

## An Evaluation of Metacognitive Functions in Obsessive-Compulsive Disorder

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### ABSTRACT

**Introduction:** In metacognitive theory, thought fusion beliefs, beliefs about rituals, and beliefs about stop signals predict obsessive-compulsive symptoms. The number of controlled studies using specific scales to assess these three belief domains in different cultures is limited.

**Methods:** The comparison sample consisted of patients with obsessive-compulsive disorder (n: 106) and control (n: 200) group. Participants filled out the Obsessive-Compulsive Inventory-Revised form, Penn State Worry Scale, Obsessive Beliefs Scale-44, Thought Fusion Inventory, Beliefs about Rituals Inventory and Stop Signs Questionnaire. Correlation analysis of worry and OCD symptom severity levels, cognitions and metacognitions in OCD were performed between groups. Worry, cognition and metacognitive predictors of obsessive-compulsive symptoms were analyzed with a hierarchical linear regression model.

**Results:** The metacognitive scale scores were significantly higher in the OCD group than in the control group except for hoarding ( $p<0.001$ ).

Obsessive-compulsive symptoms were statistically positively correlated ( $r: 0.17-0.53$ ) with all three metacognitive functions in the OCD and control groups (except ordering in the control group). In addition to the three metacognitive domains, worry, perfectionism and intolerance of uncertainty predicted obsessive-compulsive symptoms ( $p<0.05$ ). All three metacognitive domains contributed to the variance in the hierarchical regression model in addition to worry and cognitions ( $p<0.05$ ).

**Conclusion:** All the three metacognitive domains were correlated with OCD symptom severity. Metacognitions explained additional variance above and beyond cognitions. Metacognitive assessment domains of OCD predicted OCD symptom severity when included in the hierarchical regression model.

**Keywords:** Beliefs about rituals, hoarding, metacognition, metacognitive therapy, obsessive-compulsive disorder, stop signals thought fusion

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### INTRODUCTION

The metacognitive theory concerns the beliefs, strategies, and processes involved in evaluating, monitoring, or controlling cognitions related to the symptomatology of obsessive-compulsive disorder (OCD) (1). Wells' metacognitive model explains psychological disorders through the "self-regulating executive functions" model (S-REF). Cognitions are considered as internal triggers in the S-REF model and they are the inputs to be processed, which determine the response of the individual. The dysfunctional system called the "Cognitive Attentional Syndrome", which is processed at multiple levels according to the S-REF model, can lead to the onset and persistence of mental disorders (2).

Wells' model emphasizes that there are three main metacognitive domains that lead to obsessive-compulsive (OC) symptoms. These three metacognitive domains are the beliefs about rituals, stop signals and thought fusion. People with OCD can easily detect intrusive thoughts because they focus their attention on their thoughts. Metacognitive beliefs about the importance and significance of thoughts lead to a negative evaluation of these thoughts. Unrealistic interpretations of intrusive thoughts as potentially harmful lead to compulsive behavioral responses to overcome the perceived danger (3).

### Highlights

- The study's results contribute to the validity of the metacognitive theory of OCD.
- All three metacognitive domains were correlated with OCD symptom severity.
- MCT provides a more comprehensive explanation of OCD than worry and cognitions.

The studies examining the role of metacognitive beliefs in the symptoms and etiology of OCD in the literature showed that beliefs about thought-action fusion, thought control and dangerousness are associated with OCD symptoms (4). Wells and Papageorgiou found that metacognitive beliefs are predictive of obsessions regardless of worry level (5). A study comparing worry and obsession suggested that cognitive awareness, a metacognitive domain, may be specific to obsessive thoughts (6). In a

study of patients with OCD, metacognitive beliefs were specific predictors of OC symptoms rather than the perfectionism and responsibility models. The same study also found that response to exposure and response prevention therapy was highly correlated with metacognitive beliefs. Two similar studies in nonclinical samples showed that the three metacognitive domains proposed by Wells could explain the symptoms of OCD even when controlling for worry, overestimated threat beliefs, responsibility, and perfectionism (7).

The metacognitive model of OCD is based on beliefs about thought fusion, rituals, and stop signals. The Metacognitive training (MCT) methods that can be used are based on these three areas. Fusion beliefs are the perception of mental processes as if they were real in the dimension of action, event, or object. For fusion beliefs, detached mindfulness, helping the patient to distinguish the object mode from the metacognitive mode, controlling biased attentional processes, worry postponement, and challenging dysfunctional metacognitive beliefs are among some of the MCT techniques a therapist might apply in sessions. Beliefs about rituals refer to attributions about the effects of not performing rituals on anxiety, guilt, loss of function, behavior, and character. Metacognitive training provides intervention opportunities with detached mindfulness, challenging dysfunctional metacognitive beliefs, Socratic questioning, increasing metacognitive awareness, ritual modulation exercises, and postponing or stopping rituals. Beliefs about stop signals are about rules for when to stop rituals. Metacognitive training methods seek to determine how necessary and adaptive these beliefs are. The techniques to be used aim to assess the necessity of these beliefs and replace these beliefs with more functional beliefs (3).

In a recent study, severity scores on assessment scales related to the main three metacognitive domains decreased in both exposure-response prevention therapy and MCT, and the results in fusion beliefs were more significantly positive in the MCT group rather than exposure-response prevention therapy group. In the same study, it was stated that a stop signal may be a better predictor for OCD severity (8). Another study found that improvement in metacognitive beliefs could predict response to selective serotonin reuptake inhibitor treatment in OCD (9). In a study comparing detached mindfulness (an essential method of MCT) with cognitive restructuring, the response to both treatments was similarly positive (10).

Explanations for the emergence of OCD have evolved and changed. Today, the metacognitive model offers a complementary and innovative basis for the etiology of OCD. The data on the metacognitive model are mostly from studies in Western culture. In addition, the number of studies is limited and there are few studies with patient groups. In the light of all these, our study aimed to investigate the role of metacognition on OCD symptoms in a Turkish sample of patients diagnosed with OCD. The hypothesis of our study was as follows:

- Obsessive-compulsive metacognitions correlate with OC symptoms.
- There is a significant difference in OC metacognitions between the clinical and nonclinical samples.
- Metacognitions explain additional variance for OC symptoms when worry, overestimated threat beliefs, responsibility, and perfectionism/certainty are controlled,

## METHOD

### Study Sample

The patient group in the study sample consisted of patients between the ages of 18–65 with a diagnosis of OCD who applied to the “Blinded for

review” Department of Psychiatry outpatient clinic between September 2018 and September 2021.

Exclusion criteria were the diagnoses of schizophrenia and related disorders, bipolar disorders, and neurodegenerative disorders (such as Alzheimer’s disease).

Inclusion criteria for the OCD group: Individuals between the ages of 18–65 who were diagnosed with OCD as a result of the diagnostic interview and who volunteered to participate in the study.

Exclusion criteria for the OCD group: Diagnosis of schizophrenia and related disorders, bipolar affective disorders and neurodegenerative disorders (such as Alzheimer’s disease).

Continued use of psychotropic medication for any mental disorder other than OCD at the time of admission. Participants with more than 20% missing data on each assessment tool.

Inclusion criteria for the control group: Volunteer participants aged 18–65 years who applied to outpatient clinics outside the psychiatry department.

Exclusion criteria for the control group: Participants who used psychotropic medication for mental disorders in the last month and participants with more than 20% missing data in each assessment tool were also excluded from the analyses.

Ethical approval for the study was obtained from Tokat Gaziosmanpaşa University Faculty of Medicine Clinical Research Ethics Committee with permission dated 19.04.2017 and numbered 83116987-121. Written informed consent was obtained from all participants.

### Instruments and Procedure

**Sociodemographic Data Form:** This form included key descriptive characteristics such as sex, age, education level, marital status, and family history of mental illness.

**Structured Clinical Interview for the DSM-5 (SCID-5-CV):** It is a semi-structured interview guide developed to establish DSM-5 diagnoses (11). This interview guide was administered by clinicians familiar with the DSM-5 diagnostic classification system. Turkish validity and reliability studies have been conducted (12). The researchers received training on the application of the SCID-5-CV before the study.

**Obsessive-compulsive Inventory-Revised (OCI-R):** It was developed to determine the symptom severity of OC disorder (13). The scale consists of six subscales: Washing, Checking, Organizing, Obsessing, Hoarding, and Neutralizing. The Turkish validity and reliability study of the scale was conducted, and the internal consistency coefficients of the subscales were reported to be 0.55–0.89 (14). High scores indicate increased severity of the disorder.

**Obsessive-compulsive Beliefs Questionnaire-44 (OBQ-44):** It is a 44-item scale that assesses several important belief areas in the etiology of OCD. The initial version consisted of 87 items, but it was updated and reduced by the OCD Working Group to 44 high-stress items and three factors. The factors of the 44-item scale are perfectionism/certainty, importance/control of thoughts, and responsibility/exaggerated threat perception (15). The validity and reliability of the 44-item scale for Turkish society have been demonstrated (16). Another study on the 3-factor model was found inappropriate in confirmatory factor analysis conducted with 44 items. In this regard, Myers et al. determined that the four-factor structure would be appropriate because the factor related

to the importance/control of thinking assesses a metacognitive domain and may overlap with metacognitive structures. This 4-factor structure was defined as perfectionism/certainty, importance/control of thinking, responsibility, and exaggerated threat. The Cronbach's alpha values for the four factors were reported to be 0.86–0.94 (17). Since the factor related to the importance/control of thinking assesses a metacognitive domain, and as it might overlap with other metacognitive structures in this study, it was excluded, and the other three factors were based on cognitive beliefs.

**Penn State Worry Questionnaire (PSWQ):** This self-report inventory consisting of 16 questions assesses the level of worry. The questions are rated on a 5-point Likert scale from 1 to 5. The increase in scale scores indicates a higher level of worry (18). The Turkish validity and reliability study of the scale was conducted. The internal consistency coefficient of the Turkish scale was 0.91, and the test-retest reliability was 0.88 (19).

**Thought Fusion Instrument (TFI):** This is a 14-item self-report scale that assesses metacognitive beliefs about the importance and power of thoughts. It measures the metacognitive model's three types of thought fusion. These domains are thought-action fusion, thought-event fusion (TEF), and thought-object fusion (TOF) (20). Good internal consistency was found with a Cronbach's alpha of 0.89 for the scales. Adjusted item-total correlations ranged from 0.35 to 0.78 (21). In the Turkish validity and reliability study of the scale, a Cronbach's alpha of 0.75–0.89 was found for the entire scale and its subscales (22).

**Beliefs About Rituals Inventory (BARI):** The Cronbach's alpha of this 12-item scale that assesses positive beliefs about rituals through self-report was reported to be 0.86, and the corrected item-total correlations ranged from 0.39 to 0.65 (23). It consists of Behavior and Character Change (BCD), Guilt and Loss of Functioning (GLF), and Anxiety (A). The Cronbach's alpha values of the subscales showed good internal consistency at 0.77–0.87. In the validity and reliability study of the Turkish version of the scale, Cronbach's alpha value for the entire Turkish scale and subscales was 0.74–0.88 (22).

**Stop Signals Questionnaire (SSQ):** It is a 12-item self-assessment questionnaire representing unrealistic stop signals people use to end rituals. The person rates the situations depicted in the questions between 0 and 4, depending on how important they are to stop the rituals. Test-retest reliability for the SSQ at three months was reported as 0.62. The questionnaire has good internal consistency with a Cronbach's alpha of 0.89 (24). The Cronbach's alpha value for the entire Turkish scale was 0.94. The scale consisted of a single factor, like the original scale for the Turkish SSQ (22).

### Data Analysis

IBM Statistical Package for Social Sciences (SPSS) program version 25 was used to analyze the data. The Shapiro-Wilk's test was used to determine whether the data were normally distributed. Means, standard deviations and percent distributions of descriptive statistics were reported. For group comparisons, the chi-squared test was used for categorical variables, the independent group's t-test for continuous variables with normal distribution, and the Mann-Whitney U-test for continuous variables that were not normally distributed. Cohen's d-effect size was calculated for the mean difference between control and clinical groups. Cohen's d effect sizes are classified as small ( $d=0.20-0.49$ ), medium ( $d=0.50-0.79$ ) and large ( $d \geq 0.80$ ), taking into account Cohen J. (1988) classified. As a result of the normality analysis, Pearson's correlation analysis was applied to determine the correlation between the variables. Regression analysis was used to investigate the effect of the independent variables on the dependent variables, and hierarchical regression analysis was used to test the contribution of variables to the additional variance.

## RESULTS

### Sociodemographic Characteristics

The study included 209 (68.3%) female and 97 (31.7%) male participants. The distribution of the control group by sex was 140 (70%) females and 60 (30%) males; the distribution of the OCD group by sex was 69 (65.7%) females and 37 (34.3%) males. No significant difference was found between the distribution of the OCD and control groups by sex ( $p=0.38$ ).

The mean age of the 306 participants was calculated to be  $23.46 \pm 5.67$  years. The mean age of the control group was  $21.98 \pm 5.76$  years; the mean age of the OCD group was  $26.25 \pm 5.04$  years. Participants in the OCD group were statistically significantly older than the participants in the control group ( $p < 0.001$ ).

### Comparison of Obsessive-compulsive Symptoms, Cognitions, and Metacognitions Between Groups

The mean values of the scale and subscale scores of the OCD and control groups were calculated (Table 1). Symptom, cognition (except hoarding), and metacognition mean scores were higher in the OCD group than in the control group ( $p < 0.001$ ).

### The Relationship Between Cognitive Beliefs, Metacognitive Beliefs, Obsessive-compulsive Symptoms and Worry Level

Obsessive-compulsive symptoms and worry levels positively correlated with all the cognitive and metacognitive beliefs ( $r_s=0.43-0.64$ ,  $p < 0.001$ ). Cognitive and metacognitive beliefs also positively correlated with each other ( $r_s=0.40-0.62$ ,  $p < 0.001$ ). Details of the correlation analysis are given in Table 2.

### Differential Correlations of Obsessive-compulsive Symptoms with Metacognitive Beliefs in OCD and Control Groups

In the OCD group, all metacognitive beliefs correlated positively with OC symptoms ( $r_s=0.17-0.50$ ). The only exception was a non-significant correlation between the TFI and ordering. Similar results were obtained for the correlations observed in the control group ( $r_s=0.18-0.48$ ). Yet, in this instance, there was no correlation for BARI with ordering, checking and neutralizing. Further, there was also no correlation between the TFI and checking as presented in Table 3.

### Linear Regression Analysis of Worry, OCD Cognitions, and OCD-specific Metacognitive Beliefs on OC Symptoms

When all predictor variables were entered simultaneously into the linear regression model, each variable, except for responsibility beliefs and overestimation of threat, independently contributed to the variance explained in the OC symptomatology (Adj.  $R^2=0.50$ ). The association between OC symptom severity and worry was the highest ( $\beta=0.25$ ), and this was followed by perfectionism/need for certainty ( $\beta=0.17$ ) and thought fusion ( $\beta=0.17$ ) as presented in Table 4.

### Hierarchical Linear Regression Analysis of OCD Cognitions, Worry and OCD-Specific Metacognitive Beliefs on the Predictive Value of Obsessive Symptoms

The hierarchical linear regression model tested whether OCD-specific metacognitive beliefs contribute additional variance to OCD symptomatology beyond worry and cognitions. Therefore, after including worry in the first step of the hierarchical regression model, the OBQ subscales related to OCD cognitions (Perfectionism and Intolerance of Uncertainty, Responsibility, Overestimation of Threat) were entered in the second step. In the third step, TFI, BARI and SSQ were included in the regression model.

The hierarchical linear regression model tested whether OCD-specific metacognitive beliefs contributed to additional variance of OCD

**Table 1.** Comparison of obsessive-compulsive symptoms, cognitions and metacognitions between groups

	<b>Patients with OCD n=106</b>	<b>Control Group n=200</b>	<b>t</b>	<b>P</b>	<b>d</b>
	<b>MEAN ± SD</b>	<b>MEAN ± SD</b>			
OCI-R Total	34.17±15.16	21.48±10.59	-7.53	<0.0001	0.97
Washing	5.41±3.87	3.02±2.35	-5.80	<0.0001	0.74
Obsessing	7.94±4.37	3.83±2.83	-8.72	<0.0001	1.11
Hoarding	3.82±2.99	3.58±2.22	-0.74	0.459	0.09
Ordering	6.22±4.51	5.03±2.74	-2.49	0.014	0.31
Checking	6.93±3.29	3.80±2.44	-8.58	<0.0001	1.08
Neutralizing	3.45±2.89	2.22±2.23	-3.82	<0.0001	0.47
TFI	435±238.34	241±208.59	-7.32	<0.0001	0.87
BARI	26.98±8.55	17.89±5.59	-9.79	<0.0001	1.25
SSQ	27.08±10.76	15.78±12.46	-8.15	<0.0001	0.97
OBQ-44	193.5±46.33	145.34±46.54	-8.27	<0.0001	1.03

BARI: beliefs about rituals inventory; OBQ-44: obsessive beliefs questionnaire-44; OCD: obsessive-compulsive disorder; OCI-R: obsessive-compulsive inventory revised; SD: standard deviation; SSQ: stop signals questionnaire; TFI: thought fusion instrument.

**Table 2.** The relationship between cognitive beliefs, metacognitive beliefs, obsessive-compulsive symptoms and anxiety level

<b>Pearson Correlation; r value n=306</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7</b>	<b>8</b>
1. OBQ-PIU	-	0.76 <sup>a</sup>	0.73 <sup>a</sup>	0.44 <sup>a</sup>	0.54 <sup>a</sup>	0.46 <sup>a</sup>	0.55 <sup>a</sup>	0.61 <sup>a</sup>
2. OBQ-R		-	0.74 <sup>a</sup>	0.40 <sup>a</sup>	0.51 <sup>a</sup>	0.50 <sup>a</sup>	0.47 <sup>a</sup>	0.54 <sup>a</sup>
3. OBQ-OT			-	0.52 <sup>a</sup>	0.62 <sup>a</sup>	0.50 <sup>a</sup>	0.58 <sup>a</sup>	0.64 <sup>a</sup>
4. TFI Total				-	0.58 <sup>a</sup>	0.45 <sup>a</sup>	0.53 <sup>a</sup>	0.46 <sup>a</sup>
5. BARI Total					-	0.53 <sup>a</sup>	0.57 <sup>a</sup>	0.60 <sup>a</sup>
6. SSQ Total						-	0.49 <sup>a</sup>	0.43 <sup>a</sup>
7. OCI-R Total							-	0.61 <sup>a</sup>
8. PSWQ								-

<sup>a</sup>p<0.001, <sup>b</sup>p<0.01

BARI: beliefs about rituals inventory; OBQ: obsessive beliefs questionnaire-44; OCI-R: obsessive-compulsive inventory revised; OT: overestimation of threat; PIU: perfectionism and intolerance of uncertainty; PSWQ: Penn State worry questionnaire; R: responsibility; SD: standard deviation; SSQ: stop signals questionnaire; TFI: thought fusion instrument.

**Table 3.** Correlation of obsessive-compulsive symptoms with metacognitions

<b>Pearson Correlation; r value</b>	<b>Total n=306</b>			<b>Patients with OCD n=106</b>			<b>Control Group n=200</b>		
	<b>TFI</b>	<b>BARI</b>	<b>SSQ</b>	<b>TFI</b>	<b>BARI</b>	<b>SSQ</b>	<b>TFI</b>	<b>BARI</b>	<b>SSQ</b>
OCI-R	0.53 <sup>a</sup>	0.57 <sup>a</sup>	0.49 <sup>a</sup>	0.39 <sup>a</sup>	0.50 <sup>a</sup>	0.45 <sup>a</sup>	0.48 <sup>a</sup>	0.38 <sup>a</sup>	0.36 <sup>a</sup>
Washing	0.50 <sup>a</sup>	0.48 <sup>a</sup>	0.41 <sup>a</sup>	0.40 <sup>a</sup>	0.42 <sup>a</sup>	0.45 <sup>a</sup>	0.45 <sup>a</sup>	0.29 <sup>a</sup>	0.25 <sup>a</sup>
Obsessing	0.46 <sup>a</sup>	0.60 <sup>a</sup>	0.43 <sup>a</sup>	0.26 <sup>b</sup>	0.44 <sup>a</sup>	0.32 <sup>a</sup>	0.43 <sup>a</sup>	0.49 <sup>a</sup>	0.30 <sup>a</sup>
Hoarding	0.30 <sup>a</sup>	0.31 <sup>a</sup>	0.27 <sup>a</sup>	0.24 <sup>b</sup>	0.36 <sup>a</sup>	0.27 <sup>b</sup>	0.35 <sup>a</sup>	0.31 <sup>a</sup>	0.29 <sup>a</sup>
Ordering	0.24 <sup>a</sup>	0.22 <sup>a</sup>	0.26 <sup>a</sup>	0.12 <sup>d</sup>	0.17 <sup>c</sup>	0.22 <sup>c</sup>	0.28 <sup>a</sup>	0.17 <sup>b</sup>	0.24 <sup>a</sup>
Checking	0.35 <sup>a</sup>	0.43 <sup>a</sup>	0.36 <sup>a</sup>	0.23 <sup>c</sup>	0.30 <sup>a</sup>	0.23 <sup>b</sup>	0.18 <sup>b</sup>	0.17 <sup>b</sup>	0.21 <sup>a</sup>
Neutralizing	0.42 <sup>a</sup>	0.37 <sup>a</sup>	0.36 <sup>a</sup>	0.38 <sup>a</sup>	0.43 <sup>a</sup>	0.40 <sup>a</sup>	0.36 <sup>a</sup>	0.19 <sup>b</sup>	0.26 <sup>a</sup>

<sup>a</sup>p<0.001, <sup>b</sup>p<0.01, <sup>c</sup>p<0.05, <sup>d</sup>p>0.05

BARI: beliefs about rituals inventory; OCD: obsessive-compulsive disorder; OCI-R: obsessive-compulsive inventory revised; SSQ: stop signals questionnaire; TFI: thought fusion instrument.

symptomatology beyond worry and cognitions of OCD. Therefore, worry was included in the first step of the hierarchical regression model. In the second step, cognitions of OCD were included in the hierarchical regression model. In the last step, OCD-specific metacognitive beliefs were included in the hierarchical regression model.

As presented in Table 5, Overestimation of Threat and Responsibility did not contribute to the variance in the last step ( $p>0.05$ ). Perfectionism and Intolerance of Uncertainty were the only cognitive beliefs that added to the variance in the last step. All three metacognitive beliefs made an additional contribution to the variance at the last step as  $\Delta R: 0.07$  ( $p<0.05$ ).

**Table 4.** Regression analysis of cognitive, metacognitive and anxiety predictors of oc symptoms

OCI-R <sup>*</sup> n=305	$\beta$	t	P
PSWQ	0.25	4.43	<0.0001
OBQ-OT	0.13	1.75	0.081
OBQ-PIU	0.17	2.44	0.015
OBQ-R	-0.09	-1.32	0.185
TFI	0.17	3.25	0.001
BARI	0.13	2.24	0.026
SSQ	0.14	2.66	0.008

<sup>\*</sup>(r: 0.71; adjr<sup>2</sup>:0.50)

BARI: beliefs about rituals inventory; OBQ: obsessive beliefs questionnaire; OCI-R: obsessive-compulsive inventory revised; OT: overestimation of threat; PIU: perfectionism and intolerance of uncertainty; PSWQ: Penn State worry questionnaire; R: responsibility ; SSQ: stop signals questionnaire; TFI: thought fusion instrument.

**Table 5.** Hierarchical regression model of worry, cognitive and metacognitive predictors of obsessive-compulsive symptoms

OCI- R n=306	$\Delta R$	sig.	B	t	sig.
<b>STEP 1</b>	0.36	<0.001			
PSWQ			0.62	13.60	<0.001
<b>STEP 2</b>	0.02	0.16			
PSWQ			0.38	6.48	<0.001
OBQ-PIU			0.16	2.18	0.03
OBQ-R			-0.03	-0.43	0.67
OBQ-OT			0.24	3.19	0.002
<b>STEP3</b>	0.07	0.003			
PSWQ_ORT			0.28	4.47	<0.001
OBQ-PIU			0.14	2.05	.041
OBQ-R			-0.07	-0.10	.344
OBQ-OT			0.01	1.30	.194
TFI			0.17	3.23	.001
BARI			0.14	2.36	.019
SSQ			0.14	2.78	.006

BARI: Beliefs About Rituals Inventory; OBQ: Obsessive Beliefs Questionnaire; OCI-R: Obsessive Compulsive Inventory-Revised; OT: Overestimation of Threat; PIU: Perfectionism and Intolerance of Uncertainty; PSWQ: Penn State Worry Questionnaire; R: Responsibility; SSQ Stop Signals Questionnaire; TFI: Thought Fusion Instrument

## DISCUSSION

In the present study, the scores of the three OC metacognitive beliefs, the OC symptoms except hoarding, and OC cognitive belief domains were higher in the OCD group than in the control group. A large effect size was found for all three domains of the OCD-specific metacognitive beliefs (TFI  $d=0.87$ , BARI  $d=1.25$ , and SSQ  $d=0.97$ ).

Similar to our results, higher mean scores were obtained in the clinical group than in the non-clinical group study by Solem et al. (7). Although a similar effect size was found for TFI in the same study, a larger effect size was found for BARI. The current study also took into consideration the scores of the SSQ, therefore adding to the knowledge base in the literature. The current study also demonstrated that while some specific cognitive beliefs, i. e. overestimation of threat and responsibility, failed to show significant or correlation with OC symptomatology, none of the metacognitive belief domains did.

Results regarding the correlation between OC metacognitions, OC cognitions, OC symptoms, and worry ranged from  $r: 0.40$  to  $0.64$ . These results are consistent with previous studies (7,24). No correlation was found for some of the OC symptoms, such as checking and ordering. Although all metacognitive domains showed a statistically significant correlation in the overall group, no significant correlation was found for checking and ordering in the control and OCD groups. In similar studies,

some obsessive symptoms were not correlated with metacognitive beliefs similar to our study (7,25). These results could be related to the sample size, the limitations imposed by the subscales of OC symptoms, or the inability of metacognition to explain all OC symptoms at the same level.

Other studies conducted using the Metacognitive Questionnaire-30 (MCQ-30) reported that it could not differentiate between different disorder groups (26). Yet, the MCQ-30 is a scale that may be used for assessment within a more general approach, and it is specific due to the model's inherent transdiagnostic approach. Thus, the inclusion of OCD-specific assessment tools in the current study aims to overcome this observed limitation. The ability of metacognitions in OCD to explain OC symptoms independently of worry indicates the existence of disorder-specific metacognitive beliefs as well. This finding is consistent with the general model of metacognitive psychopathology, which suggests that in addition to cognitive attention syndrome, positive and/or negative metacognitive beliefs may also be maintenance factors of mental disorders.

There was a correlation between OCD-specific metacognitive beliefs and worry and cognitive belief domains in OCD. Linear regression and hierarchical regression analyses were used to test whether OCD-specific metacognitive beliefs could further account for additional variance in OC symptomatology simultaneously with worry and OCD-related beliefs



and whether individual metacognitive beliefs were associated with OCD symptoms beyond and above worry and cognitions.

OCD metacognitions were predictive of OCD symptoms in the last step of our hierarchical regression model. On the theoretical basis, it provides evidence that OCD-specific metacognitions may offer some advantages beyond OCD cognitions. This result reinforces the empirical power of OCD metacognitive beliefs since it was conducted with a patient group in contrast to the studies in the literature and showed its contribution to the variance in the hierarchical regression model independently of OCD cognitions (8,9,10).

Studies of metacognition have also shown the association between specific metacognitive belief domains and OC symptoms across various cultural backgrounds and age groups (6,7,27,28). In our study worry, all OCD-specific metacognitive beliefs, and only perfectionism/need for certainty domain of OCD-related beliefs contributed to variance in OC symptoms. When worry and the three OC metacognitions were sequentially included in the hierarchical regression model, the TFI ( $\Delta r^2=0.08$ ), the BARI ( $\Delta r^2=0.03$ ), and the SSQ ( $\Delta r^2=0.02$ ) additionally contributed to the variance and continued to account for the model. These results demonstrate the unique contribution of OCD-specific metacognitive beliefs to explain the presence of OC symptoms.

The results of our study show that OCD-specific metacognitive beliefs can account for the majority of the OC symptoms in a Turkish clinical sample. Studies focusing on the three metacognitive belief domains (thought fusion, beliefs about rituals, and stop signals) conjointly are scarce in the literature, and most of them did not have a comparison with a patient group.

However, our study also has some limitations. This was a cross-sectional study, and there were no follow-up comparisons. The mean age of the control group was  $21.98 \pm 5.76$ , while the mean age of the OCD group was  $26.25 \pm 5.04$ . The average age in the OCD group may have affected the results. The presence of comorbid mental disorders other than primary psychotic disorders and bipolar disorders was not considered an exclusion criterion in the study. Although this constitutes a limitation of this study, the researchers considered the transdiagnostic approach of metacognitive theory and the fact that comorbid conditions were not excluded in the original study (2,5,7).

The currently recommended first-line treatment options for OCD are cognitive behavioral therapy (CBT) and pharmacological therapy. Patient-related issues (such as low treatment adherence), problems with practice (such as CBT being difficult to apply), and the high incidence of comorbidity in OCD may result in treatment resistance and recurrence despite following an appropriate CBT protocol (29). Therefore, an alternative approach might be preferred for CBT under these circumstances. One such alternative might be MCT, which has shown promising results in various psychological disorders, including challenging cases with OCD (30).

The results of this study support the validity of the metacognitive model of OC symptoms in the Turkish sample. The potential clinical utility of these findings may provide the basis for research on MCT for OCD, which aims to challenge fusion beliefs, beliefs about rituals and stop signals, to change the relationship with different thought experiences, and develop new functional thought control strategies as well as targeting the classical components of the cognitive attentional syndrome. The current study provides further evidence of the metacognitive model of OCD in a Turkish clinical sample and suggests that MCT may be an alternative option in cases non-responsive to first-line pharmacological and psychotherapeutic treatments.

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