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Clinical, cognitive, and social characteristics of a sample of neuroleptic-naive persons with schizotypal personality disorder

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Abstract

Introduction—Schizotypal personality disorder (SPD) shares with schizophrenia many biological features, yet little is known about the clinical characteristics of persons diagnosed with this disorder. This report describes the clinical, cognitive and socio-occupational characteristics of a community sample of subjects diagnosed with SPD.

Method—Sixty-four male and 40 female neuroleptic-naive DSM-IV SPD subjects and 59 male and 51 female comparison subjects were recruited from the community for a total sample of 214 subjects. Demographic and cognitive differences between groups and, within the SPD group, the effect of gender on clinical features, such as the SPD criteria, SAPS, SANS, Schizotypal Personality Questionnaire, and co-morbidity, were examined using ANOVA and Chi-square distributions.

Results—SPD subjects, in contrast to comparison subjects, had significantly lower socio-economic status, poorer social relationships and skills, and lower vocabulary scores. Furthermore, SPD subjects demonstrated more impairment on Vocabulary scores than on Block Design, as measured by the WAIS-R, a pattern not seen in comparison subjects. In the SPD cohort, positive symptoms predominated and nearly half were co-morbid for major depression. With respect to gender, male SPD subjects, compared with female SPD subjects, evinced significantly more negative symptoms, fewer friends, had more odd speech, and were more likely to also suffer from paranoid and narcissistic personality disorders. In contrast to male SPD subjects, female SPD subjects perceived themselves to be more disorganized.

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Conclusions—SPD subjects, similar to schizophrenics, are impaired socially, occupationally, and cognitively, particularly in the area of verbal measures. Moreover, male SPD subjects may be more severely affected than female SPD subjects across multiple domains of functioning.

Keywords

Schizophrenia; Schizotypal personality disorder; Gender; Clinical; Demographics; IQ

1. Introduction

SPD is genetically related to schizophrenia (Kendler et al., 1993) and shares many biological features as enumerated in a recent, comprehensive review by Siever and Davis (2004). For example, many studies have documented abnormalities in magnetic resonance imaging studies (Dickey et al., 2002), as well as on electrophysiological (e.g., Mitropoulou et al., 2002; Cadenhead et al., 2000), neurochemical (e.g., Siever et al., 1993), and cognitive (e.g., Voglmaier et al., 2000) measures. Additionally, the clinical symptoms observed in SPD (e.g., Kety et al., 1967) tend to be dimensional with less severe phenomenological manifestations compared with patients diagnosed with schizophrenia. However, unlike schizophrenia, where several papers have characterized the cognitive, social, and emotional impairments that make schizophrenia such a debilitating disease, there is a dearth of comprehensive information on the social, emotional, and cognitive status of SPD individuals, and how such impairments impact their lives.

More specifically, SPD subjects by definition have poor social relations and often misinterpret sensory information, but the degree of such impairment due to cognitive and emotional difficulties has not been well documented. One notable exception is a report by Skodol et al. (2002) who examined such functioning in 86 SCID diagnosed SPD subjects recruited from inpatient and outpatient mental health services, some of whom had been psychotic. Findings showed that SPD subjects had three times the probability of only having a high school education compared with subjects with major depression, and 53.9% had self-rated occupational impairment with 40.7% disabled. These investigators further reported the disability and impairment of subjects with SPD as being greater than many suffering with an Axis I disorder, major depression.

Despite such evidence for impairment, SPD is classified as a personality disorder, a constellation of maladaptive and ingrained personality traits which cause significant impairment in terms of cognition (defined as “ways of perceiving and interpreting self, other people, and events”), affectivity, interpersonal functioning, or impulse control (Kaplan et al., 1995). It should be noted that “cognition” is defined here as a person’s interpretation of self and the world around one, and thus reflects meta-cognitive skills (and their deficits) rather than a set of neuropsychologically defined cognitive skills such as the function of short and long term memory. Of further note, it has been traditionally understood that personality disorders are less severe and less biologically driven than Axis I disorders. However, recent work, some of which has been reviewed above, challenges this notion (also, Skodol et al., 2002).

In searching for the source of SPD impairments, several possible mediating factors have been examined. One factor is genetic loading, as manifested by having a schizophrenic first-degree relative, which likely plays a major role in the expressed phenomenology (Tsuang et al., 2002). Many argue that higher genetic loading is necessary for cognitive deficits in SPD subjects (Johnson et al., 2003), yet others find neurocognitive deficits in subjects without such genetic loading (Voglmaier et al., 1997). Gender has also been shown to affect the clinical presentation of schizophrenia (Goldstein et al., 1998), yet in the SPD literature, gender effects have been equivocal with some finding a difference (Voglmaier, submitted) and others not

(Skodol et al., 2002). Additionally, environmental effects, which are likely important in shaping the clinical presentation (Tsuang et al., 2002), have been largely ignored in the SPD literature.

The goal of the current study is to evaluate the symptoms, as well as cognitive, social and occupational status of a sample of 104 SPD subjects who were recruited from the community, all of whom are neuroleptic-naïve and generally have not engaged in mental health treatment. This is an exploratory and descriptive study, designed to characterize further these individuals as well as to guide future hypothesis-driven studies.

2. Methods

2.1. Subject recruitment

Community subjects were recruited using local advertisements requesting subjects who believe they have ESP, telepathy, sixth sense, anxiety or discomfort in situations with unfamiliar people or few close friends. Telephone respondents included 2335 potential SPD subjects, of whom 678 could not later be contacted to discuss the study. Both potential SPD and comparison subjects were first screened by telephone to review the inclusion/exclusion criteria: right-handed; age between 18 and 55 years old; estimated IQ >80, English as primary language; no history of learning or neurological disorder including no head trauma with loss of consciousness greater than two minutes; ECT; drug or alcohol dependence ever or abuse in the last year; and no current use of psychotropic medications (1260 potential SPD subjects did not meet the inclusion/exclusion criteria). All subjects were neuroleptic-naive. Potential SPD subjects were also asked questions from the SPD section of the SCID-II and if the subject answered affirmatively to at least three SPD questions, he/she was brought to the laboratory for an interview. Full SCID-I and II administration and interviews with the 397 potential SPD subjects who passed the phone screen were conducted. Some potential SPD subjects were excluded at the interview stage. Therefore, from the initial 2335 respondents, only 104 subjects (64 males and 40 females) met both the DSM-IV diagnostic criteria for SPD and all other study requirements. Comparison subjects were similarly recruited from the community and also received the SCID I and II. Comparison subjects had the additional inclusion criteria of no personal or first-degree relative history of an Axis I or II disorder. After fully understanding the nature of the study, subjects signed an informed consent form, approved by the local IRB.

2.2. SCID interview

A clinically licensed psychiatrist or psychologist administered the SCID-I and SCID-II interview (laboratory interrater reliability for diagnosis of SPD based on SCID interviews of 25 subjects and three raters was kappa =0.89, as previously reported (Dickey et al., 1999)). Answers to questions from the SCID interview were used to assess parental socio-economic status (PSES), subjects' own socio-economic status (SES) (Holingshead, 1975), and subjects' marital status.

2.3. Cognitive measures

IQ was estimated using the age-scaled Vocabulary and Block Design sub-tests from the Wechsler Adult Intelligence Scales (WAIS-R (Wechsler, 1987), used initially until the WAIS-III (Wechsler, 1997) was published). There was a statistically significant difference among the comparison subjects on their WAIS-R and WAIS-III Vocabulary scores, therefore, scores on these tests are listed separately. To ensure that scores were not affected by parental socio-economic status (PSES), PSES was used in some analyses as a regressor.

2.4. Clinical measures

SPD subjects were given the SAPS (Andreasen, 1984) and SANS (Andreasen, 1981) to assess positive and negative symptoms. SPD subjects were additionally given the Schizotypal Personality Questionnaire (SPQ) (Raine, 1991), a self administered questionnaire, consisting of questions designed to elicit the SPD criteria and scored into three factors, was compared with the interviewers' ratings from the SCID II SPD criteria using a Pearson correlation. Comparison subjects were not given the SPQ but instead were given the SCID II to rule out possible SPD. All subjects received a neurodevelopmental history questionnaire (Faraone et al., 1995); drug use questionnaire (Faraone et al., 1995); and a medical history questionnaire (Faraone et al., 1995).

2.5. Statistical methods

Group comparisons were performed using an ANOVA procedure, or for nominal data, a Chi-square distribution. To determine whether the WAIS-R Vocabulary was primarily affected in SPD subjects with relative sparing of scores on Block design, a paired *t* test was performed on SPD and comparison subjects separately. Data analyses were exploratory, two-tailed, and not Bonferroni corrected. Although the latter may lead to an increase in false positive findings, the descriptive nature of this report required such an approach.

3. Results

3.1. Demographics: comparison vs. SPD subjects

Table 1 includes the major demographics between groups and within diagnostic group gender comparison. There was no differences between groups on age, although in both groups males were older than females (ANOVA $F(1,212)=12.193$, $p=0.001$). As the difference between groups on PSES approached statistical significance ($p=0.052$) and PSES may affect their children's SES as well as IQ, PSES was used as the independent factor in a linear regression procedure to correct for subjects' own SES and IQ scores (Table 1).

3.2. Functions compromised in SPD compared with comparison subjects

3.2.1. IQ testing—Comparisons for WAIS-III and WAIS-R Vocabulary and Block Design age-scaled scores are presented separately (Table 1). Vocabulary was statistically significantly lower in SPD than in comparison subjects; Block Design differences were at the trend level. To determine whether SPD subjects' performance on Block Design was preserved relative to Vocabulary, within group paired *t* tests were calculated. Within the SPD group, WAIS-R Vocabulary scores were lower than Block design (both corrected for PSES) (Paired samples *t* test, $t=-3.040$, $df=58$, $p=0.004$), a relationship not found in comparison subjects (Paired samples *t* test, $t=-0.086$, $df=63$, $p=0.9$). Years of education was lower in SPD subjects, and there was a correlation for all subjects between years of education and WAIS-R vocabulary (Pearson $r=0.365$, $N=160$, $p<0.0005$). To ensure that the reduced scores were a function of diagnosis, and not PSES, a regression procedure was performed and the corrected WAIS-R scores remained statistically lower in SPD subjects. There was no gender difference for SPD subjects on these measures.

3.2.2. Occupational status—SPD subjects had lower SES than did comparison subjects, even after correcting for a marginally lower PSES. Although there was no difference between groups on the duration of current job, SPD subjects were more likely to have had a period of time in which they were unable to work or go to school. Indeed, a third of male and half of female SPD subjects had a period of time in their lives in which they were unable to attend school or to work. Although 59/61 males and 20/34 female SPD subjects listed an occupation,

more than half the subjects did not answer the question asking how long they were working in that occupation.

3.2.3. Social status, living situation, and general health—SPD subjects were more likely to be single and living alone or with their family of origin, whereas comparison subjects more frequently lived with a partner/spouse. SPD subjects did not differ from comparison subjects in health problems, but males compared with females had more medical issues (ANOVA $F(1,114)=15.360$, $p < 0.0005$).

3.3. Preserved functions in SPD

In each domain, cognitive, occupational, and social, SPD subjects evinced some relative strengths. First, although their Vocabulary scores were lower than that of the comparison subjects (see above and Table 1), they still had scores in the average to above average range. Second, if a SPD subject was currently employed, the duration of employment did not differ from comparison subjects, suggesting that if he/she found an appropriate job, it could be maintained. Third, although few SPD subjects had children, they did not differ from comparison subjects on this demographic. There is no data available, however, as to the nature of the relationship with the child.

3.4. SPD symptomatology in SPD subjects

The most common SPD criteria met was impairment due to experiencing unusual perceptions, followed by suspiciousness/paranoid ideation, and odd beliefs/magical thinking (Table 2). No subject met all nine SPD criteria and only three met 8/9 criteria. The least common criteria was odd thinking/speech. Male SPD subjects, however, were more impaired than female SPD subjects in terms of odd thinking/speech by DSM-IV criteria. (Table 2). Moreover, males also had fewer close relationships. Male SPD also scored higher on the SANS, nearly twice the score of females.

In contrast, female SPD subjects had higher SPQ disorganization scores. There were strong correlations observed between SPD subjects' self report on the SPQ and SCID interview for the Cognitive Perceptual ($r = 0.616$, $N = 41$, $p < 0.0005$) and the Interpersonal ($r = 0.406$, $N = 41$, $p = 0.008$) factors, but not for the Disorganized factor ($r = -0.003$, $N = 41$, $p = 0.99$). There was no gender difference for this pattern of correlations.

3.5. Additional psychopathology in SPD subjects

Co-morbidity with Axis I disorders was common. Nearly half of the SPD subjects met or had met criteria for major depression (Table 2), and roughly a quarter for generalized anxiety disorder and dysthymia. The usual female>male frequency of major depression was not seen in this cohort. Other Axis II diagnoses were also met by the subjects with about 15% meeting criteria for avoidant, obsessive–compulsive, paranoid, narcissistic, or borderline personality disorders with males more commonly than females experiencing impairment due to paranoid and narcissistic symptoms.

No subject met DSM-IV criteria for drug or alcohol abuse in past 5 years as this was an exclusionary criteria. Recreational use, defined as less than daily use or being a social drinker, did differ between the two groups with SPD subjects having used more (Table 1). Male SPD subjects used more recreational drugs and alcohol than female SPD subjects. No subject had a diagnosed learning disorder, yet SPD subjects, particularly male SPD subjects, described more learning difficulties.

3.6. Family history of mental illness in SPD subjects

In the last five years subjects were asked if a family member could be contacted in order to corroborate family history, but no SPD subject agreed. However, when subjects were asked directly whether there was a first-degree relative with major mental illness, 49 of the SPD subjects [29 (49%) males, 20 (54%) females] affirmed familial mental illness and eight subjects did not answer. Thirteen (7 males, 6 females) subjects stated that there were multiple disorders in the family; 12 (7 males, 5 females) major depression; 6 (1 male, 5 females) psychosis; 6 (all males) alcohol/drug abuse; 2 (both females) bipolar disorder; and 10 (8 males, 2 females) other disorders. Note that no subject definitively answered that he/she had a first-degree relative with schizophrenia.

4. Discussion

This report describes the demographic, cognitive, and clinical features of 104 SPD subjects in order to systematically examine the phenomenology and social/occupational aspects of this disorder. While the number of participants does not approach the size of large epidemiological studies, it is, to our knowledge, the largest cohort of neuroleptic-naive SPD subjects recruited directly from the community. As such, the findings provide important insights into the effect this disorder has on its sufferers both in terms of their professional status, as well as their social standing and personal situations. For both genders, SPD individuals tended to have lower socio-economic status, more difficulty with unemployment, to be single and living with their family of origin, or alone. The disorder was also associated with fewer years of education and, perhaps related, lower Vocabulary scores. Furthermore, true to their clinical characterization as belonging to schizophrenia spectrum disorders, SPD persons manifested more suspiciousness and paranoid ideation, qualities which in conjunction with other features made effective and satisfactory social functioning difficult. Thus, these findings corroborate, and expand upon, existing reports in the literature.

Poor occupational functioning in these subjects was evident. Despite their above average to above average IQ and college experience, the SPD subjects failed to reach the occupational standing predicted by that of their parents compared with controls (SES corrected), similar to what others have shown (Kunkel et al., 1998), and analogous to what has been described in the schizophrenia literature as “downward drift” (Loffler and Hafner, 1999). Moreover, they more frequently had a period of time during which they were unable to work or attend school, although if they had an appropriate job, they were able to maintain it. Poor occupational and social achievement are mediated by a complex constellation of factors, some of which are delineated below.

For example, cognitively, the SPD subjects scored lower than comparison subjects on Vocabulary age-scaled scores, regardless of whether WAIS-III or WAIS-R was used. This effect remained even after correcting for the effect of parental SES. The literature has been inconsistent concerning whether the SPD condition affects IQ scores, with some groups finding a trend level difference (Cadenhead et al., 1999). However, in Trestman et al. (1995), subjects were matched on education and there was no difference on WAIS-R Block Design or Vocabulary. Similar conclusions were reached for WAIS Vocabulary scores (Mitropoulou et al., 2002). However, education and vocabulary scores often correlated in the literature, as in this sample, complicating the interpretation. Another potential explanation for the difference between this study and the previous negative reports is that IQ scores here are higher for SPD subjects than any other studies’ control group. This current recruitment strategy reached higher IQ subjects in general, and at higher IQ, it may have been possible to demonstrate more deficits in SPD subjects (Diaz-Asper et al., 2004).

Another cognitive function that was somewhat compromised in this SPD sample was performance on Block Design, which reflects impaired spatial attention. Although this group difference did not quite reach statistical significance, there was a trend level difference with SPD subjects scoring lower. The difference between groups was not likely due to the history of major depression in the SPD subjects as Kohler et al. demonstrated that co-morbid depression in schizophrenic patients had no effect on WAIS-R Block Design scores (Kohler et al., 1998). In terms of gender differences in cognitive function, male compared with female SPD subjects had more cognitive deficits and more non-clinically significant learning problems, similar to what has been shown in schizophrenia (Goldstein et al., 1998). Finally, a paired comparison between Vocabulary and Block Design scores revealed that SPD subjects, but not control subjects, had a selective deficit in Vocabulary, similar to what has been shown in schizophrenia.

Another area of impairment in this SPD sample was social functioning. Half of the SPD subjects had no close friends and they were unlikely to live with partners/spouses. The significance of this finding goes beyond a sense of loneliness, as poor social relations increases mortality in normals (Avlund et al., 1998).

SPD symptomatology could also contribute to SPD social isolation. Within our SPD group, positive symptoms of SPD predominated. Illusions/unusual perceptual experiences, suspiciousness/paranoid ideation, and magical thinking/odd beliefs were the three most commonly reported symptoms (78% of subjects). This is consistent with a report of positive symptoms occurring more frequently in SPD subjects without a family history of schizophrenia (Torgersen et al., 2002) as was the case in the current sample. The presumed low genetic loading of schizophrenia in this sample may have led to disproportionately high rates of positive symptoms in these SPD subjects compared with the entire population of SPD subjects. This may be further underscored by the relatively low frequency of odd speech in our sample (46%) which is more common in SPD subjects with a schizophrenic relative (Torgersen et al., 2002; Kendler et al., 1995). Therefore, this large current sample of SPD subjects may represent a subpopulation of SPD subjects with more positive symptoms and less genetic vulnerability. This hypothesis, however, can not be tested due to the recruitment methods.

The functional anatomy subserving these clinical symptoms is unclear, although some suggestive evidence has emerged. In SPD, illusions and magical thinking impairment correlated with the right fusiform gyrus volumes (Dickey et al., 2003a); odd speech with left superior temporal gyrus volumes in females (Dickey et al., 2003b); and in non-psychiatric subjects a fMRI experiment designed to simulate low level paranoia/delusions, selectively activated the left inferior frontal gyrus (Brodmann area 44) (Blackwood et al., 2000), a region shown to have metabolic rates in SPD subjects intermediate between control and schizophrenic subjects (Buchsbaum et al., 2002). Although tentative, these findings, taken together, suggest that at least some of the dominate symptoms of SPD may be attributable to abnormalities in the frontotemporal cortices, again, not unlike what has been shown in schizophrenia (Niznikiewicz et al., 1999; Weinberger et al., 1992).

Gender comparisons in terms of SPD clinical symptoms suggest that male SPD subjects compared with female SPD subjects had a constellation of scores demonstrating more significant impairment, including higher SANS scores, more disability due to odd thinking/speech, more recreational drug and alcohol use and fewer friends. Males also more frequently suffered from paranoid and narcissistic personality disorders. The only measure on which female SPD subjects were more impaired was the SPQ disorganization sub-scale. This self-administered scale tapped subjects' unusual appearance and vague, rambling speech. It was the only measure of the SPQ that relied on the opinions of others ("other people see me as slightly eccentric (odd)") and was the only factor of the SPQ in which there was no correlation

with SCID interviewers' observations. Thus, it may in fact suggest that female SPD subjects may not have fully recognized or appreciated how others viewed them. Again, gender differences in clinical features have been shown to be important in schizophrenic patients (Goldstein, 1996).

In addition to presenting with the constellation of clinical symptoms characteristic of SPD, the prevalence of co-morbid Axis I and Axis II disorders in this SPD sample exceeded that expected in the general population, which is consistent with other reports (Cadenhead et al., 1999; Mikhailova et al., 1996; Mitropoulou et al., 2002, and also likely contributes to the impairment in the personal and occupational lives experienced by this group of SPD subjects. Indeed, the potential confounding effects of co-morbid Axis I and Axis II disorders for the SPD subjects may have elevated their social and occupational impairment relative to the controls. However, given the frequency of co-morbidity in the SPD population, potential SPD subjects were not ruled-out due to additional Axis I and II disorders. This led to a heterogeneous sample of SPD subjects. Note that comparison subjects, while recruited similarly to SPD subjects, were specifically selected for having no history of Axis I or Axis II disorder in themselves or in a first-degree relative. One possibility for future studies would be to recruit comparison subjects who had depression or anxiety. In that way, the effects of disturbed mood on social or occupational impairment would be balanced between the SPD and comparison subjects so that the additive effect on occupational and social impairment due to having a diagnosis of SPD could be parceled out.

Despite co-morbidity none of the SPD subjects have ever received a neuroleptic and none were on psychoactive medications during the study. Possible explanations for lack of health care include potential difficulties SPD subjects experience in obtaining appropriate healthcare given their social anxiety or, in spite of their difficulties, did not recognize themselves as ill enough to require treatment.

As enumerated above, the SPD subjects demonstrated several aspects of normal functioning, which may have been key to their ability to live independently without many social supports. They were bright and this may have allowed them to develop compensatory strategies for managing their symptoms. This may have also allowed them to maintain their jobs, once obtained. Additionally, they had children at rates similar to the comparison subjects, attesting to some degree of ability on the part of the SPD subjects to form social relationships at some point in their lives.

Limitations of this study included potential ascertainment bias in several ways. First, the advertisements for research may have solicited brighter subjects than in the entire population of SPD subjects. Additionally, advertisements focused on positive symptoms and social anxiety and, therefore, may have attracted SPD subjects with predominately those symptoms. For example, as the advertisement specifically solicited subjects with few close friends, the ad may have attracted more SPD subjects without friends than generally exist in the SPD population. However, only approximately half of the subjects met that criteria. Furthermore, as it is difficult to script an advertisement for some of the criteria, such as odd and peculiar behavior, inappropriate affect, or odd speech, it is possible that subjects impaired by those clinical features may have been under-represented in this population. Of note here, only approximately half the SPD subjects met those three criteria. Nonetheless, it is difficult to know the true incidence of each of these criteria in the SPD population given the social isolation of these subjects and the scant literature on this issue. Indeed, an attempt to quantify the relative frequency of the criteria was one of the goals of this study. Two additional potential limitations of this study include the cross-sectional nature and the lack of Bonferroni correction. Specifically, as this was a cross-sectional study, and not a longitudinal study, an argument could be made that some of the younger subjects will go on to develop schizophrenia. The

average age for both genders, however, was older than is typical for the development of schizophrenic symptoms (average age 22.0 years) (Goldstein et al., 1998), lessening the potential of this being a prodromal cohort. Finally, these data were not Bonferroni corrected and many of the findings would not have remained significant if a strict correction had been applied. Nonetheless, the findings parallel those in the schizophrenia literature.

Finally, Kety et al. (1967) described SPD as being along the same spectrum as schizophrenia and coined the term “schizophrenia spectrum” suggesting a similar genetic predisposition and clinical presentation. Siever and Davis (2004) have documented the biological similarities between schizophrenia and SPD, and here we have documented cognitive and functional deficits in SPD which are also seen in schizophrenia. This raises the issue as to whether SPD would be better termed schizophrenia II, not unlike the nomenclature of bipolar II, in which the symptoms follow those in bipolar disorder, but are less extreme. The importance of this exceeds a semantic argument. By viewing SPD as a disease, closely allied with schizophrenia, research into the pathogenesis and potential treatment approaches may be strengthened.

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Table 1

SPD and comparison subject demographics

	Sex	SPD		Controls		SPD vs. controls
		*N*Mean (sd)	*F* or X^2, *p*	*N*Mean (sd)	*F* or X^2, *p*	*F* or X^2, *p*
			Male SPD vs. female SPD		Male controls vs. female controls	SPD vs. controls
Basic demographics (ANOVA)						
Age	Male	6438.1 (11.2)	8.459, 0.004*	5935.5 (11.3)	3.709, 0.057	1.897, 0.17
	Female	4031.8 (9.8)		5131.4 (11.0)		
	All	10435.7 (11.1)		11033.6 (11.2)		
PSES	Male	643.6 (1.2)	5.464, <0.02*	593.9 (1.1)	6.025, <0.02*	3.812, 0.052
	Female	404.1 (1.0)		514.3 (.8)		
	All	1033.8 (1.1)		1104.1 (1.0)		
SES	Male	643.1 (1.3)	0.032, <0.9	583.8 (1.2)	0.434, 0.5	14.927, <0.0005
	Female	403.0 (1.3)		513.6 (1.5)		
	All	1033.0 (1.3)		1093.72 (1.3)		
SES corrected	Male	64−0.35 (1.3)	0.062, 0.8	580.39 (1.1)	0.519, <0.5	14.777, <0.0005
	Female	39−0.41 (1.3)		510.21 (1.5)		
	All	103−0.37 (1.3)		1090.3 (1.3)		
Yrs. education	Male	6414.8 (2.5)	3.735, <0.06	5916.4 (2.7)	0.301, <0.6	17.825, <0.0005*
	Female	4015.7 (2.0)		5116.6 (1.5)		
	All	10415.2 (2.4)		11016.5 (2.3)		
Occupational status						
Duration of current job yrs. (ANOVA)	Male	328.9 (8.9)	2.501, 0.1	326.8 (7.3)	0.002, <1.0	0.352, <0.6
	Female	175.2 (4.4)		286.7 (7.7)		
	All	497.6 (7.8)		606.7 (7.4)		
Period of time unable to work (X^2)	Male	62*N* =25 [40%]	1.400, <0.2	50*N* =13 [26%]	5.331, <0.02*	16.841 <0.0005*
	Female	32*N* =17 [53%]		48*N* =4 [8%]		
	All	94*N* =42 [45%]		98*N* =17 [17%]		
Social status and living situation						
Single	Male	6147 [77%]	0.023, 0.5	5231 [60%]	1.92, 0.1	0.085, <0.05*
	Female	3729 [78%]		5137 [73%]		
	All	9876 [78%]		10368 [66%]		
Married	Male	6114 [23%]		5221 [40%]		
	Female	378 [22%]		5114 [27%]		
	All	9822 [22%]		10335 [34%]		
Had a child	Male	6011 [18%]	0.0005, <0.6	4815 [31%]	0.957, 0.2	1.881, 0.1
	Female	377 [19%]		4911 [22%]		
	All	9718 [19%]		9726 [27%]		
Living alone	Male	5919 [32%]	3.533, 0.3	5217 [33%]	7.753, 0.051	17.847, <0.0005*
	Female	3812 [32%]		517 [14%]		
	All	9731 [32%]		10324 [23%]		
Living with friend	Male	5915 [25%]		5210 [19%]		
	Female	385 [13%]		5119 [37%]		
	All	9720 [21%]		10329 [28%]		
Living with significant other	Male	598 [14%]		5218 [35%]		
	Female	384 [11%]		5115 [29%]		
	All	9712 [12%]		10333 [32%]		
Living with family of origin	Male	5917 [29%]		527 [13%]		
	Female	3817 [45%]		5110 [20%]		
	All	9734 [35%]		10317 [17%]		
Cognitive measures						
WAIS III Vocabulary	Male	2213.0 (2.2)	3.014, 0.09	1614.9 (2.6)	0.222, 0.6	9.125, 0.003*
	Female	1914.2 (2.5)		2015.3 (2.0)		
	All	4113.5 (2.4)		3615.1 (2.3)		

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	Sex	SPD		Controls		SPD vs. controls
		*N*Mean (sd)	*F* or X^2, *p*	*N*Mean (sd)	*F* or X^2, *p*	*F* or X^2, *p*
			Male SPD vs. female SPD		Male controls vs. female controls	SPD vs. controls
WAIS R Vocabulary	Male	3811.8 (2.6)	2.154, 0.15	3714.2 (2.2)	0.617, 0.4	20.215, <0.0005*
	Female	2212.8 (2.0)		2813.8 (2.0)		
	All	6012.2 (2.4)		6514.0 (2.1)		
WAIS R Vocabulary corrected for PSES	Male	38−1.0 (2.5)	0.803, <0.4	371.0 (2.2)	4.453, 0.2	16.368, <0.0005*
	Female	22−0.5 (2.0)		280.4 (1.9)		
	All	60−0.8 (2.4)		650.8 (2.1)		
WAIS III Block design	Male	2211.1 (2.4)	0.281, <0.6	1612.3 (2.8)	0.173, <0.7	3.846, 0.054
	Female	1911.5 (3.4)		2012.7 (2.7)		
	All	4111.3 (2.9)		3612.5 (2.7)		
WAIS R Block design	Male	3811.3 (3.0)	1.504, 0.2	3712.8 (2.7)	1.144, <0.3	3.303, 0.072
	Female	2112.2 (2.8)		2712.1 (2.4)		
	All	5911.6 (2.9)		6412.5 (2.6)		
Learning difficulties	Male	470.34 (0.5)	8.844, 0.004*	250.12 (0.3)	3.674, 0.061	6.632, 0.01*
	Female	210.0 (0.0)		280.0 (0.0)		
	All	680.24 (0.5)		530.06 (0.2)		
Additional features (ANOVA)						
Recreational drug use currently	Male	580.17 (0.4)	4.801, 0.03	380.0 (0.0)		11.139, 0.001*
	Female	370.03 (0.2)		470.0 (0.0)		
	All	940.12 (0.3)		850.0 (0.0)		
Recreational drug use past	Male	570.67 (1.1)	1.469, 0.2	370.11 (0.4)	0.919, 0.3	13.339, <0.0005*
	Female	370.42 (0.8)		470.19 (0.4)		
	All	930.57 (1.0)		840.15 (0.4)		
Recreational alcohol use currently	Male	580.45 (0.7)	5.678 <0.02*	380.26 (0.5)	0.352, <0.6	0.135, 0.7
	Female	370.14 (0.3)		450.33 (0.5)		
	All	930.33 (0.6)		830.3 (0.5)		
Recreational alcohol use past	Male	560.82 (1.2)	2.947, <0.09	370.3 (0.6)	1.140, <0.3	5.041, <0.03*
	Female	370.43 (0.7)		450.44 (0.6)		
	All	920.67 (1.0)		830.38 (0.6)		
Medical problems	Male	460.43 (0.8)	3.077, <0.09	210.95 (0.8)	26.039, <0.0005*	0.746, <0.4
	Female	210.1 (0.4)		280.07 (0.4)		
	All	670.33 (0.7)		490.45 (0.7)		

N =number of subjects for whom there is data. SES = social economic status (1=low, 5=high). PSES = parental SES. Period of time unable to work is whether there was a period of time >6 months in which the subject could neither attend school nor work. Recreational alcohol and drug use scales range from 0–5 with a score of 1 being considered recreational (ie: alcohol use 7–14×/week or less than daily drug use with no interference in daily functioning).

Table 2

SPD subjects only

Measure	Gender	*N* [%]	*F* or X^2	*p*
SPD criteria				
Unusual perceptual experiences	Male	51 [79%]	1.778	<0.2
	Female	34 [85%]		
	All	85 [82%]		
Suspiciousness/paranoid ideation	Male	54 [84%]	2.098	<0.2
	Female	29 [73%]		
	All	83 [80%]		
Odd beliefs/magical thinking	Male	47 [73%]	3.457	<0.07
	Female	34 [85%]		
	All	81 [78%]		
Ideas of reference	Male	37 [58%]	2.072	<0.2
	Female	29 [72%]		
	All	66 [64%]		
Excessive social anxiety	Male	32 [50%]	2.878	0.09
	Female	27 [68%]		
	All	59 [57%]		
Odd/eccentric/peculiar behavior or appearance	Male	29 [46%]	1.892	<0.2
	Female	26 [65%]		
	All	55 [53%]		
No close friends	Male	38 [59%]	6.825	0.01*
	Female	14 [35%]		
	All	52 [50%]		
Inappropriate/constricted affect	Male	30 [47%]	0.162	<0.7
	Female	19 [48%]		
	All	49 [47%]		
Odd thinking and speech	Male	35 [54%]	3.961	<0.05*
	Female	13 [33%]		
	All	48 [46%]		
Lifetime additional personality disorders				
Avoidant	Male	13 [20%]	0.184	<0.7
	Female	4 [10%]		
	All	17 [16%]		
Obsessive–compulsive	Male	7 [11%]	0.626	0.4
	Female	8 [20%]		
	All	15 [14%]		
Paranoid	Male	12 [19%]	4.269	0.04*
	Female	4 [10%]		
	All	16 [15%]		
Narcissistic	Male	11 [17%]	4.323	0.04*
	Female	3 [8%]		
	All	14 [14%]		
Borderline	Male	11 [17%]	0.612	0.4
	Female	8 [20%]		
	All	19 [18%]		
Lifetime Axis I disorders				
Major depression	Male *N* =60	25 [42%]	1.779	<0.2
	Female *N* =32	18 [56%]		
	All *N* =92	43 [47%]		
Generalized anxiety disorder	Male	10 [17%]	3.787	<0.06
	Female	11 [28%]		
	All	21 [23%]		
Lifetime axis I disorders				
Dysthymia	Male	14 [23%]	0.746	<0.4
	Female	5 [16%]		
	All	19 [21%]		
Eating disorder	Male	1 [2%]	4.917	<0.03*
	Female	4 [13%]		
	All	5 [5%]		

Additional clinical measures	Gender	*N*	Mean (sd)	*F*	*p*
SAPS	Male	60	4.8 (1.6)	0.766	< 0.4
	Female	36	4.5 (1.8)		
	All	96	4.7 (1.7)		
SANS	Male	60	5.7 (3.3)	17.743	< 0.0005*
	Female	36	3.1 (1.9)		
	All	96	4.7 (3.1)		
SPQ cognitive perceptual	Male	20	17.9 (10.9)	0.494	< 0.5

Additional clinical measures	**Gender**	***N***	**Mean (sd)**	***F***	***p***
	Female	21	19.9 (7.7)		
	All	40	18.9 (9.3)		
SPQ interpersonal	Male	20	14.7 (9.2)	1.514	0.2
	Female	21	18.0 (7.7)		
	All	40	16.4 (8.5)		
SPQ disorganization	Male	20	8.0 (5.3)	4.356	0.04*
	Female	21	10.9 (3.5)		
	All	40	9.5 (4.6)		

N is the number of subjects meeting that criteria with the % given in [ ]. Statistics run on the degree of impairment (1=no impairment, 2=some impairment but not meeting criteria, 3=meets criteria for symptom causing impairment). Fewer than 5 subjects met DSM-IV criteria for Dependent (*N* =5), Passive–Aggressive (*N* =4), Self-defeating (*N* =3), Depressive (*N* =3), Schizoid (*N* =4), Histrionic (*N* =1), and Anti-social (*N* =1) Personality disorders.