

Neuropsychological Function in Obsessive-Compulsive Personality with Schizotypal Features

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ABSTRACT:

NEUROPSYCHOLOGICAL FUNCTION IN OBSESSIVE-COMPULSIVE PERSONALITY WITH SCHIZOTYPAL FEATURES

Objective: We examined the neurocognitive profiles of 12 clinically referred obsessive-compulsive disorder (OCD) patients in Turkey. Numerous studies examining neuropsychological function among OCD patients document performance deficits on measures considered sensitive to orbitofrontal dysfunction. **Method:** We administered a neuropsychological test battery consisting of tasks considered sensitive to orbitofrontal dysfunction and tests of executive function. **Results:** Contrary to expectation, OCD subjects did not display performance deficits on orbitofrontal tasks. Unexpectedly, only 2 of 12 patients in Turkish sample presented with classical OCD. The remaining 10 subjects displayed obsessive-compulsive personality traits (e.g., striving for symmetry and order, perfectionism, and rigid adherence to rules), schizotypal personality features (OCPT/SP), and generalized anxiety. We excluded the two primary OCD subjects and conducted a separate analysis of the OCPT/SP group. They demonstrated performance deficits on measures of executive function relative to control subjects. **Conclusion:** Findings are consistent with the contention that obsessive-compulsive personality traits and schizotypal personality features are associated with performance deficits on tests of executive function, possibly reflecting dorsolateral- or mesial-prefrontal dysfunction. We suggest that obsessive-compulsive personality traits may develop as a compensatory response to working memory and executive function deficits.

Key Words: obsessive-compulsive personality traits; schizotypal personality; orbitofrontal dysfunction; prefrontal dysfunction; neuropsychological test

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INTRODUCTION

Obsessive-compulsive disorder (OCD) is a common, often debilitating neuropsychiatric syndrome characterized by pathological doubt, intrusive thoughts, exaggerated threat appraisal, and ritualized behavior affecting 2-3% of the general population (1). A considerable amount of work supports the hypothesis that prefrontal dysfunction is an etiologic factor in OCD. Studies examining neurocognitive function in OCD document performance deficits on tasks considered sensitive to orbitofrontal dysfunction (2-5). Functional neuroimaging studies also implicate the orbitofrontal system and further suggest that dysfunction of a cortical-subcortical circuit involving the orbitofrontal region is associated with OCD (6-13). Thus, both neuropsychological test findings and patterns of abnormal neuroactivation (e.g., orbitofrontal hypermetabolism) among OCD patients implicate the orbitofrontal system.

Neuropsychological testing also reveals impairment on tests of executive function among OCD patients (14-21). Performance decrements on tests assessing

frontal executive function are associated with dorsolateral-prefrontal (DLPF) dysfunction. This raises the possibility that global prefrontal deficits (i.e., both orbitofrontal and DLPF) may be related to OCD. However, Abbruzzese et al. reported that OCD patients did not demonstrate performance deficits on classical tests of frontal executive function (e.g., the Wisconsin Card Sorting Task) (2,3,22).

How can we account for conflicting findings in the neuropsychological literature? One possibility is that performance deficits on tests assessing frontal executive function among OCD patients are associated with the presence of coexistent neuropsychiatric conditions. In prior work, we found that OCD patients could be subtyped on the basis of comorbid schizotypal personality features (5). Distinct patterns of neurocognitive impairment were associated with each OCD subtype. Executive function deficits were associated with the presence of comorbid schizotypy. That is, we found that patients presenting with OCD and comorbid schizotypal personality (OCD/SP) demonstrated performance deficits on putative orbitofrontal tasks such as the Object Alternation Test

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and on measures of executive function. Patients presenting with primary OCD (i.e., without coexistent schizotypy) performed poorly on orbitofrontal tasks; however, they did not exhibit performance decrements on tests assessing executive function. OCD/SP subjects in this study also obtained clinically significant scores on a measure of obsessive-compulsive personality disorder (OCPD). These patients were preoccupied with ordering rituals, striving for symmetry, and attaining perfection. We speculated that the preoccupation with rules and organization displayed by OCD/SP patients represented compensatory behavioral strategies. That is, obsessive-compulsive personality traits may develop as a compensatory response to working memory and executive function deficits. Differences in the proportion of OCD patients presenting with schizotypal features may account, at least in part, for inconsistencies in the neuropsychological literature regarding executive functional deficits in OCD. Further support for this contention can be found in the schizotypy literature. Individuals diagnosed with schizotypal personality disorder (SPD) or subjects psychometrically defined as schizotypic display performance decrements on tests of frontal executive function including the Wisconsin Card Sorting Task (WCST), Trail-Making Test (Part B), California Verbal Learning Test (CVLT) and the Booklet Category Test (23-28). Schizotypic subjects also exhibit performance deficits on visuospatial working memory tasks (29-31).

In the present study, we attempted to replicate the findings of Dinn and Harris (5) in a cross-cultural context. The biological approach would be strengthened considerably if researchers could replicate studies demonstrating strong relationships between performance on neuropsychological measures sensitive to dysfunction in discrete brain regions and clinical presentation among the populations of diverse cultures.

Method

We examined the neurocognitive profiles of clinically referred OCD patients in an urban center of Turkey (Istanbul). Subjects were referred by their primary clinicians. The Istanbul 5 group comprised seven female and five male outpatients. Their ages ranged from 17-43 years (mean=26.2; SD=7.3). The mean education level was 12.6 years (SD=4.4). Eleven subjects were right-handed and one subject was left-handed, as determined by self-report. Twenty control subjects were recruited from the general population in the metropolitan Istanbul area. Control participants responded to flyers posted in the community. The control group comprised 14 females and 6 males. Their ages ranged from 16-34 years (mean+SD=21.2.+4.8). The mean education level was 12.5 years (SD=1.9). Nineteen subjects were

right-handed and one subject was left-handed, as determined by self-report. Written informed consent was obtained from all participants. Confirmatory diagnostic interviews was conducted by a Turkish psychologist (A.A). Questions were based on the Mini International (32) Neuropsychiatric Interview (MINI) (OCD module) and the Personality Diagnostic Questionnaire (PDQ-4) (33). The MINI is a brief structured psychiatric interview based on DSM-IV (Axis-I) and ICD-10 diagnostic criteria. PDQ-4 items reflect DSM-IV diagnostic criteria for personality disorders. A review of the lead author's interview notes revealed that only two patients exhibited core OCD characteristics (i.e., contamination obsessions, washing rituals, and checking behavior). The remaining 10 subjects displayed obsessive-compulsive personality traits (e.g., striving for symmetry and order, perfectionism, and rigid adherence to rules), schizotypal personality features (OCPT/SP), and generalized anxiety. Therefore, we excluded the two primary OCD subjects and conducted a separate analysis of the OCPT/SP group. Although we had intended to examine neurocognitive function in OCD, the fact that only two patients displayed classical OCD permits a comparison of the performance patterns of patients presenting with primary OCD (i.e., our prior work) and the present sample consisting of outpatients exhibiting obsessive-compulsive personality traits and schizotypal personality features (OCPT/SP) (without classical OCD symptoms). In the present study, we compared the neurocognitive profiles of OCPT/SP patients and community control subjects.

We administered a neuropsychological test battery consisting of tasks considered sensitive to prefrontal dysfunction. The battery included computer versions of the Object Alternation Test (34), a visual Go/No-Go discrimination task (35) [based on Lapierre and colleagues], Controlled Word Fluency Test (FAS Test) (36), Divergent Thinking Task (37) [based on Guilford and Hoepfner], Porteus Maze Task (38), and the Trail-Making Test (Parts A & B) (39). Performance impairments on the Object Alternation Test are associated with orbitofrontal dysfunction (34,40-43). The inability to inhibit a dominant or prepotent response on Go/No-Go tasks may also reflect orbitofrontal dysfunction. Performance deficits on Go/No-Go tasks are associated with orbitofrontal lesions among human and nonhuman primates (44). Rubia et al. (45) documented increased activation in mesial frontal and inferior frontal cortex, and caudate nucleus during a Stop Task among healthy adult subjects. The Stop Task is similar to the Go/No-Go Task (i.e., conflict blocks) used in the present study. These findings suggest that the Go/No-Go task should be considered a broadly frontal task. Performance deficits on tests assessing frontal executive functions may reflect DLPF dysfunction. Impaired verbal fluency may reflect dorsolateral-

frontal dysfunction. Regional cerebral blood flow (rCBF) and PET studies revealed significant flow augmentation and increased activity in DLPF cortex during verbal fluency tasks (46-48). The Trail-Making Test (parts A & B) taps visuospatial scanning and graphomotor skills; however, Trails B places additional demands on the subject. During Trails B, the subject must maintain two lines of information in working memory and sequentially alternate between numbers and letters (i.e., set-shifting). Efficient performance during the Porteus Maze Task requires planning and anticipation of blocked routes. Neuroimaging research and lesion studies suggest that the tasks employed in our protocol may be sensitive measures of prefrontal dysfunction; however, the localizing value of such measures remains uncertain. Of course, we must proceed cautiously when we argue that variations in brain function correspond to patterns of neuropsychological impairment and clinical presentation.

Subjects also completed the Schizotypal Personality Questionnaire-B (SPQ-B) (49). The lead author (A.A.) and a clinical psychologist independently translated the SPQ-B. A third individual translated the Turkish version back to the English. Integrity of the Turkish translation was verified using the back-translation technique. Discrepancies in meaning with the original English version were noted and the Turkish translation was adjusted. Time to completion of the protocol was highly variable across clinical subjects. In some cases subjects asked to end specific tasks before they were completed. For these reasons not all tasks were run on all subjects. In our analyses, degrees of freedom in the *t* statistics vary according to how many subjects participated in that task.

Results

As shown in Table 1, analysis revealed that OCPT/SP and control participants did not differ significantly on the Go/No-Go Task (a putative orbitofrontal measure) (all *p* values > 0.15). However, there were significant differences in performance on the Trail-Making Test (part B) and Divergent Thinking Task with OCPT/SP subjects demonstrating performance deficits in comparison to control participants, with $t(28)=2.447$, $p<0.02$ and $t(27)=-2.170$, $p<0.04$, respectively. Difference between groups on Controlled Word Fluency Test was marginally significant and was in the expected direction with OCPT/SP subjects generating fewer words, $t(27)=-1.995$, $p<0.07$. Groups did not differ significantly on the Porteus Maze ($p>0.40$) and Trail-Making Test (part A) ($p>0.12$). There were significant group differences on the Object Alternation Test, $t(27)=-2.814$, $p<0.01$, with OCPT/SP subjects displaying superior task performance. Difference between groups on the SPQ-B approached

significance and was in the expected direction, $t(25)=1.946$, $p<0.07$. As expected, OCPT/SP subjects obtained significantly higher scores on the OCPD Subscale of the PDQ-4, $t(28)=2.77$, $p<0.01$.

Tablo 1. Neuropsychological test performance: Group means

	Control	OCPT/SP
n	20	10
Age	21.2	25.5
Education	12.5	12.3
Orbitofrontal Tasks		
Object Alternation Test	19.7	6.4*
Go/No-Go Task (Mean Reaction Time)		
Go/No-Go--1	287ms	314ms
Go/No-Go--2	467ms	463ms
Go/No-Go--3	471ms	470ms
Executive Function Tasks		
FAS Test	33.2	26.8
DvT	5.7	4.2***
Porteus Maze Task	62.1s	78.2
Trail-Making Test		
Trail-Making (A)	38.6s	47.8
Trail-Making (B)	61.3s	83.6**
SPQ-B	9.7	13.7
OCPD	3.8	5.3*

Note: OAT=Object Alternation Test; Go/No-Go=Go/No Go Task (blocks 1, 2, 3) Mean Reaction Time; FAS=Controlled Word Fluency Test (FAS Test); DvT=Divergent Thinking Task; Porteus Maze Task=Time to Completion; Trail-Making Test = Time to Completion; ms=milliseconds; s=seconds; SPQ-B=Schizotypal Personality Questionnaire-B; OCPD=Obsessive-Compulsive Personality Disorder Subscale from the PDQ-4.

* $p < 0.01$ ** $p < 0.02$ *** $p < 0.04$

Discussion

Unexpectedly, only two of 12 patients in the Turkish sample presented with classical OCD (i.e., contamination obsessions, washing and checking rituals). Based on patients' performance patterns on clinical scales and a confirmatory diagnostic interview, the remaining 10 were best characterized as manifesting obsessive-compulsive personality traits and schizotypal features (OCPT/SP), and generalized anxiety. The neurocognitive profile of this group differed from the performance patterns of patients with primary OCD and OCD/SP in our prior work (5). It was particularly striking that the Istanbul patients were not impaired on measures considered sensitive to orbitofrontal dysfunction (such as the Object Alternation Test and the Go/No-Go Task). However, they demonstrated greater neuropsychological deficits on several executive function tasks. This similarity between the OCD/SP patients in the United States and the Turkish group suggests that further investigation into the relation between OCPTs, schizotypal personality features, and executive function deficits is warranted.

Our findings are broadly consistent with the contention that orbitofrontal dysfunction underlies primary OCD, while OC personality traits and schizotypal personality features are associated with performance deficits on tests of frontal executive

function, possibly reflecting DLPF dysfunction. While classical OCD symptoms are associated with performance deficits on orbitofrontal measures (5), subjects exhibiting obsessive-compulsive personality traits and schizotypal personality features do not demonstrate impaired performance on orbitofrontal tasks. Indeed, Istanbul OCPT/SP subjects demonstrated superior task performance on the object alternation test in comparison to community controls. The significance of this finding is uncertain;

however, it does suggest that OCD and OCPD may represent distinct neurocognitive, as well as clinical, entities. The limitations of this study are; relatively small sample size and danger of Type I error that would increase with multiple comparisons. However, results form a meaningful pattern and are consistent with prior research which found an association between performance deficits on tests of frontal executive function and OCPT as well as schizotypal personality features.

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