Cognitive impairments and psychopathological parameters in patients of the schizophrenic spectrum

M.-I.V. Kontaxaki, E. Kattoulas, N. Smyrnis, N.C. Stefanis

1st Department of Psychiatry, Athens University Medical School, Eginition Hospital, Athens, Greece

ognitive impairment is a core feature of schizophrenia and it is considered by many researchers as one of the dimensional components of the disorder. Cognitive dysfunction occurs in 85% of schizophrenic patients and it is negatively associated with the outcome of the disorder, the psychosocial functioning of the patients, and non-compliance with treatment. Many different cognitive domains are impaired in schizophrenia, such as attention, memory, executive functions and speech. Nowadays, it is argued that apart from clinical heterogeneity of schizophrenia, there is probable heterogeneity in the accompanying neurocognitive dysfunction. Recent studies for cognitive dysfunction in schizophrenia employ computerized assessment batteries of cognitive tests, designed to assess specific cognitive impairments. Computerized cognitive testing permits for more detailed data collection (e.g. precise timing scores of responses), eliminates researcher's measurement errors and bias, assists the manipulation of data collected, and improves reliability of measurements through standardized data collection methods. The aims of the present study are: the comparison of cognitive performance of our sample of patients and that of healthy controls, on different specific cognitive tests, and the testing for possible association between patients' psychopathological symptoms and specific cognitive impairments, using the Cogtest computerized cognitive assessment battery. 71 male inpatients diagnosed with schizophrenia or other psychotic spectrum disorders (mean=30.23±7.71 years of age), admitted in a psychiatric unit of the First Department of Psychiatry, Athens University Medical School, Eginition Hospital (continuous admissions) were studied. Patients were excluded from the study if they suffered from severe neurological conditions, severe visual or hearing impairment, mental retardation, or if they abused alcohol or drugs. The patients' diagnoses were based on the semi-structured diagnostic interview "Diagnostic Interview for Psychosis" (DIP) and were clinically confirmed by two independent expert psychiatrists, according to the criteria of DSM-IVTM. Our healthy control group consisted of 20 healthy male participants (mean=31.65±5.90 years of age), who met the same inclusion criteria for the study as the patient group, as well as the same exclusion criteria from the study, having no

history of psychiatric disorders. All statistical analyses were conducted using the statistical package SPSS.17. According to our results, healthy controls cognitively outperform our patient sample in all cognitive tests, with the differences between performances being statistically significant. Results concerning the association between psychotic symptoms and cognitive deficits of our patients indicated that hallucinations, highly organized delusions, persecutory delusions, agitation, catatonia and inappropriate affect did not associate with any subtype of cognitive deficit. Blunted affect associated significantly with response inhibition ("GoNoGo test", p=0.007), and poor speech associated significantly with declarative memory of faces ("FMT test", p=0.002). Moreover, psychomotor ability (non-dominant hand) associated significantly with generalized delusions ("TST test", p=0.033), and with constricted affect ("TST test", p=0.026). Furthermore, there was a tendency towards significance association between persecutory delusions and executive function ("CPT test", p=0.053), inappropriate affect and declarative face memory ("FMT test", p=0.056), and psychomotor ability and poor speech (p=0.086).

Key words: Schizophrenic spectrum, psychopathology, cognitive impairments.

Introduction

Schizophrenia is one of the most severe and chronic psychiatric disorders that affects 0.4–1.3% of the general population, throughout lifetime. In most cases (30–40%), the onset of the disorder occurs in early adult life (18–25 years of age). The incidence rate of schizophrenia is relatively equivalent for both sexes, with women demonstrating a later onset (3–4 years later), and an improved social functionality.[1–4]

Predisposing and precipitating factors for schizophrenia include genetic predisposition, toxic states relating to CNS dysfunction, pregnancy and childbirth complications, negative/stressful life events, and various environmental factors (e.g. prolonged stress, drug use, etc.). The interactions, as well as the additive effect of the above factors appear to trigger the onset of the disorder.[5,6]

It is widely accepted that the outcome of schizophrenia is varied.[7] Up to 50% of the patients experience social and functional decline after the first psychotic episode, whereas 16% to 40% of patients recover into their premorbid level of functioning. Nowadays, many researchers argue that schizophrenia is a heterogenic clinical manifestation.[8–10]

Cognitive impairment is a core feature of schizophrenia and it is considered by many researchers as one of the dimensional components of the disorder.[10,11] Findings from recent studies indicate that cognitive functioning in patients with schizophrenia is impaired compared to that of healthy controls; it is reported that the difference in performance of the two groups is one to two standard deviations, demonstrating statistical significance.[12–14] Cognitive dysfunction occurs in 85% of schizophrenic patients and it is negatively associated with the outcome of the disorder,[15] the psychosocial functioning of the patients, and non-compliance with treatment.[16,17] Many different cognitive domains are impaired in schizophrenia, such as attention, memory, executive functions and speech.[18,19] Different types of tests have been used to assess cognitive impairment, such as the "Wisconsin Card Sorting Test", the "Stroop Test", the "Verbal Fluency Test", "Continuous Performance Test", or the "Tower of Hanoi Test". The great variety of assessment tools for cognitive dysfunction prevents the rise of conclusive findings often leading to contradictory results.[13,20]

Nowadays, it is argued that apart from clinical heterogeneity of schizophrenia, there is probable heterogeneity in the accompanying neurocognitive dysfunction.[21] Most association studies on the subject adopt the dimensional categorization of symptoms into positive, negative or disorganized symptoms. There are considerably fewer studies investigating the associations of cognitive deficits with more specific psychopathological manifestations.[22,23] Negative symptoms are frequently summarized into one variable, expressing many different psychopathological symptoms. Cognitive dysfunctions are also summarized, by some studies, into one variable, expressing performance in many different cognitive domains.

Recent studies for cognitive dysfunction in schizophrenia employ computerized assessment batteries of cognitive tests, designed to assess specific cognitive impairments.[24,25] Computerized cognitive testing permits for more detailed data collection (e.g. precise timing scores of responses), eliminates researcher's measurement errors and bias, assists the manipulation of data collected, and improves reliability of measurements through standardized data collection methods. Cogtest Console is a computerized cognitive assessment battery, specialized in testing cognitive domains that are frequently impaired in psychotic disorders, consisting of tests standardized in adequate sample sizes of patients and healthy controls.[24,26,27]

The aims of the present study are: (a) The comparison of cognitive performance of our sample of patients and that of healthy controls, on different specific cognitive tests, and (b) To test for possible association between patients' psychopathological symptoms and specific cognitive impairments.

Material and method

a. Participants

Seventy one male inpatients diagnosed with schizophrenia or other psychotic spectrum disorders, admitted in a psychiatric unit of the First Department of Psychiatry, Athens University Medical School, Eginition Hospital (continuous admissions) were studied. Patients' age varied from 18 to 51 years of age (mean=30.23±7.71 years of age). Patients were excluded from the study if they suffered from severe neurological conditions, severe visual or hearing impairment, mental retardation, or if they had abused alcohol or drugs during the past two months.

The patients' diagnoses were based on the semi-structured diagnostic interview "Diagnostic Interview for Psychosis" (DIP).[28] The diagnoses were clinically confirmed by two independent expert psychiatrists, according to the criteria of DSM-IV™.[29] 48 (67.6%) patients were diagnosed with "schizophrenia", 14 (19.8%) patients with "psychosis not otherwise specified", 5 (7.0%) patients with "schizoaffective disorder", and finally 4 (5.6%) patients with "schizophreniform disorder". The mean age of illness onset (positive psychotic symptoms) for our sample was 21.11 (±5.94) years of age. The mean age of first psychiatric assessment and psychiatric medication

treatment for our sample was 22.89 (±5.86) years of age.

The patients were clinically stabilized with adequate antipsychotic medication treatment before the study. 52 (73.2%) patients received atypical antipsychotic treatment, 10 (14.1%) received typical antipsychotic treatment, and 9 (12.7%) received a combination of atypical and typical antipsychotic medication. Furthermore, 19 (26.7%) patients of our sample received clozapine, 12 (16.9%) received anticholinergics, 8 (11.3%) received mood stabilizers, and 8 (11.3%) received antidepressants (SSRIs). Patients were benzodiazepines free for a week before cognitive assessment.

We recruited a control group of 20 healthy male participants, who volunteered to participate in the study with no monetary reward. Our healthy control group consisted of students, hospital employees and members of the surrounding community. The participants' control group met the same inclusion criteria for the study as the patient group, as well as the same exclusion criteria from the study, having no history of psychiatric disorders. The age of healthy controls varied from 18 to 45 years of age (mean=31.65±5.90 years of age).

Participants in our control group were recruited according to frequency matching sampling design. The patient group and the control group were matched for sex (all males), age, education years, marital status, and handedness. All participants received detailed information about the purpose of the study and their written informed consent was obtained. The study received the approval of the Ethics Committee of Eginition Hospital. Table 1 shows the socio-demographic characteristics of our patients and control samples, as well as the statistics of our matching procedure. There were no statistically significant differences between patients and controls in all socio-demographic parameters.

b. Materials

The following instruments were administered:

1. A standardized questionnaire for the assessment of patients' demographic and clinical parameters (e.g. age, marital status, education years, age of symptomatology onset, age at first psychiatric medication treatment, etc.).

2. The diagnostic interview "Diagnostic Interview for Psychosis" (DIP).[28] This is a semi-structured inter-

Table 1. Comparison of patients and controls in socio-demographic parameters

Socio-demographic parameters		Patients (n=71)		Controls (n=20)		Pearson x^2	Statistical Significance
		n	(%)	n	(%)	p	
Age (years)	≤25	20	(28.2)	4	(20.0)	0.719	NS
	26–35	36	(50.7)	12	(60.0)		
	≥36	15	(21.1)	4	(20.0)		
Education (years)	≤6	3	(4.2)	0	(0.0)	0.346[1]	NS
	7–12	34	(47.9)	7	(35.0)		
	≥13	34	(47.9)	13	(65.0)		
Marital status	(Single)	62	(100.0)	18	(90.0)	0.057[2]	NS
Handedness	(Right)	68	(95.8)	18	(90.0)	0.582[2]	NS

1. Pearson x^2 Test (exact significance).
2. Fisher's Exact Test.

view consisting of 97 questions, reinforcing clinical diagnosis with detailed reporting of psychopathological parameters, chronicity and severity (e.g. depressive symptoms, manic symptoms, hallucinations, delusions, drug/alcohol abuse, subjective thought disorder, behavior and speech disturbances, illness course and duration). "DIP" also examines level of functioning, family psychiatric history, insight, and response to medication. "DIP" was administered by an expert psychiatrist. For the present study, we included the "DIP" information that concerned the presence of the following symptoms: hallucinations, generalized delusions, delusions highly organized, persecutory delusions, agitation, catatonia, constricted affect, blunted affect, inappropriate affect, and thought/speech disturbance.

3. The psychosis specialized cognitive assessment "Cogtest Console" battery, exhibiting standardized, computerized data collection and management.[24,26,27] We administered seven cognitive tests to our participants, assessing different cognitive domains. These cognitive domains were: sustained attention ("AX-CPT" test), declarative face memory ("FMT" test), response inhibition ("GoNoGo" test), working memory ("SWM" test), executive function ("CPT" test and "STDT" test), and psychomotor speed ("TST" test). Cognitive assessment for each participant lasted approximately 90 minutes with a 15-minute break, between the fourth and the fifth cognitive test. Cognitive tests were administered by an expert and especially trained psychologist (M-E.K.), in the same order every time.

The procedure, the goal and the scoring of each cognitive test is presented in detail below.

The "Spatial Working Memory Test" (SWM-test) is a working memory test. The overall goal of the task is to determine how accurately participants recall the spatial locations of briefly presented visual targets. The task involves showing the targets at various positions on a display device, and having subjects touch the screen at the location where they recall the target had appeared. Between presentation and recall of the target, a number of distracters of variable location appear, which need to be actively touched by the subject. Scoring on this test is the mean distance (number of "pixels"), between the initial target and the participants' answer.

The "Face Memory Test" (FMT-test) is a declarative face memory test. Participants are presented with a series of pictures of human faces (constructed using a computer algorithm that assembles individual features into composites). The study phase of the test involves viewing 20 faces for 3 seconds each, followed by the recognition phase of the test, where each one of the 20 original faces is paired with a distracter face, one randomly selected from a set that was not seen before. The participant has to choose the faces that he/she saw before. Then the procedure is repeated with new faces and new distracters, and the scoring on this test is the mean percentage of correct recognitions of all faces.

The "Competing Programs Test" (CPT-test) is an executive functions test. Participants should learn to respond to one contingency (by pressing a button on the same side as the stimulus), and then to a changed contingency (by pressing on the side

opposite to the stimulus). Participants should accomplish that solely from the trial-by-trial feedback, without any explicit instruction. The percentage of correct answers when the participant should imitate contingency and the percentage of correct answers when the participant should reverse their selection, are the two measurements of performance in this test. This test results in a strict measurement of executive function, since the test automatically terminates the procedure after a series of wrong answers, with a pass/fail scoring.

The "Strategic Target Detection Test" (STDT-test) is also an executive functions test. In this test, the participant touches the target stimuli (shapes) directly on the touch screen. The participant is not told in advance which of the stimuli is the "target", and should learn which the correct target is by choosing one of the stimuli and observing feedback that indicates whether the choice was right or wrong. The target stimulus changes after a number of consecutive correct responses. The scoring on this test is the percentage of correct choices out of the total choices of the participant.

The "Continuous Performance Test – AX Version" (AX-CPT-test) is a sustained attention test. The participant is instructed to respond with a right mouse press whenever the stimulus is an X that was preceded by an A (target stimuli). The left mouse button is pressed for all other stimuli, including an A, an X that was not preceded by an A, and any other letter (non-target stimuli). The test consists of 150 trial stimuli presented according to a randomization algorithm, and the procedure is especially cognitively demanding. The percentage of correct choices of target stimuli and the percentage of correct choices of non-target stimuli are the two measurements of performance in this test.

The "Go-No-Go Test" (GONOGO test) is a response inhibition test. Participants are asked to respond and pick the correct choice, based on which stimulus is filled with green color "go" stimulus, while the other stimulus is blank. In some trials, however, one of the stimuli is colored red, which is a signal not to respond at all ("no-go" stimulus). The frequency of "go" stimuli relative to "no-go" stimuli is 80%, which maintains a bias and tendency to respond on every trial. The percentage of correct non-choices when the stimuli should not have been chosen is the scoring of this test.

Finally, the "Tapping Speed Test" (TST-test) is a psychomotor speed test. 95,8% of our patients sample was right-handed. The mean reaction times, measured in msec, for each hand, are the two measurements of performance in this test. In the present study, we incorporated in our analysis only the reaction time of the non-dominant hand, since, in the literature on the subject, there were references of practice effects in the repetitive procedure of this test.[30]

c. Statistical analysis

Continuous and normally distributed variables are presented as mean±standard deviation (sd) while continuous variables with asymmetric distribution are reported as median and minimum-maximum (min-max) values. Categorical data are presented as counts and percentages. Testing of normality assumption was made using the Kolmogorov-Smirnov test.

The univariate associations between categorical variables were evaluated using Pearson x^2 test whether in cases where there were not enough data in the subcategories for testing, Fisher's exact test or Pearson x^2 test (exact significance) were employed for 2×2 or larger tables respectively.

Our first research hypothesis was that there is a statistically significant difference in performance between the group of psychotic patients and that of healthy controls, in every cognitive domain tested (e.g. sustained attention, declarative face memory, etc.). The primary research hypothesis of the study was to reveal the associations between different types of cognitive dysfunction and different psychopathological symptoms in our patient group.

For the comparison of cognitive functionality between cases and controls or considering the absence or the presence of the various psychotic symptoms, t-test or Mann-Whitney test were employed, depending on the data distribution each time. In cases that t-test was used but equality of variances of the two comparing groups could not be assumed, according to Levene's test, the adjusted p-value is reported. The cut-off point for statistical significance was set at 0.05 for all analyses.

All statistical analyses were conducted using the statistical package SPSS 17 (Statistical Package for the Social Sciences).

Results

The statistical comparison between the group of patients and healthy controls, for every cognitive test, are presented in table 2. Statistical analysis was conducted for more than one performance measure for each cognitive test (e.g. target stimuli response, non-target stimuli response, etc.), where this was possible. According to our results, healthy controls cognitively outperform our patient sample in all cognitive tests, with the differences between performances being statistically significant.

Results concerning the association between psychotic symptoms and cognitive deficits of our patients are presented in table 3. Table 3 includes only the psychotic symptoms that reveal significant associations, or a tendency towards significant associations with cognitive deficits.

Hallucinations, highly organized delusions, persecutory delusions, agitation, catatonia and inappropriate affect did not associate with any subtype of cognitive deficit. Blunted affect associated significantly with response inhibition ("GoNoGo test", p=0.007), and poor speech associated significantly with declarative memory of faces ("FMT test", p=0.002). Moreover, psychomotor ability (TST test) associated significantly with generalized delusions (p=0.033 for the non-dominant hand), and with constricted affect (p=0.026, for the non-dominant hand).

Furthermore, there was an indication of tendencies towards statistical significance between different psychotic symptoms and cognitive deficits. Specifically, there was a tendency towards significance association between persecutory delusions and executive function ("CPT test", p=0.053), inappropriate affect and declarative face memory ("FMT test", p=0.056), and psychomotor ability and poor speech (p=0.086, non-dominant hand).

Discussion

According to the findings of the present study, all different cognitive domains appear to be impaired in psychotic patients compared to healthy controls. Sustained attention, declarative memory of faces, spatial working memory, psychomotor speed, response inhibition and other executive functions, all appear to be significantly impaired in psychotic patients compared to our healthy participants.

Several meta-analytic studies, using different methodologies and instruments, have reported summarized findings of research investigating the role of cognitive impairment in psychotic patients versus healthy controls. Findings of early meta-analytic studies (1998–2008) focused on associations of verbal memory impairment among patients with psychotic disorders versus controls.[14,31–33] Furthermore, according to early meta-analytic studies there was evidence of an association between

Table 2. Comparison of performance on cognitive tests for the patients and the healthy controls.

Cognitive functionality	Patients			Controls			t-test
	n	mean (median)*	sd (min-max)*	n	mean (median)	sd (min-max)	p
AXCPT proportion correct target	66	0.73	0.22	20	0.92	0.10	<0.001[1]
AXCPT proportion correct non-target	66	(0.96)	(0.36–1.00)	20	(0.98)	(0.93–1.00)	0.001[2]
GONOGO proportion correct	65	(1.00)	(0.78–1.00)	20	(1.00)	(0.98–1.00)	0.006[2]
FMT proportion correct	71	0.68	0.13	20	0.82	0.09	<0.001
SWM mean pixels	68	83.9	45.4	20	46.3	13.4	<0.001[1]
STDT proportion correct	66	0.85	0.07	20	0.89	0.04	0.013
CPT reversal proportion correct	31	0.56	0.21	5	0.87	0.08	<0.001[1]
CPT imitation proportion correct	31	0.59	0.20	5	0.90	0.07	<0.001[1]
TST mean intertap right hand time (msec)	68	(207)	(135–1062)	20	(155)	(141–179)	<0.001[2]
TST mean intertap left hand time (msec)	68	(208)	(133–696)	20	(166)	(141–217)	<0.001[2]

1. t-test: equality of variances not assumed (Levene's Test for Equality of Variances).
2. Mann-Whitney Test.
* When data were normally distributed mean/sd are reported, when data were not normally distributed median/ min-max values are reported.

Table 3. Comparison of performance on cognitive tests for the patients and the healthy controls.

| | | Symptom's presence | | | | | | Statistical significance |
| | | No | | | Yes | | | |
Psychotic symptoms	Cognitive functionality	n	mean (median or %)	sd (min-max)	n	mean (median or %)	sd (min-max)	p
Delusions generalized	AXCPT	34	0.82	0.16	30	0.84	0.15	0.452[4]
	CPT (passed)	15	(39.5%)		15	(48.4%)		0.458[2]
	FMT	38	0.66	0.14	31	0.71	0.12	0.146[4]
	GONOGO	34	(1.00)	(0.75–1.00)	30	(1.00)	(0.90–1.00)	0.590[1]
	SWM	36	91.0	53.9	31	75.9	33.0	0.178[4]
	STDT	34	0.84	0.08	31	0.86	0.05	0.112[4]
	TST (non-dom)	36	(230)	(154–696)	31	(199)	(133–307)	**0.033[1]**
Delusions persecutory	AXCPT	36	0.80	0.18	28	0.86	0.11	0.110[3]
	CPT (passed)	13	(33.3%)		17	(56.7%)		0.053[2]
	FMT	39	0.68	0.15	30	0.69	0.11	0.650[4]
	GONOGO	35	(1.00)	(0.90–1.00)	29	(1.00)	(0.75–1.00)	0.931[1]
	SWM	38	85.0	53.5	29	82.8	33.8	0.848[4]
	STDT	36	0.85	0.08	29	0.85	0.05	0.922[4]
	TST (non-dom)	38	(218)	(133–696)	29	(206)	(159–358)	0.672[1]
Constricted affect	AXCPT	28	0.83	0.15	36	0.83	0.17	0.963[4]
	CPT (passed)	12	(40.0%)		18	(46.2%)		0.609[2]
	FMT	30	0.69	0.13	39	0.68	0.13	0.786[4]
	GONOGO	27	(1.00)	(0.75–1.00)	37	(1.00)	(0.90–1.00)	0.734[1]
	SWM	29	87.2	53.4	38	81.6	39.5	0.625[4]
	STDT	29	0.85	0.07	36	0.85	0.07	0.903[4]
	TST (non-dom)	29	(237)	(172–696)	38	(200)	(133–485)	**0.026[1]**
Blunted affect	AXCPT	30	0.85	0.12	34	0.81	0.18	0.279[3]
	CPT (passed)	16	(51.6%)		14	(36.8%)		0.218[2]
	FMT	31	0.71	0.13	38	0.67	0.14	0.212[4]
	GONOGO	31	(1.00)	(0.95–1.00)	33	(1.00)	(0.75–1.00)	**0.007[1]**
	SWM	31	75.8	32.3	36	91.1	54.2	0.175[4]
	STDT	30	0.86	0.06	35	0.84	0.07	0.355[4]
	TST (non-dom)	31	(201)	(155–358)	36	(228)	(133–696)	0.458[1]
Inappropriate affect	AXCPT	42	0.85	0.13	22	0.78	0.20	0.144[3]
	CPT (passed)	22	(50.0%)		8	(32.0%)		0.147[2]
	FMT	44	0.71	0.11	25	0.65	0.15	0.056[4]
	GONOGO	41	(1.00)	(0.90–1.00)	23	(1.00)	(0.75–1.00)	0.136[1]
	SWM	44	77.9	49.8	23	95.8	34.8	0.129[4]
	STDT	42	0.85	0.07	23	0.85	0.07	0.852[4]
	TST (non-dom)	44	(208)	(133–696)	23	(227)	(162–358)	0.822[1]
Poor speech	AXCPT	24	0.87	0.13	33	0.80	0.18	0.119[3]
	CPT (passed)	13	(52.0%)		15	(41.7%)		0.426[2]
	FMT	25	0.75	0.11	36	0.64	0.14	**0.002[4]**
	GONOGO	25	(1.00)	(0.95–1.00)	32	(1.00)	(0.75–1.00)	0.582[1]
	SWM	25	83.1	33.5	34	79.0	35.6	0.649[4]
	STDT	24	0.87	0.06	33	0.85	0.06	0.165[4]
	TST (non-dom)	25	205	36	34	229	63	0.086[4]

1. Mann-Whitney Test.
2. Pearson x^2 Test.
3. t-test: equality of variances not assumed (Levene's Test for Equality of Variances).
4. t-test.

both working memory and episodic memory to psychotic disorders.[14,34,35] Other early meta-analytic studies indicated the moderate association of psychotic disorders and other cognitive functions, like sustained attention and executive functions.[14] A couple of most recent meta-analytic studies confirm the association between psychotic disorders and general memory impairment.[13,36] Moreover, other recent studies report patients' impairment in declarative memory of faces, arguing that face recognition may be an independent endophenotype of schizophrenia.[37,38] Additionally, recent mela-analytic studies demonstrate that associations between psychotic disorders and attention or executive functions impairments are also important.[36]

According to the results of our study, psychotic patients are more cognitively impaired when they suffer from symptoms such as blunted affect and poor speech. Additionally, cognitively impaired patients tend to suffer more often from inappropriate affect (p=0.056); all symptoms relating to the negative or disorganization psychopathology. Our findings are in line with the previous literature on the subject. Patients with negative or disorganized psychotic symptoms have been reported to be more cognitively impaired compared to patients exhibiting positive psychotic symptoms.[13,39] Moreover, disorganized symptoms, as well as other negative symptoms of psychotic disorders, demonstrate stronger associations with neurocognitive functioning compared to symptoms of perceptual distortion.[40]

In a more detailed review of our findings, every cognitive domain should be thoroughly analyzed. In the present study, findings indicate that impairment in declarative memory of faces is associated significantly with the symptom of poor speech, and secondly –through a statistical tendency– with the symptom of inappropriate affect. Both these symptoms are considered to belong in the subcategory of negative/disorganized psychotic symptomatology. Other studies have also indicated that the poor speech symptom is associated mostly with declarative memory and to a lesser extent with working memory, as it is the case in the present study.[41]

Furthermore, schizophrenia is reported to associate with recognition memory impairment, as well as with declarative memory impairment.[42] The findings of the present study support that assumption. The face memory test used in the present study is also a test of recognition memory, not a free recall memory test, and face memory is considered part of the declarative memory construct.

Our findings suggest that patients who exhibit blunted affect symptomatology also exhibit response inhibition impairment. The response inhibition cognitive component has been theoretically incorporated into the executive functions cognitive domain by many researchers.[43] According to the literature on the subject, psychotic patients were found to be cognitively impaired considering the executive functions performance.[44] The presence of negative symptomatology in psychotic patients has been reported in the past as a prognostic factor of executive functions impairments.[45,46] Additionally, affective blunting has been found to correlate with cognitive flexibility, another executive function component.[47] Our findings also imply, in the form of a statistical tendency, that patients who exhibit persecutory delusions outperform all other psychotic patients on a cognitively demanding executive functions test (CPT). As it has been previously reported in the literature, persecutory delusions characterize the cognitively intact paranoid schizophrenia subtype.[48,49]

The results of the present study appear to be inconclusive considering the association of psychomotor speed and psychotic symptomatology. Patients who exhibit generalized delusions, as well as patients who exhibit constricted affect, were found to exhibit significantly more intact psychomotor skills. On the other hand, patients who exhibit speech/thought disturbances were found to also exhibit psychomotor impairment approaching statistical significance. The association between psychotic symptomatology and psychomotor speed has also revealed inconclusive evidence in the previous literature. Withdrawal-retardation symptoms were found to be correlated with performance on psychomotor speed tasks.[50,51] On the other hand, positive symptoms have also been reported to correlate significantly with psychomotor speed.[52]

According to the findings of the present study, working memory deficit does not correlate significantly with any specific psychotic symptom. The literature review on the subject reveals inconclusive findings. Some studies report that working memory deficits are generalized in patients with predominantly positive or predominantly negative psychotic

symptoms.[46] On the contrary, other studies indicate that working memory deficits associate mostly with the negative psychotic symptoms.[53,54]

According to the results of the present study, performance of our patient group in the sustained attention test does not correlate significantly with any specific psychotic symptom. It has been previously reported that negative psychotic symptoms associate with impaired performance in sustained attention,[42] although, this association between negative symptoms and sustained attention cannot be confirmed by our results. However, it is worth noting that our study focuses on specific symptoms and not on clusters of symptoms, as previous studies. Moreover, other studies used different instruments to assess attention performance.

Our study had some limitations. Our findings could not be generalized in both sexes, since our sample consists exclusively of male patients. A second limitation is that of the possible effects of the therapeutic antipsychotic dose medication of our patients' sample. However, it should be noted that all patients were on clinically stable condition and were free of benzodiazepines medication. Lastly, our sample size was relatively limited. A bigger sample size would allow to statistically investigate even more detailed symptomatology and might help strong statistical tendencies to convert to statistical significances.

Further investigation of the mechanisms and associations underlying cognitive dysfunction in schizophrenia spectrum disorders would be useful, since improved cognitive performance is reported to associate with improved functionality and clinical state for patients with schizophrenia, as well as for patients with schizoaffective disorder.[55] Moreover, cognitive dysfunction appears to affect functionality of psychotic patients in everyday life, social functionality, quality of life, as well as the outcome of disorders.[56] Many studies point out the importance of cognitive dysfunction in the understanding of neuroanatomical substrate of psychotic disorders,[57] as well as its importance as a therapeutic target.[58]

Υποκατηγορίες γνωσιακών ελλειμμάτων και ψυχοπαθολογικές παράμετροι σε ασθενείς του σχιζοφρενικού φάσματος

Μ.-Ε.Β. Κονταξάκη, Ε. Κάττουλας, Ν. Σμυρνής, Ν.Κ. Στεφανής

Α΄ Ψυχιατρική Κλινική Πανεπιστημίου Αθηνών, Αιγινήτειο Νοσοκομείο, Αθήνα

Η γνωσιακή δυσλειτουργία αποτελεί πυρηνικό χαρακτηριστικό της σχιζοφρενικής διαταραχής ενώ από πολλούς ερευνητές θεωρείται μια από τις διαστασιακές της συνιστώσες. Εμφανίζεται περίπου σε ποσοστό 85% των ασθενών και σχετίζεται αρνητικά με την έκβαση της διαταραχής, την ψυχοκοινωνική λειτουργικότητα του ασθενούς, όπως και τη μη συμμόρφωση στη θεραπεία. Στη σχιζοφρένεια διάφορες πλευρές της γνωσιακής λειτουργίας δυσλειτουργούν, όπως η προσοχή, η μνήμη, οι εκτελεστικές λειτουργίες, ο λόγος. Σήμερα υποστηρίζεται ότι εκτός από την κλινική ετερογένεια της σχιζοφρένειας υπάρχει και ετερογένεια όσον αφορά στη νευρογνωσιακή δυσλειτουργία. Οι σύγχρονες μελέτες για τη γνωσιακή δυσλειτουργία στη σχιζοφρένεια χρησιμοποιούν ηλεκτρονικές μπαταρίες δοκιμασιών των επιμέρους γνωσιακών λειτουργιών. Οι ηλεκτρονικές γνωσιακές δοκιμασίες παρουσιάζουν μεγαλύτερες δυνατότητες στη συλλογή λεπτομερών δεδο-

μένων, περιορίζουν την επιρροή και τα πιθανά λάθη του εξεταστή εφόσον είναι πλήρως τυποποι-
ημένες και διευκολύνουν τη συλλογή και την επαλήθευση των ερευνητικών δεδομένων. Σκοποί
της παρούσας μελέτης είναι: η σύγκριση σε επιμέρους γνωσιακές δοκιμασίες των ασθενών της
μελέτης και υγιών μαρτύρων και, η αναζήτηση συσχετίσεων μεταξύ ειδικών ψυχοπαθολογικών
συμπτωμάτων και υποκατηγοριών γνωσιακών ελλειμμάτων των ασθενών της μελέτης, χρησιμο-
ποιώντας την ηλεκτρονική κονσόλα Cogtest. Στην έρευνα συμπεριελήφθησαν 71 άρρενες ασθε-
νείς (μέση ηλικία 30,23±7,71 έτη) με διάγνωση «σχιζοφρένεια ή άλλες ψυχωσικές διαταραχές» που
εισήχθησαν σε ένα ψυχιατρικό τμήμα της Α΄ Ψυχιατρικής Κλινικής του Πανεπιστημίου Αθηνών στο
Αιγινήτειο Νοσοκομείο (συνεχείς εισαγωγές). Από τη μελέτη εξαιρέθηκαν ασθενείς με σοβαρές
νευρολογικές παθήσεις, σοβαρά προβλήματα ακοής και όρασης, νοητική υστέρηση, κατάχρηση
ουσιών ή/και οινοπνευματωδών. Οι κλινικές διαγνώσεις του δείγματος των ασθενών της μελέτης
έγιναν στη βάση της δομημένης διαγνωστικής συνέντευξης "Diagnostic Interview for Psychosis"
(DIP), και επιβεβαιώθηκαν μετά από κλινική εκτίμηση δύο ανεξάρτητων ψυχιάτρων στη βάση των
διαγνωστικών κριτηρίων του DSM-IVTM. Στην έρευνα συμπεριλήφθηκε ομάδα 20 αρρένων υγιών
μαρτύρων (μέση ηλικία 31,65±5,90 έτη), που πληρούσαν τα ίδια κριτήρια εισαγωγής στη μελέτη
όπως κι η ομάδα των ασθενών, όπως και τα ίδια κριτήρια αποκλεισμού από αυτήν, έχοντας πλή-
ρως ελεύθερο ψυχιατρικό ιστορικό. Για τη στατιστική επεξεργασία των δεδομένων της μελέτης
χρησιμοποιήθηκε το στατιστικό πακέτο SPSS.17. Σύμφωνα με τα αποτελέσματα της μελέτης, τα
υγιή άτομα της ομάδας ελέγχου διαφοροποιούνταν από τους ασθενείς σε στατιστικά σημαντικό
βαθμό σε όλες τις γνωσιακές δοκιμασίες. Η διερεύνηση για πιθανές συσχετίσεις σχετικά με τα ψυ-
χωτικά συμπτώματα και τις γνωσιακές δυσλειτουργίες ανέδειξε τα παρακάτω: οι ψευδαισθήσεις,
οι παραληρητικές ιδέες υψηλής οργάνωσης, οι παραληρητικές ιδέες διωκτικού τύπου, η διέγερση,
η κατατονία και το απρόσφορο συναίσθημα δεν συσχετίστηκαν με οποιαδήποτε υποκατηγορία
γνωσιακής δυσλειτουργίας. Το αμβλύ συναίσθημα συσχετίστηκε σημαντικά με την παρεμπόδιση
απάντησης ("GoNoGo test", p=0,007), ενώ ο πτωχός λόγος συσχετίστηκε σημαντικά με τη δη-
λωτική μνήμη προσώπων ("FMT test", p=0,002). Επιπροσθέτως, η ψυχοκινητική ικανότητα (μη-
επικρατιτικό χέρι) συσχετίστηκε σημαντικά με τις γενικευμένες παραληρητικές ιδέες ("TST test",
p= 0,033) και με το περιεσφιγμένο συναίσθημα ("TST test", p=0,026). Εξάλλου, εντοπίστηκε μια
τάση για στατιστική σημαντικότητα όσον αφορά στις συσχετίσεις ανάμεσα στις παραληρητικές
ιδέες διωκτικού τύπου και στις εκτελεστικές λειτουργίες ("CPT test", p=0,053), ανάμεσα στο απρό-
σφορο συναίσθημα και στη δηλωτική μνήμη προσώπων ("FMT test", p=0,056), και τέλος ανάμεσα
στην ψυχοκινητική ικανότητα και στον πτωχό λόγο ("TST test", p=0,086).

Λέξεις ευρετηρίου: Σχιζοφρενικό φάσμα, ψυχοπαθολογία, γνωσιακά ελλείμματα.

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Corresponding author: M.-I.V. Kontaxaki, Psychologist, Research Fellow, 1st Department of Psychiatry, Athens University Medical School, Eginition Hospital, 74 Vas. Sophias Ave., GR-115 28, Athens, Greece
e-mail: melkont@yahoo.com