

Note: SASS= N = number of participants; SD = Standard Deviation;The Social Adaptation Self-evaluation Scale;

Total SSI = Total scores of Social Skill Inventory; EE-SSI = emotional expressivity of social skill inventory;

ES-SSI = emotional sensitivity of social skill inventory; EC-SSI = emotional control of social skill inventory;

SE-SSI = social expressivity of social skill inventory; SS-SSI = social sensitivity of social skill inventory; SC-SSI

= social control of social skill inventory.

N.S. = Not Significant; **p<0.001

Table 3

Pearson correlation between SRS and RSQ (n=212)

Variable	SRS
RSQ	-.301**

Note: N = number of participants; RSQ= Rejection Sensitivity Questionnaire; SRS= Sensitivity to rejection scale

**p<.01 * p<.05

Table 4

Pearson correlation among SASS, RSQ & SRS (n=212)

Variables	SASS
RSQ	-.328**
SRS	-.153*

Note: N= number of participants; SASS= The Social Adaptation Self-evaluation Scale; RSQ= Rejection Sensitivity Questionnaire; SRS= Sensitivity to rejection scale

**p<.01 * p<.05

Table 5

Regression coefficient (beta) of the SASS and RSQ to predict score in SPQ (n=212)

	Score in SPQ		
	β	t	p
SASS	-.224	-3.371	.000**
RSQ	.282	4.237	.000**

Note: N= number of participants; SASS= The Social Adaptation Self-evaluation Scale; RSQ= Rejection Sensitivity Questionnaire.

**p<.01

Table 6

Regression coefficient (beta) of the SASS and SRS to predict score in SPQ (n=212)

	Score in SPQ		
	β	t	p
SASS	-.275	-4.332	.000**
SRS	.269	4.235	.000**

Note: N= number of participants; SASS= The Social Adaptation Self-evaluation Scale; SRS= Sensitivity to rejection scale

**p<.01

Table 7

Mean (standard deviation) baseline of cognitive functioning and social cognition of high SPQ group and low SPQ group in gender

		High SPQ group		Low SPQ group		gender by SPQ classification
		N	Mean (s.d.)	N	Mean (s.d.)	F
Cognitive functioning						
DSST	Male	15	77.1 (15.6)	15	72.3 (8.3)	0.340 N.S.
	Female	22	77.3 (12.4)	21	75.9 (10.9)	
	All	37	77.2 (13.6)	36	74.4 (9.9)	
BVMT-total	Male	15	30.7 (2.6)	15	30.5 (2.6)	0.378 N.S.
	Female	22	30.7 (3.1)	21	31.1 (3.3)	
	All	37	30.7 (2.9)	36	31.0 (3.0)	
BVMT-sensitivity	Male	15	0.6 (0.6)	15	0.1 (1.4)	0.411 N.S.
	Female	22	0.5 (0.7)	21	0.4 (1.5)	
	All	37	0.5 (0.7)	36	0.3 (1.5)	
Social cognition						
S.D.G- r.t. on self (right)	Male	9	1.2 (0.6)	7	1.3 (0.2)	0.321 N.S.
	Female	16	1.2 (0.4)	11	1.1 (0.7)	
	All	25	1.2 (0.5)	18	1.2 (0.6)	
S.D.G- hit no. on self (right)	Male	9	11.2 (2.9)	7	8.7 (3.7)	1.325 N.S.
	Female	16	11.3 (3.7)	11	11.4 (3.8)	
	All	25	11.2 (3.4)	18	10.3 (3.9)	
S.D.G- false no. on self (right)	Male	9	2.7 (2.6)	7	5.9 (5.1)	3.364 N.S.
	Female	16	3.1 (3.3)	11	2.2 (3.2)	
	All	25	3.0 (3.1)	18	3.6 (4.3)	
S.D.G- r.t. on friend (right)	Male	9	1.4 (0.2)	7	1.7 (0.3)	2.323 N.S.
	Female	16	1.3 (0.2)	11	1.4 (0.3)	
	All	25	1.4 (0.2)	18	1.5 (0.3)	

S.D.G- hit o.n on friend (right)	Male	9	3.2 (2.2)	7	4.6 (1.1)	0.597 N.S.
	Female	16	3.2 (2.4)	11	5.8 (3.6)	
	All	25	3.2 (2.3)	18	5.3 (2.9)	
S.D.G- false no. on friend (right)	Male	9	10.7 (1.7)	7	8.6 (1.6)	0.248 N.S.
	Female	16	10.7 (2.1)	11	7.7 (4.3)	
	All	25	10.7 (8.1)	18	2.0 (3.4)	
S.D.G- r.t. on other (right)	Male	9	1.3 (0.8)	7	1.3 (0.3)	0.339 N.S.
	Female	16	1.4 (0.8)	11	1.1 (0.7)	
	All	25	1.4 (0.8)	18	1.2 (0.6)	
S.D.G- hit no. on other (right)	Male	9	5.0 (5.6)	7	6.0 (2.9)	0.205 N.S.
	Female	16	5.9 (3.6)	11	5.7 (4.3)	
	All	25	5.6 (4.3)	18	5.8 (3.7)	
S.D.G- false no. on other (right)	Male	9	21.9 (6.5)	7	23.1 (6.8)	0.818 N.S.
	Female	16	24.4 (6.6)	11	22.0 (5.3)	
	All	25	23.5 (6.5)	18	22.4 (5.7)	
S.D.G- r.t. on self (left)	Male	9	1.4 (0.7)	7	1.3 (0.3)	0.690 N.S.
	Female	16	1.5 (0.6)	11	1.1 (0.4)	
	All	25	1.4 (0.6)	18	1.2 (0.4)	
S.D.G- hit no. on self (left)	Male	9	12.4 (3.0)	7	11.9 (2.3)	1.459 N.S.
	Female	16	10.1 (4.2)	11	12.1 (2.4)	
	All	25	11.0 (3.9)	18	12.0 (2.3)	
S.D.G- false no. on self (left)	Male	9	2.0 (2.9)	7	2.9 (2.6)	2.285 N.S.
	Female	16	4.3 (4.0)	11	2.1 (2.1)	
	All	25	3.5 (3.8)	18	2.4 (2.3)	
S.D.G- r.t. on friend (left)	Male	9	1.2 (0.2)	7	1.3 (0.2)	0.203 N.S.
	Female	16	1.3 (0.2)	11	1.3 (0.3)	
	All	25	1.3 (0.2)	18	1.3 (0.3)	
S.D.G- hit no. on friend (left)	Male	9	2.3 (1.6)	7	4.6 (2.5)	0.200 N.S.
	Female	16	2.3 (2.1)	11	5.3 (3.6)	
	All	25	2.3 (1.9)	18	5.0 (3.1)	

S.D.G- false no. on friend (left)	Male	9	12.6 (1.8)	7	9.9 (1.9)	0.467 N.S.
	Female	16	12.3 (2.3)	11	8.5 (3.5)	
	All	25	12.4 (2.1)	18	9.0 (3.0)	
S.D.G- r.t. on other (left)	Male	9	1.5 (0.6)	7	1.3 (0.3)	0.668 N.S.
	Female	16	1.6 (0.7)	11	1.1 (0.4)	
	All	25	1.6 (0.7)	18	1.2 (0.4)	
S.D.G- hit no. on other (left)	Male	9	4.9 (6.2)	7	8.1 (6.1)	1.451 N.S.
	Female	16	5.3 (3.5)	11	4.8 (4.6)	
	All	25	5.2 (4.5)	18	6.1 (5.2)	
S.D.G- false no. on other (left)	Male	9	24.0 (6.2)	7	20.7 (6.9)	0.019 N.S.
	Female	16	24.9 (5.8)	11	21.1 (6.9)	
	All	25	24.6 (5.8)	18	20.9 (6.7)	

Note: N = number of subjects; DSST=Digit Symbol Substitution Test; BVMT-total =Brief visuospatial memory test to test immediate visuospatial recall ability; BVMT-sensitivity = Brief visuospatial memory test to test delay visuospatial recall ability; S.D.G- r.t. on self (right) = Self-description game of reaction time by using right hand on self-description words; S.D.G-hit no. on self (right) = Self-description game's correct number of targets by using right hand; S.D.G- false no. on self (right) = Self-description game's incorrect number of targets by using right hand; S.D.G- r.t. on friend (right) = Self-description game of reaction time by using right hand on friend-description words; S.D.G-hit no. on friend (right) = Self-description game's correct number of targets by using right hand; S.D.G- false no. on friend (right) = Self-description game's incorrect number of targets by using right hand; S.D.G- r.t. on other (right) = Self-description game of reaction time by using right hand on other-description words; S.D.G-hit no. on other (right) = Self-description game's correct number of targets by using right hand; S.D.G- false no. on other (right) = Self-description game's incorrect number of targets by using right hand; S.D.G- r.t. on self (left) = Self-description game of reaction time by using left hand on self-description words; S.D.G-hit no. on self (left) = Self-description game's correct number of targets by using left hand; S.D.G- false no. on self (left) = Self-description game's incorrect number of targets by using left hand; S.D.G- r.t. on friend (left) = Self-description game of reaction time by using left hand on friend-description words; S.D.G-hit no. on friend (left) = Self-description game's correct number of targets by using left hand; S.D.G- false no. on friend (left) = Self-description game's incorrect number of targets by using left hand; S.D.G- r.t. on other (left) = Self-description game of reaction time by using left hand on other-description words; S.D.G-hit no. on other (left) = Self-description game's correct number of targets by using left hand; S.D.G- false no. on other (left) = Self-description game's incorrect number of targets by using left hand.

N.S. = Not significant

Table 8

Mean (standard deviation) baseline of social functioning and social skills of high SPQ group and low SPQ group in gender

	Gender	High SPQ group		Low SPQ group		gender by SPQ
		N	Mean (s.d.)	N	Mean (s.d.)	classification
						F
SASS	Male	15	38.4 (4.8)	15	42.1 (5.6)	0.412 N.S.
	Female	22	37.0 (6.1)	21	42.2 (4.2)	
	All	37	37.5 (5.6)	36	42.1 (4.6)	
Total SSI	Male	15	272.7 (26.7)	15	282.6 (37.4)	1.310 N.S.
	Female	22	256.7 (21.0)	21	281.3 (23.3)	
	All	37	263.2 (24.4)	36	281.1 (29.5)	

Note: N = number of subjects; SASS= The Social Adaptation Self-evaluation Scale; Total SSI = Total scores of Social Skill Inventory

N.S. = Not significant