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RESEARCH ARTICLE

The relationship between neurocognitive profile and metacognitions in obsessive-compulsive disorder patients with autogenous and reactive features

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ABSTRACT

Objective: Obsessive-compulsive disorder (OCD) is characterized by obsessions and/or compulsions with heterogeneous symptom presentations. This study examines the neurocognitive functions and metacognitions of patients with OCD who have autogenous and reactive obsessions. Data from previous studies on neurocognitive functions and metacognitions in OCD patients with autogenous and reactive obsessions present different results. The purpose of the research was to investigate whether this subtyping, performed within the context of cognitive theory, differs in terms of metacognitive and neurocognitive aspects.

Method: The study included 67 patients with OCD, and 67 healthy participants matched with these patients. Patients were divided into groups based on their primary obsessions: autogenous and reactive. The Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Metacognition Questionnaire-30 (MCQ-30), Trail-Making Test (TMT), Stroop Test (ST), Rey Auditory Verbal Learning Test (RAVLT), and Wisconsin Card Sorting Test (WCST) were administered to all participants.

Results: No significant demographic differences were found between the OCD subgroups. The autogenous and reactive groups received higher scores than the healthy controls on the uncontrollability and danger, need to control thoughts, and cognitive self-consciousness subscales evaluated with the MCQ-30. Although the reactive group scored higher than the autogenous group on the MCQ-positive belief about worry subscale, no difference was detected between both groups and the healthy controls. In the correlation analysis, there was a moderate correlation between the positive beliefs score subscale of the MCQ-30 and the RAVLT verbal learning and recognition memory scores and between the cognitive confidence score of MCQ-30 and RAVLT immediate recall, verbal learning, and recognition memory scores in the autogenous group.

Conclusion: The study supports the presence of metacognitive beliefs and neurocognitive impairments in OCD subgroups. As a result, it can be concluded that the proposed grouping would be worthy of research in determining OCD subtypes. Future research with a larger sample may help to better explain metacognition and neurocognitive features in OCD patients with autogenous and reactive obsessions.

Keywords: Autogenous obsessions, cognitive function, metacognition, obsessive-compulsive disorder, reactive obsessions

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INTRODUCTION

Obsessive-compulsive disorder (OCD) is a common chronic psychiatric disorder characterized by obsessive thoughts and/or compulsive behaviors (1). OCD has been reported to affect 1% to 3% of the worldwide general population (2). OCD exhibits a heterogeneous structure in many aspect,s such as etiology, clinical features, and response to treatment. It has also been suggested that the different symptom dimensions of this mental disorder are associated with differences in neurobiology, clinical features, and response to treatment. The number of studies aimed at defining subtypes of OCD is increasing.

Classification of OCD into autogenous and reactive types is one of the most valid subtyping approaches for the heterogeneity of OCD (3). In their classification of obsessions, Lee and Kwon (3) proposed subtyping in which obsessions are classified into two subgroups, autogenous and reactive, within the context of cognitive theory. Accordingly, autogenous obsessions are more repetitive and disturbing; the individual is less willing to discuss them and requires fewer stimuli to appear in the mind. Obsessions with aggression, religious, and sexual themes are included in this group. Reactive obsessions tend to be triggered by an external stimulus. The individual also finds them less absurd and feels less need to conceal them, and they cause less discomfort compared to autogenous obsessions. Obsessions of contamination, doubt, symmetry, and hoarding are included in this group.

Research in cognitive functions like memory, executive function, and attention sheds light on various aspects of psychiatric disorders, such as their relationship with biological foundations, prognosis, and treatment of disorders (4). There are few studies in the literature comparing OCD subgroups in terms of cognitive functions. One study found that patients with checking compulsions tended to show more general memory deficits (5). Rachman (6) thought that different cognitive disorders may be seen in OCD according to symptom subgroups. Different results have also been obtained in neurocognitive-based studies on OCD patients with autogenous and reactive obsessions. Aydin et al. (7) reported that they could not find any difference in executive functions and verbal memory performance between the group with autogenous obsessions and the group with reactive obsessions. In a thesis study, autogenous and reactive OCD patients were compared with healthy controls using the Rey Auditory Verbal Learning Test, Wisconsin Card Sorting Test, Stroop Test, Controlled Word Association Test, and Clock Drawing Test. As a result of the research, no significant difference was found in the executive function, memory, attention, and visual-spatial functions of autogenous OCD patients compared to the reactive OCD group (8). Examining the cognitive processes of patients may be guiding in determining possible neurobiological differences between autogenous and reactive subgroups. It is thought that there may be differences in cognitive functions between autogenous and reactive OCD patients, who have different cognitive development systems and possibly different neurobiological bases. In addition, the fact that autogenous obsessions were found to be more associated with schizotypal features in a study conducted by Lee and Telch (9) may be related to the fact that there may be more cognitive impairment in the group with autogenous obsessions than in the reactive group.

Metacognitions include knowledge and beliefs about the thinking process and strategies for evaluating, interpreting, monitoring, organizing, and controlling that process and are defined as "cognitions about cognitions" (10). Many cognitive processes depend on metacognitive factors that control and monitor these processes (11). The metacognitive model of OCD has been supported by many studies. Cartwright-Hatton (12) and Wells demonstrated that OCD patients differed from the control group in the subscales that evaluate metacognition: positive beliefs about worry, negative beliefs about worry, and cognitive self-consciousness. Negative beliefs about anxiety and the need to control thoughts have been shown to be higher in OCD and obsessive-compulsive and related disorders compared to the comparison group (13). Although it is accepted that there are metacognitive differences in OCD patients, the situation of this in subgroups is not clear. People with autogenous obsessions tend to perceive their thoughts as ego-dystonic and irrational, to remove and repress them from their consciousness, or to use control strategies with compulsive behaviors, often of a covert, magical nature.

On the other hand, although they may describe their thoughts as irrational or strange, people with reactive obsessions tend to believe their thoughts are relatively realistic and plausible. Therefore, rather than trying to fend off the thought, they devote themselves to the actual coping behavior to prevent the undesirable consequences of the obsessive thought (3, 14). Our study was planned to compare

the metacognitions of autogenous and reactive groups and healthy people, considering that this difference may also be reflected in metacognition. Contradictory findings on the subject stand out in the literature. Dogan et al. (15) reported that they did not observe a statistically significant difference in any of the Metacognition Questionnaire-30 (MCQ-30) subscales and total scores among the 30 autogenous and 31 with reactive obsessions they evaluated with the MCQ-30. However, in a thesis study examining cognitive differences in OCD patients, it was reported that the average scores of the autogenous group were significantly higher than the reactive group in the dimensions of MCQ-uncontrollability and danger, need to control thoughts, and cognitive self-consciousness (16).

One of the hypotheses of this study is that OCD patients with autogenous and reactive features will have significantly more impairment in executive function, memory, and attention performances than healthy controls. In addition, it was thought that more deterioration in these neurocognitive performances would be detected in the group with autogenous obsessions associated with schizotypal personality traits (9) than in the reactive group. This study also examines whether metacognitive factors differ between groups with autogenous and reactive obsessions. In addition, it aimed to contribute to the limited number of studies on the relationship between metacognition, which monitors and regulates cognitive processes such as learning, problem-solving, memory, and neurocognitive performance (17).

METHODS

Sixty-seven patients meeting the inclusion criteria among individuals presenting to the Karadeniz Technical University (KTU) Faculty of Medicine Psychiatry Outpatient Clinic and diagnosed with OCD according to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) diagnostic criteria were included in the study. Sixty-seven healthy individuals with characteristics similar to those of the patient group in terms of age, gender, and education level were included as the control group. The control group was selected by invitation to participate in the study among students, hospital staff, and their acquaintances. Inclusion criteria were being educated to at least primary school level and aged 18–65. Exclusion criteria included the presence of conditions that impair cooperation and cognitive functions, alcohol or substance abuse in the previous six months, possession of a severe medical condition or drug use, history of brain surgery, or receipt of electroconvulsive therapy in the previous six months.

The patient group was divided into subgroups according to their primary obsessions using the Yale-Brown Obsessive Compulsive Scale (Y-BOCS) Symptom Checklist, which is in line with the relevant literature (3). When primary obsessions were screened, patients with both autogenous and reactive obsessions were excluded from the study because the dominant obsession could not be determined. Patients with one or more aggression, religious, or sexual primary obsessions were included in the autogenous group. In contrast, those with one or more contamination, doubt, symmetry/order, or hoarding primary obsessions were included in the reactive group. The suspicion obsession is not part of the Y-BOCS symptom list, but since it was observed in the patients in our study, it was included in the analysis. Twenty-seven of the 67 OCD patients included in the study were included in the OCD group with autogenous obsessions (AO group) and 40 in the OCD group with reactive obsessions (RO group).

One of the researchers administered neurocognitive tests. This researcher received supervision from a psychologist who was certified to administer these tests. All tests were administered by the same researcher in the same environment.

The research was performed as a descriptive study in which data were collected. The study was approved by the Karadeniz Technical University Faculty of Medicine Ethics Committee (Institutional Review Board, IRB approval date: January 11, 2016, number: 2015-116). Written informed consent was obtained from all participants.

Data Collection Tools

The Yale-Brown Obsessive Compulsive Scale (Y-BOCS)

Y-BOCS was developed by Goodman et al. (18) to measure the type and severity of obsessive-compulsive symptoms. Scores of 0–7 are regarded as subclinical, 8–15 as mild, 16–23 as moderate, and 24–31 as severe. Karamustafalioglu et al. (19) performed its adaptation into Turkish and validity and reliability study.

Beck Depression Inventory (BDI)

The BDI, developed by Beck et al. (20), assesses the severity of depression symptoms. Hisli (21) conducted the Turkish-language validity and reliability study.

Beck Anxiety Inventory (BAI)

The BAI measures the frequency and severity of anxiety symptoms and was originally developed by Beck et al. (22). Ulusoy et al. (23) conducted a validity and reliability study in Turkiye.

Metacognition Questionnaire-30 (MCQ-30)

The MCQ-30 was developed by Wells and Cartwright-Hatton (24) to assess various metacognitive beliefs in the metacognitive model of psychological disorders. The scale includes five dimensions: 1 - "positive beliefs about worry," 2 - "negative beliefs about uncontrollability and danger," 3 - "cognitive confidence," 4 - "need to control thoughts," and 5 - "cognitive self-consciousness." High scores indicate a higher occurrence of the beliefs assessed. The Turkish-language adaptation of the MCQ-30 was conducted by Tosun and Irak (25).

Trail-Making Test (TMT)

The TMT assesses psychomotor speed, visual-motor scanning, abstract thinking, ability to change set-up, inhibition of response tendency, ability to follow sequences, and attention (26). The longer the time in part A, the lower the psychomotor speed; the longer the time spent in part B, the weaker the mental flexibility (27). The TMT B-A duration, based on the difference in time taken to complete the two sections, eliminates the effect of the speed component, aiming to allow the measurement of attention, flexibility, and set-shifting (28). The Turkish-language validity and reliability study was conducted by Turkes et al. (29).

Stroop Test (ST)

This test was first developed by Stroop in 1935 (30). The Stroop Test reveals the ease with which an individual can alter their perceptual set-up in line with changing demands, especially under an "interference effect," and their ability to suppress a habitual behavior pattern (31). If the color used in the spelling of the word is not the same as the color that the word expresses, the time to say the color is prolonged. This is called the Stroop interference effect (Card 5) (32). Perseverative, stereotypic, maladaptive behaviors and difficulty in regulating and controlling motor movements are observed in the absence of such ability. The Turkish-language validity and reliability study of the test was conducted by Karakas et al. (32).

Rey Auditory Verbal Learning Test (RAVLT)

Rey (33) developed the original form of the RAVLT, which consists of word lists. The test aims to assess verbal learning and memory. Can et al. (34) conducted the Turkish-language validity and reliability study of the RAVLT.

Wisconsin Card Sorting Test (WCST)

The WCST was developed by Berg in 1948 (35). It is a useful test for assessing abstraction and conceptualization skills and evaluating the frontal complex attention system, such as the ability to maintain one's construct and to alter this when necessary. The WCST is associated with features such as attention, feature detection, perseveration, working memory, executive functions, conceptualization, and abstract thinking (36). Turkish-language adaptation studies of the test were conducted by Karakas et al. (37). The computerized version of the WCST (WCST-64 Computer Version 2 Research Edition) was used in the present study. Bekci et al. (38) reported that the results of the two applications overlapped in their study of whether the computerized applications measured the same characteristics as the classic form.

Data Analysis

The conformity of the data to the normal distribution was assessed with the Shapiro-Wilk test. The Mann-Whitney U test and Kruskal-Wallis test were applied to continuous variables that did not meet parametric assumptions, while Spearman's test was used in correlation analysis, and the Chi-Square test was applied to categorical data. Due to differences in BDI and BAI scores between groups, group comparisons were made with Quade's nonparametric analysis of covariance (ANCOVA). Linear regression analysis was used, and modeling was done backward. Statistical analyses were performed using SPSS version 22.0 software (SPSS Inc., Chicago, IL, USA). P-values less than 0.05 were regarded as statistically significant.

RESULTS

Sociodemographic Variables

No statistically significant differences were observed between the AO, RO, and control groups in terms of age, gender, marital status, education, and occupational status ($p=0.954$, $p=0.998$, $p=0.839$, $p=0.629$, and $p=0.145$, respectively) (Table 1). The most common type of obsession in the AO group was those with religious content (55.6%), while in the RO group, it was those with contamination (60.0%).

Test Scores

A statistically significant difference was determined between the AO and RO groups in terms of Y-BOCS insight score ($p=0.041$). No statistically significant difference was detected between AO and RO in the Y-BOCS obsession subscale, compulsion subscale, total score, and total severity scale ($p=0.136$, $p=0.183$, $p=0.142$, and $p=0.134$, respectively).

Table 1: Comparison of sociodemographic characteristics in autogenous, reactive, and control groups

	Autogenous	Reactive	Control	df Test statistic p
Age (years)				2
Median (min–max)	24 (18–55)	40 (18-53)	24 (18-55)	0.094 0.954^
Gender, n (%)				2
Female	16 (59.3)	24 (60.0)	40 (59.7)	0.004
Male	11 (40.7)	16 (40.0)	27 (40.3)	0.998+
Marital status, n (%)				2
Single	19 (70.4)	29 (72.5)	45 (67.2)	0.351
Married	8 (29.6)	11 (27.5)	22 (32.8)	0.839+
Education, n (%)				2
≤8 years	3 (11.1)	8 (20.0)	11 (16.4)	0.928
>8 years	24 (88.9)	32 (80.0)	56 (83.6)	0.629+
Occupation, n (%)				
Student	12 (44.4)	19 (47.5)	35 (52.2)	4
Working	6 (22.2)	9 (22.5)	23 (34.3)	0.145
Not working	9 (33.3)	12 (30.0)	9 (13.4)	0.145+

p<0.05; ^: Kruskal-Wallis test; +: Chi-Square test; df: Degrees of freedom; min: Minimum; max: Maximum.

BDI scores of both AO and RO groups were found to be statistically significantly higher than the control group (p<0.001). However, no significant difference was detected between the AO and RO groups in terms of BDI scores.

In terms of BAI scores, there was no statistically significant difference between the AO and RO groups and the RO and the control groups. However, a difference was observed between the AO and control groups (p=0.012).

Cognitive Functions

While no significant difference was detected between the autogenous and reactive groups in the TMT, Stroop Test (ST), RAVLT, and WCST, both groups showed significantly lower performance than the control group in all test scores (p<0.05) (Table 2).

When BDI and BAI fixed ANCOVA were applied, there was no difference between the subgroups and the control group in terms of neurocognitive test scores (p>0.05) (Table 2).

Metacognitive Functions

In MCQ positive belief scores, the RO group was found to be statistically significantly higher than the AO group (p=0.017). However, no significant difference was detected between the AO, RO, and control groups. In terms of MCQ-30 uncontrollability and danger, need to control thoughts, cognitive self-consciousness, and total scores, the AO and RO groups received statistically significantly higher scores than the control group (p<0.001, p<0.001, p=0.001, and p<0.001, respectively). In MCQ-30 cognitive confidence scores, no significant difference was detected between the groups (p=0.222) (Table 3).

When BDI and BAI fixed ANCOVA were applied to MCQ-30 positive belief scores, the RO group was found to be statistically significantly higher than the AO group (p=0.001). However, no significant difference was detected between the AO and RO groups and the control group (p=0.729, p=0.090, respectively). In MCQ-30 uncontrollability and danger scores, the AO group was found to be statistically significantly higher than the RO and control groups (p=0.044, p=0.017, respectively). No significant difference was detected between the RO and control group (p=0.184). In terms of MCQ-30 need to control thoughts and MCQ-30 total scores, the AO group was found to be statistically significantly higher than the control group (p=0.049, p=0.046, respectively). No significant difference was detected between the RO and control groups for both subscale scores (p=0.545, p=0.079, respectively). In the MCQ-30 cognitive self-consciousness score, the RO group was found to be statistically significantly higher than the control group (p=0.048). No significant difference was detected between the AO and control groups (p=0.086) (Table 3).

Table 2: Comparison of neurocognitive test scores in autogenous, reactive, and control groups

	Autogenous median (min–max)	Reactive median (min–max)	Control median (min–max)	p[1] Cohen's d	df H	ANCOVA (Quade) p[2]
TMT						
TMT-A (sec)	37 (14–104)[a]	29.5 (14–105)[a]	23 (13–100)[b]	**0.003** 0.244	2 11.776	0.375
TMT-B (sec)	92 (29–108)[a]	70 (38–245)[a]	51 (30–165)[b]	**<0.001** 0.451	2 29.080	0.499
TMT B-A (sec)	57 (15–103)[a]	44.5 (15–174)[a]	27 (8–105)[b]	**<0.001** 0.517	2 31.356	0.319
Stroop test						
Card 1 (sec)	9 (7–13)[a]	8 (6–17)[a]	8 (6–15)[b]	**0.036** 0.162	2 6.652	0.650
Card 2 (sec)	10 (7–11)[a]	10 (6–19)[a]	9 (6–25)[b]	**0.026** 0.167	2 7.293	0.889
Card 3 (sec)	13 (8–20)[a]	12 (7–21)[a]	10 (7–21)[b]	**0.001** 0.290	2 13.785	0.670
Card 4 (sec)	16 (8–33)[a]	14.5 (7–37)[a]	12 (9–30)[b]	**0.002** 0.231	2 12.133	0.539
Card 5 (sec)	26 (13–50)[a]	23.5 (11–43)[a]	18 (11–45)[b]	**0.002** 0.227	2 11.985	0.610
RAVLT						
Immediate recall	7 (3–12)[a]	7 (3–12)[a]	9 (5–12)[b]	**0.001** 0.351	2 14.274	0.674
Verbal learning	48 (24–72)[a]	54 (37–69)[a]	63 (44–72)[b]	**<0.001** 0.579	2 35.999	0.212
Interference effect	5 (3–10)[a]	6 (3–13)[a]	8 (4–14)[b]	**<0.001** 0.385	2 17.518	0.158
Delayed recall	10 (2–15)[a]	10.5 (6–15)[a]	13 (8–15)[b]	**<0.001** 0.544	2 30.201	0.299
Recognition memory	15 (4–15)[a]	14 (8–15)[a]	15 (10–15)[b]	**0.010** 0.258	2 29.246	0.203
WCST						
Perseverative responses	8 (3–38)[a]	9 (3–27)[a]	5 (3–18)[b]	**<0.001** 0.449	2 25.479	0.366
Perseverative errors	8 (3–29)[a]	9 (3–21)[a]	5 (3–15)[b]	**<0.001** 0.429	2 29.323	0.291
Nonperseverative errors	7 (3–16)[a]	9 (3–18)[a]	5 (2–14)[b]	**<0.001** 0.522	2 29.142	0.402
Number of categories completed	3 (1–5)[a]	3 (1–5)[a]	4 (1–5)[b]	**<0.001** 0.402	2 21.283	0.397

p<0.05; df: Degrees of freedom. The same letters indicate statistical similarity, different letters indicate difference. sec: Second; TMT: Trail Making Test; RAVLT: Rey Auditory Verbal Learning Test; WCST: Wisconsin Card Sorting Test; p[1]: Krukal-Wallis Test; p[2]: ANCOVA.

Correlation Analysis

There is a moderate negative correlation between MCQ-30 positive beliefs score and RAVLT verbal learning and recognition memory scores (rho=-0.425 and rho=-0.435, respectively). While the test score increases, the scale scores decrease. There is a moderate negative correlation between the MCQ-30 cognitive confidence score and RAVLT immediate recall, verbal learning, and recognition memory scores (rho=-0.429, rho=-0.453, and rho=-0.452, respectively). As the scale score increases, test scores decrease. There is a weak negative correlation between the MCQ-30 total score and RAVLT verbal learning scores (rho=-0.381). The verbal learning score decreases as the scale score increases (Table 4).

Table 3: Comparison of Metacognition Questionnaire-30 (MCQ-30) scores in autogenous, reactive, and control groups

	Autogenous	Reactive	Control	p[1] Cohen's d	df Test Statistic p[2]
MCQ Positive beliefs about worry Median (min–max)	8 (6–24)[a]	11 (6–21)[b]	11 (6–19)[a,b]	**0.017**^ 0.215	2 7.020 0.002++
MCQ Uncontrollability and danger Median (min–max)	20 (8–23)[a]	16 (7–23)[a]	13 (6–22)[b]	**<0.001**^ 0.489	2 3.856 0.026++
MCQ Cognitive confidence Median (min–max)	27 (7–24)	12.5 (6–24)	13 (6–24)	0.222^ 0.216	2 0.459 0.634++
MCQ Need to control thoughts Mean±SD	18.52±3.9[a]	15.83±4.04[a]	12.52±3.6[b]	**<0.001**# 0.636	4 11.300 <0.001+
MCQ Cognitive self-consciousness Mean±SD	17.26±2.9[a]	16.70±3.22[a]	14.74±3.8[b]	**0.001**# 0.325	4 3.275 0.016+
MCQ Total score Mean±SD	78.85±16.78[a]	73.37±14.30[a]	63.93±12.8[b]	**<0.001**# 0.440	4 6.962 <0.001+

p<0.05; ^: Krukal-Wallis Test; #Analysis of variance (ANOVA); +: Analysis of covariance (ANCOVA); ++: Quade analysis (non-parametric ANCOVA); df: Degrees of freedom. Same letters indicate statistical similarity; different letters indicate a difference. MCQ: Metacognition Questionnaire-30; p[1]: Either Krukal-Wallis Test or ANOVA; p[2]: ANCOVA.

Table 4: Correlation analysis between Metacognition Questionnaire-30 (MCQ-30) scores and neurocognitive test scores in the autogenous group

	MCQ Positive beliefs about worry	MCQ Uncontrollability and danger	MCQ Cognitive confidence	MCQ Need to control thoughts	MCQ Cognitive self-consciousness	MCQ Total score
TMT B-A rho	0.248	0.168	0.204	0.103	0.147	0.210
Stroop Test Card 5 reaction time rho	0.189	0.128	0.328	0.185	-0.052	0.217
RAVLT Immediate recall rho	-0.298	-0.368	-0.429*	-0.070	-0.235	-0.365
RAVLT Verbal learning rho	-0.285	-0.425*	-0.453*	-0.121	-0.150	-0.381*
RAVLT Recognition memory rho	-0.220	-0.435*	-0.452*	-0.150	0.071	-0.345
WCST Perseverative errors rho	0.108	0.224	0.286	0.214	0.115	0.253
WCST Nonperseverative errors rho	0.108	0.224	0.286	0.214	0.115	0.253

*: p<0.05 (Spearman's test). MCQ: Metacognition Questionnaire-30; TMT: Trail Making Test; RAVLT: Rey Auditory Verbal Learning Test; WCST: Wisconsin Card Sorting Test.

In the correlation analysis, no statistically significant difference was detected between the neurocognitive test and MCQ-30 scores in the RO group (p>0.05) (Table 5).

Regression Analysis

Linear regression analysis was applied to the neurocognitive test scores to calculate the separate predictive values of the MCQ scores for autogenous

Table 5: Correlation analysis between Metacognition Questionnaire-30 (MCQ-30) scores and neurocognitive test scores in the reactive group

	MCQ Positive beliefs about worry	MCQ Uncontrollability and danger	MCQ Cognitive confidence	MCQ Need to control thoughts	MCQ Cognitive self-consciousness	MCQ Total score
TMT B-A rho	-0.067	-0.273	-0.190	-0.145	0.147	-0.264
Stroop Test Card 5 reaction time rho	-0.153	-0.136	-0.193	0.063	-0.022	-0.162
RAVLT Immediate recall rho	0.191	0.057	0.153	-0.100	0.122	0.106
RAVLT Verbal learning rho	0.009	0.065	0.211	-0.068	0.060	0.082
RAVLT Recognition memory rho	-0.029	0.189	0.118	-0.032	0.022	0.007
WCST Perseverative errors rho	-0.071	0.215	-0.358*	0.095	0.190	-0.015
WCST Nonperseverative errors rho	0.044	0.048	-0.276	-0.071	-0.168	-0.106

*: p<0.05 (Spearman's test). MCQ: Metacognition Questionnaire-30; TMT: Trail Making Test; RAVLT: Rey Auditory Verbal Learning Test; WCST: Wisconsin Card Sorting Test.

Table 6: Linear regression analysis results of neurocognitive tests (predictive values of Metacognition Questionnaire-30, MCQ) in obsessive-compulsive disorder (OCD) patients with autogenous obsessions

Group	Predictive variable	Variable predicted	Beta	t	R^2	F
AO	MCQ Cognitive confidence	TMT-A	0.142	2.689*	0.224	7.231*

*: p<0.05. AO: Group with autogenous obsessions; MCQ: Metacognition Questionnaire; TMT: Trail Making Test.

and reactive obsessions. Accordingly, for the AO group, MCQ-30 cognitive confidence (β=0.142; p<0.05) emerged as a positive predictor of the Trail-Making Test Part A (TMT-A) (Table 6).

DISCUSSION

The distinction between autogenous and reactive obsessions offers a homogeneous subtyping opportunity, as they have different cognitive developmental systems, are triggered by different stimuli, have different contents, and are associated with different clinical features. Identifying homogeneous subgroups of OCD patients is important for understanding the pathophysiological mechanisms involved, clarifying differences in responses to treatment, and developing new therapeutic methods. Our study is considered remarkable as it is one of the limited number of studies in the literature examining OCD patients with autogenous and reactive obsessions.

No significant difference was found between the autogenous and reactive groups in terms of sociodemographic data such as age, gender, and educational level, which was considered valuable in terms of standardizing the effect of these parameters on test performances, considering that neurocognitive tests may be affected by age and educational level (37).

Akhtar et al. (39) suggested that the content of obsessions and compulsions may be affected by factors such as religion, locality, and social class. The high rate of obsessions with religious content in the AO group in our study may be due to the fact that the study was conducted in a predominantly Muslim society such as Turkiye, where there are some practices in Muslim culture such as religious rituals and practice of the warding off of blasphemous thoughts through repeated religious phrases. It was thought that the fact that contamination obsession was the most common type of obsession in the RO group was related to it being the most common obsession type of obsession in OCD (40).

The positive belief about worry sub-dimension of metacognition questions to what extent the person believes that worry is functional (24). Considering the results of our analysis in which the effects of depression and anxiety levels were controlled, our study findings may indicate that the RO group considered worrying as a positive or saving situation for themselves. Wells and Papageorgioui showed that doubt obsessions and checking compulsions were predicted by positive beliefs about worry (10). Doubt obsessions are in the reactive obsessions group. In this context, the result that positive beliefs about worry were significantly higher in the RO compared to the AO group in our study was thought to be compatible with Wells' findings.

On the other handsome studies did not find a difference between the AO and RO groups regarding the positive belief subscale (15,16). Dogan et al. (15) reported that they did not observe a statistically significant difference in any of the MCQ-30 subscales and total scores between the AO and RO groups, consisting of 30 and 31 patients, respectively. Unlike our study, the depression and anxiety levels of the patients were not evaluated in this study. Although they describe their thoughts as irrational or bizarre, people with reactive obsessions tend to believe that their thoughts are relatively realistic and rational. Unlike people with autogenous obsessions, they devote themselves to coping behaviors to prevent the possible undesirable consequences of the obsessive thought (3) rather than to avoid the thought (41). Our study findings may be related to the fact that people with reactive obsessions are more likely to believe that worrying is protective and prevents unwanted consequences. People with reactive obsessions may believe that worrying is useful in problem-solving and that the more they worry, the more prepared they will be to prevent potential danger.

Regarding the sub-dimension assessed by MCQ-30 uncontrollability and danger, the AO and RO groups had significantly higher scores than the control group. This finding is consistent with the findings of previous studies comparing OCD and control groups (13, 42). When depression and anxiety levels were controlled between the groups, it is noteworthy that the AO group scored significantly higher than the RO group. In a study examining cognitive differences in OCD patients with autogenous and reactive obsessions, it was reported that the mean scores of the autogenous group were significantly higher than those of the reactive group in the MCQ-30 uncontrollability and danger dimension (16). In a recent study, in the evaluation of 23 autogenous and 31 reactive patients with obsessions using MCQ-30, it was reported that the MCQ-30 uncontrollability and danger scores of the autogenous group were significantly higher than those of the reactive group (43). However, there is no data on the effect of depression and anxiety levels on the groups in both studies. In another study, obsessions to harm showed a relationship between the beliefs that anxiety is uncontrollable and dangerous (10). Beliefs that worry is uncontrollable and dangerous have been shown to be associated with obsessional thoughts about harming others and oneself (44).

In contrast to these studies, Dogan et al. (15) found no difference between the autogenous and reactive groups in the uncontrollability and danger subscale of the MCQ-30, as well as in all subscales. Our study results may indicate that patients with autogenous obsessions have stronger beliefs that anxiety is dangerous and uncontrollable than those in the reactive group. The group with autogenous obsessions may have a more negative evaluation of worry than the reactive group, who more often believed that worrying was beneficial.

Our study findings revealed that when depression and anxiety levels were controlled, the AO group scored significantly higher than the RO group on the MCQ-30 need to control thoughts sub-dimension. There are studies showing that the need to control thoughts is associated with OCD symptoms (45, 46). In terms of subgroups, there are studies that found MCQ-30 need to control thoughts scores significantly higher in OCD patients with autogenous obsessions compared to the reactive group (16, 43); some studies found no difference (15). The need to control thoughts involves the need to control negative beliefs that include the themes of being punished and being responsible. These beliefs are related to the fact that if the person cannot control them, the person will be responsible for the damaging consequences and will be punished (25).

On the other hand, while autogenous obsessions lead to feelings of dissatisfaction and guilt due to their content (religion, sexuality, and aggression), patients with these obsessions tend to consciously suppress these intrusive thoughts more than patients with reactive obsessions (14). The effort to consciously suppress thoughts paradoxically leads to an increase in autogenous obsessions (47). As a result, patients with autogenous obsessions may tend to suppress their thoughts more in relation to the content of their obsessions; that is, they may tend to try to control them.

Our study findings revealed that in the MCQ-30 cognitive self-consciousness subscale when depression and anxiety levels were controlled, the RO group scored significantly higher than the AO. In contrast

to our findings, in a study in which OCD patients with autogenous and reactive features were compared using MCQ-30, it was shown that the AO group scored significantly higher than the RO group in the cognitive self-consciousness subscale (16). There are also studies that found no difference between the groups (15, 43). The cognitive self-consciousness sub-dimension of the MCQ refers to a person's constant preoccupation with his or her own thought processes (25). People with autogenous obsessions tend to perceive their thoughts as alien to the self and irrational, push them away from their consciousness and suppress them (14). This effort may also affect the effort to work on thought processes. However, given the different results in the literature, this hypothesis needs to be supported by more robust studies with larger samples.

Our study found no difference between the autogenous, reactive, and control groups in the MCQ-30 cognitive confidence subscale. The result did not change when depression and anxiety levels were controlled. In a study investigating metacognitive predictors of worry and obsessive-compulsive symptoms using the Penn State Worry Questionnaire and MCQ-30 in a non-clinical Turkish sample, it was shown that cognitive confidence was specific to pathological worry and did not predict obsessive-compulsive symptoms (48). In previous studies comparing groups with autogenous and reactive obsessions, no significant difference was found between the groups (15) (16, 43). On the other hand, studies using experimental methods related to memory instead of self-report-based scale assessments have reported results showing that cognitive insecurity is associated with obsessive-compulsive symptoms (49, 50). Fowle and Boschen, in their study in a non-clinical sample, suggested that repeated cleaning decreases the confidence of individuals in their memory (50). Hermans et al. (49) pointed out the relationship between checking and MCQ-30 cognitive confidence in their study involving 16 OCD patients. Cognitive confidence evaluates people's distrust in their memory or the memory problems and forgetfulness they experience. Our findings support the view that the OCD group did not differ from the control group in terms of memory confidence. Differences between studies may be due to sample sizes or methodological differences.

TMT performance is affected by age and education level (29). The fact that there was no significant difference between the age and education levels of the groups compared in our study was thought to make the results more reliable in this respect. In one of the studies based on symptom dimension in OCD, the symmetry/order dimension was found to be associated with lower performance in verbal memory and TMT (51). In this study, 63 OCD patients and 50 healthy participants were included as a control group. Although the depression scores of the OCD group, assessed by the BDI, were significantly higher than the control group, there is no data on depression scores at the symptom level.

On the other hand, there are studies reporting that there is no difference between symptom dimension and neurocognitive test performances in OCD (52) Khanna and Vijaykumar (52) applied various neuropsychological tests such as TMT and ST to OCD patients who were categorized into subgroups such as pure obsessionals, checkers, and washers but could not detect any significant difference between the groups. Mataix-Cols et al. (53), in their meta-analysis, stated that they did not find a consistent relationship between symptom size and neurocognitive test performances in OCD. Our study findings reveal that neurocognitive test performances such as psychomotor speed, focused attention, and shifting attention (set-shifting) assessed by TMT did not differ between AO and RO groups. In this respect, our findings contribute to the data that there is no statistically significant difference in TMT performances between autogenous and reactive obsession groups.

There is evidence of impairment in the Stroop Test in OCD patients (54), as well as studies reporting no difference between OCD patients and controls (55, 56). Our study found no significant difference between the AO and RO groups in Stroop Test task performance. However, both groups performed significantly worse than the control group. In the study conducted by Aydin et al. (7), 62 OCD patients and 40 healthy controls were compared in terms of executive function and memory using the Stroop Test, WCST, Auditory Consonant Trigram Test, Controlled Word Association Test, Rey Auditory Verbal Learning Test, and Digit Span Test. In this study, no significant difference was found between OCD patients with autogenous and reactive obsessions, similar to our findings (7).

On the other hand, in some studies conducted on the symptom dimension in OCD, the symmetry/order dimension was found to be associated with poor performance in the Stroop Test (51, 57). There are also studies showing impaired Stroop Test performance in OCD patients with schizotypal personality traits (58). Based on studies showing that OCD patients with autogenous obsessions are associated with schizotypal personality traits such as magical thinking and unusual perceptions (9), it could be expected that AO would show worse Stroop performance than RO in our study.

However, no such finding was found in our study. Ultimately, although we think that there may be an impairment in both selective attention maintenance and inhibition of cognitive interference in patients with autogenous and reactive obsessions based on our study findings, it is evident that more studies are needed in the field to be able to say this conclusively.

In OCD patients, doubts about whether they actually perform an action or only think about doing it may turn into obsessions, and this may result in checking. The questions of what underlies these doubts in terms of information processing and whether there are specific memory problems that may lead to these doubts in patients with doubt obsessions in the reactive obsession group await an answer. Our study showed no significant difference between AO and RO in RAVLT performance. However, both groups performed significantly worse than those in the control group. In a study by Rajender et al. (59), a neurocognitive endophenotype was investigated by comparing OCD patients who were not taking medication with healthy controls and first-degree relatives of the patients. In this study, the verbal memory performance of 30 OCD patients, 30 relatives of OCD patients, and 30 healthy controls was evaluated with the RAVLT. In this study, verbal memory performance of OCD patients was found to be worse than that of the healthy control group (59). In their study, Tukel et al. (60) compared 72 OCD patients with 54 healthy controls in terms of neurocognitive functions. In this study, the California Verbal Memory Test was used to evaluate verbal memory, and it was found that the verbal memory performance of OCD patients was impaired.

Regarding subgroups, Aydin et al. (7) reported no significant difference between the AO and RO groups in terms of RAVLT performance. When examining the studies on symptom dimensions, the study by Hashimoto et al. (51), which used the Wechsler Memory Scale for memory assessment, found that the symmetry/order dimension was associated with lower performance in verbal memory tests. In contrast to these data, there are also studies suggesting that OCD patients do not have memory impairment (61, 62). Lastly, although our study findings indicate a significant impairment between AO and RO compared to the control group regarding the parameters evaluated by RAVLT, this should be supported by more consistent data.

AO and RO performed significantly worse than the control group in terms of WCST perseverative responses, perseverative errors, non-perseverative errors, and number of categories completed. Studies suggesting that there is no memory and attention problem in OCD, instead that OCD patients have biased memory and attention functioning, have drawn attention to the fact that OCD patients have problems in executive functions (63). Similar to our findings, there are studies in the literature reporting impairment in WCST in OCD patients (60–66). Bohne et al. (64) reported impairment in executive functions such as set-shifting, perseveration, and planning in OCD patients compared to healthy individuals. At the same time, they reported that the ability of OCD patients to learn changing categories according to the feedback given during the WCST application decreased (64). Aydin et al. (7) reported that there was no significant difference between the AO and RO groups in executive functions evaluated with WCST. In a study examining another executive feature in OCD patients with autogenous and reactive features, response inhibition was evaluated with the visceral Go/No-Go task, and it was reported that patients with autogenous obsessions had impaired response inhibition, with no difference between the reactive group and the control group (67).

In contrast to these findings, some studies found that patients diagnosed with OCD performed similarly to healthy subjects on the WCST (68–70). Our findings may indicate an impairment in executive functions assessed by the WCST, such as complex attention, perseveration, conceptualization, abstract thinking, and changing the setup in OCD patients with autogenous and reactive obsessions. However, the differences between the studies are striking in general. It should be kept in mind that the sensitivity of the WCST, which is also used in most of the above studies to assess executive function, may be low because it includes many sub-functions at the same time (71).

In all neurocognitive performances assessed by the TMT, ST, RAVLT, and WCST, patients with OCD performed worse than the control group. However, when the depression and anxiety scores between the groups are taken into consideration, it is noteworthy that the depression and anxiety scores of the patient group were higher than those of the control group. There are studies showing that depression and anxiety disorders negatively affect individuals' performance in cognitive domains such as attention, memory, executive functions, and processing speed (72–75). It has been suggested that depression has negative effects, especially on memory and executive functions, and anxiety has negative effects on attention and processing speed (76). Moritz et al. (77) examined 36 OCD patients and 36 healthy controls to investigate the effect of comorbid depressive symptoms on neurocognitive functions in OCD patients.

All participants were administered the WCST, TMT, and verbal fluency tasks. Patients with OCD who had high depression scores as assessed by the Hamilton Rating Scale for Depression (HRSD) performed significantly worse on the WCST and TMT-B than the control group and patients with low HRSD scores. In terms of the verbal fluency task, significant impairment was reported in the OCD group with high depression scores compared to healthy controls (77). In this context, in our study, when depression and anxiety levels of the AO and RO groups were controlled, no difference was observed in all neurocognitive test performances with the control group. Our study may support the proposition that neurocognitive dysfunction scores in OCD patients may be artificially increased by comorbid depressive symptoms (77). The limited number of studies in this field and the limited data on depression and anxiety scores in existing studies on OCD and neurocognitive functions suggest that this proposition should be reviewed with more studies.

A correlation was observed between the MCQ-30 cognitive confidence and RAVLT immediate recall, verbal learning, and recognition memory scores in the AO group. No significant relationship was determined between metacognitions and cognitive functions in the RO group. In line with these findings, it may be concluded that the less confidence OCD patients with autogenous obsessions have in their memory, the greater the loss of performance in immediate recall, verbal learning, and recognition memory functions. However, the question now arises of whether the cause of memory insecurity in the AO group represents a defect in recording, verbal learning, or recognition memory, or whether these patients have a misconception caused by mistrust in their memory, even though their current memory functions are normal. Some data in the literature support the idea of the presence of verbal memory impairment in patients with OCD (51, 59, 60, 78). However, studies also report no difference between the verbal memory performances of patients with OCD and healthy controls (61, 62). In particular, the possibility of a memory problem may be considered in OCD patients who are unsure whether or not they have performed an action and who check this frequently; this may indicate a memory-related encoding or recall problem. It has also been suggested that verbal memory impairment in OCD patients is related to organizational problems, i.e., executive functions, such as the inability to develop a good method for encoding information (79, 80).

Contrary to the idea of memory impairment in OCD, some researchers argue that patients do not, in fact, have poor memory, but that they maintain pathological suspicion due to poor confidence in their memory (61). Metacognition has included memory as a type of cognition in the majority of metacognitive studies. Metamemory is the prediction of whether or not we can subsequently remember something that we have difficulty remembering (81). Some studies on confidence judgments indicating metamemory have suggested that OCD patients have less confidence in their memory than normal individuals and that there is a metamemory disorder as well as memory impairment in OCD (61, (81). In their study, Tuna et al. (81), including 17 patients diagnosed with OCD, 16 subclinical checkers, and 15 normal controls, investigated memory and metamemory performance (feeling-of-knowing judgments) between groups for neutral and threat-related material. As a result, they suggested that OCD patients have a real impairment in memory performance and that this impairment may be related to metacognitive beliefs (that one's memory is terrible) and problems in encoding information as a result of these beliefs (81). Finally, the AO group exhibits a relationship between distrust in their memory and poor verbal memory performance. However, the context of this relationship is uncertain. On the other hand, it is noteworthy that the relationship between metacognitive data regarding memory confidence and verbal memory performance was not detected for the RO group.

According to the regression analysis results, the MCQ-30 cognitive confidence score emerged as a positive predictor of TMT-A in the AO group. This finding may indicate a potential relationship between decreased confidence in memory and attention skills and increased impairment in psychomotor speed and attention in this subgroup of OCD patients. However, our findings need to be replicated in more studies with larger samples in which neurocognitive functions and metacognitions are studied in OCD. In addition, the association between low cognitive confidence and lower psychomotor speed and attention may highlight the complex interplay between metacognitive beliefs and neuropsychological functioning in OCD.

The study has some limitations, the main one being that a significant proportion of the patients were receiving psychiatric medical treatment at the time of the study. Treatment may have had an effect on both obsessive-compulsive symptoms and neurocognitive and metacognitions. The lack of an adequate and clear instrument to fully define AO and RO may have affected the assessment of self-reported outcomes on most scales. Another important limitation of the study is

the small sample size, the fact that a single researcher interviewed patients, and the fact that it was cross-sectional. A dimensional assessment with a larger sample and more interviewers may strengthen the results.

CONCLUSION

In conclusion, this study sheds light on the nuanced differences between OCD subtypes characterized by autogenous and reactive obsessions. Through a comprehensive examination encompassing neurocognitive functions and metacognitive beliefs, we have aimed to research distinct patterns that contribute to our understanding of the heterogeneity within OCD. Identifying homogeneous subgroups within OCD not only aids in refining diagnostic criteria but also paves the way for personalized treatment approaches tailored to specific symptom profiles.

According to our findings, autogenous obsessions are associated with poorer memory performance and attention deficits, while reactive obsessions manifest as higher levels of anxiety and positive beliefs about worry. These findings emphasize the multifaceted nature of OCD and the need to consider both cognitive and emotional dimensions in clinical assessments. Our regression analysis reveals predictive relationships between metacognitive beliefs and neurocognitive functioning, highlighting the interaction between cognitive processes and metacognitions in OCD. In particular, decreased cognitive confidence is linked to poorer attentional skills in individuals with autogenous obsessions.

In summary, this research aims to contribute to our understanding of OCD by identifying distinct neurocognitive and metacognitive profiles associated with autogenous and reactive obsessions. Elucidating these nuances may contribute to developing targeted interventions that meet the specific needs of individuals with different OCD subtypes and ultimately improve treatment efficacy and patient outcomes. Future dimensional studies with a larger sample addressing the above limitations may help to better explain metacognition and neurocognitive features in OCD patients with autogenous and reactive obsessions.

Contribution Categories		Author Initials
Category 1	Concept/Design	E.U., E.O.K.
	Data acquisition	E.U., I.K.A.
	Data analysis/Interpretation	E.U., I.K.A.
Category 2	Drafting manuscript	E.U., E.O.K.
	Critical revision of manuscript	E.U., I.K.A., E.O.K.
Category 3	Final approval and accountability	E.U., I.K.A., E.O.K.

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