INVESTIGATING RELATIONSHIP BETWEEN ENCODING STRATEGY AND METACOGNITIVE PROCESSES IN PATIENT WITH OBSESSIVE - COMPULSIVE DISORDER

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INVESTIGATING RELATIONSHIP BETWEEN ENCODING STRATEGY AND METACOGNITIVE PROCESSES IN PATIENT WITH OBSESSIVE - COMPULSIVE DISORDER

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ABSTRACT

NEUROPSYCHOLOGICAL EXAMINATION OF COGNITIVE AND METACOGNITIVE PROCESSES OF PEOPLE WITH OBSESSIVE-COMPULSIVE DISORDER

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The present study aims to investigate the relationship between encoding strategy and metacognitive processes particularyfor Feeeling of Knowing and Judgment of Learning and also to analyze the attention bias that OCD patients has been experienced.The study was conducted with 43 participants who were divided in two groups namely clinical groupand healthy control group. Participants in the clinical group were recruited from Marmara University Pendik Education and Research Hospital in Istanbul. The healthy control group was matched to the clinical group in terms of age and level of education and participants inthe healthy control group were attended in the study in accordance with their Maudsley ObsessiveCompulsive Inventory (MOCI) scores.All participants in the clinical group had primarily met criteria for OCD on the Diagnostic and Statistical Manual of Mental Health Disorders (DSM-5). All participants are asked to answer the self-rated psychological measures (Socio-Demographic Information Form, MaudsleyObsessive-Compulsive Inventory (MOCI), Yale-Brown Obsessive Compulsive

Scale (Y-BOCS), State-Trait Anxiety Inventory (STAII), Beck Depression Inventory (BDI), Meta-Cognitions Questionnare-65). Additionally, to measure participants' memory performances,an episodic memory task was applied. The result of the study demonstrated that people diagnosed with OCD indicated low memory confidence regarding their JOL and FOK judgments and they also performed poorly in recognition task in compare to the healthy control group. The result of the present study might be explained with the executive function impairments. Attentional biases and organizational strategies that used by OCD patients can be seen as a consequence of low memory confidence and memory performances. The findings of the present study were explained based on the relevant literatures and directions for future studies and clinical applications were recommended.

Keywords: Obsessive-compulsive disorder, metacognition, feeling of knowing, judgment of learning, encoding, organizational strategies, executive functions, attention bias

ÖZ

OBSESİF-KOMPULSİF BOZUKLUK TANISI KONMUŞ HASTALARIN ÜST-BİLİŞSEL SÜREÇLERİ VE KODLAMA STRATEJİLERİ ARASINDAKİ İLİŞKİNİN İNCELENMESİ

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Çalışmanın amacı Obsessif Kompulsif Bozukluk (OKB) tanısı alan bireylerde kodlama stratejisinin ve bilme hissi kararları (BH) ile öğrenme yargısı (ÖY) açısından üst-bilişsel süreçlerin arasındaki ilişkinin incelenmesi ve OKB hastalarının deneyimlediği dikkat yanlılığını araştırabilmektir. Çalışma toplamda 43 kişi ile birlikte yürütülmüş olunup, çalışmada klinik ve kontrol olmak üzere iki grup yer almıştır. Ek olarak çalışmadaki klinik gruba Ruhsal Bozukluklar Tanısal ve Sayımsal El Kitabı – Beşinci Baskı (DSM- V) ölçütlerine göre Marmara Üniversitesi Eğitim ve Araştırma Hastanesi psikaytri servisi tarafından OKB tanısı konulmuştur. Kontrol grubu Maudsley Obsesif Kompulsif soru listesi puanları temel alınarak klinik grup ile yaş ve eğitim seviyelerine göre eşleştirilecek şekilde seçilmiştir. Katılımcılara Sosyodemografik Bilgi Formu, Maudsley Obsesif Kompulsif Soru Listesi (MOKSL), Beck Depresyon Ölçeği (BDÖ), Durumluluk ve Süreklilik Kaygı Envanteri (DSKE), Üstbiliş Ölçeği- 65 (ÜBÖ-30), Yale Brown Obsesyon Kompulsiyon Ölçeği (Y-BOCS) uygulanmış olup, ayrıca bellek

performanlarını ölçebilmek amacıyla da katılımcılara episodic bellek görevi uygulanmıştır. Sonuçlar, OKB grubunun ÖY ve BH açısından kontrol grubuna kıyasla belleklerine anlamlı bir şekilde daha az güven duyduğunu göstermiştir. Ek olarak, OKB hastalarının episodik bellek performanslarının kontrol grubundaki katılımcıların performanslarına göre daha düşük olduğu bulunmuştur. Yürütücü işlev bozukluklarının, dikkat yanlılığının ve OKB hastalarının kullanmış olduğu örgütsel kodlama stratejileri OKB de görülen düşük bellek güveni ve bellek performanslarının bir sonucu olarak görülebilir. Çalışma bulguları güncel litaratür ile birlikte ele alınmış, klinik uygulamalar ve gelecekteki çalışmalar için önerilerde bulunulmuştur.

Anahtar kelimeler: Obsesif Kompulsif Bozukluk, kodlama, öğrenme, organizasyonel stratejiler, yürütücü işlevler, tanıma, üst-biliş, bilme-hissi-değerlendirmesi

To my family and Barış

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CHAPTER 1

INTRODUCTION

1.1. Obsessive Compulsive Disorder

Obsessive-compulsive disorder (OCD) has been considered as a psychiatric disorder which impacts people's daily functioning and causes significant disruptions. The essential features of OCD are obsessions and compulsions which are distressing, time-consuming and causing significant interference in normal functioning. People usually experience obsessions and compulsions concomitantly (Heyman, at al., 2006). Obsessions are characterized as intrusive, unwanted and recurrent thoughts, impulses and images (Olley et al., 2007). Fear of contamination, fear of causing harm for self or others, sexual imagination, and religion might be given as examples for common themes in obsessions. On the other hand, compulsions might be defined as behaviors that are time-consuming and repetitive. Compulsions can be categorized into two groups, while first one is related with observable behaviors like checking, cleaning, ordering; the other one is related with mental acts like counting and repeating (Derin, 2014; Heyman et al., 2006). Moreover, obsessions usually create anxiety or distress for people and to relieve from distress that obsessions produce, people perform compulsions (Muller & Roberts, 2005). However, it is known that

compulsions provide relief for a small amount of time. Even if people who diagnosed with OCD have known that their behaviors are not rational, they have reported that they feel like they cannot control these thoughts and behaviors (Muller & Roberts, 2005).

OCD is found to be comorbid most frequently with major depression in the ratio of 67% (Olley et al., 2007). On the other hand, in their study Ruscio et al., (2010) reported high (75%) comorbidity for OCD and any other anxiety disorders as well as (63%) comorbidity for OCD and mood disorders. It was estimated that almost four or six million people receive diagnosis of OCD in the United States and it was seen as one of the most common mental disorders (Cooper, 1996). Also, Binbay et al. (2013) stated that the prevalence of OCD might show changes between 2.2% to 5.9% for Turkey.

OCD was clustered under anxiety disorder but with publishing Diagnostic and Statistical Manual of Mental Disorders 5th Edition it has been called obsessive-compulsive and related disorders (OCRDs) and includes other disorders like hoarding and skin picking disorder within a new cluster. They were separated as a new cluster due to their similarities like repeated, ritualized behavior and their treatments (Derin, 2014).

It is also important to address the treatment options for OCD. There have been various numbers of treatment options and one of them is pharmacological treatments. Researches have showed that drug treatments are especially adequate and

help people to decrease their symptoms (Franklin et al., 2002). The utilization of antidepressants, particularly the selective serotonin reuptake inhibitors (SSRIs) took more attention in terms pharmacotherapy and it was reported that SSRIs lead to better outcomes in the long run (Bloch et al., 2013). On the other hand, psychotherapeutic techniques have also seen as very effective in treating OCD. Cognitive behavioral therapies was found very effective and lots of study and demonstarated its efficacy (Mancebo et al., 2011; Warren & Thomas, 2001). Also in recent years, studies have focused on Metacognitive Therapy and its effectiveness has also started to be shown for treatment of OCD (Andouz et al., 2012; Fisher & Wells, 2008). Wells proposed that if a treatment of OCD is successful, it must lead to change in metacognition. Moving from the this point of view, in another study, Solem et al. (2009) examined the impact of exposure treatment on metacognitive beliefs of OCD patients. It was found that treatment leads to significant changes for both OCD symptoms and metacognitive beliefs. Researchers stated that this study demonstrated the importance of metacognition while OCD symptoms were treated. However, combining usage of pharmacological treatments and cognitive behavioral therapies were suggested and it is seen as the most common treatment options for OCD (Heyman et al., 2006; Kellner, 2010).

1.2. Neurobiology and Neuropsychology of OCD

Recent evidence have been proposed that executive function impairment which is related with cognitive functions deficiencies might be present for OCD patients (Tukel et al., 2012), thus in the litarature executive functions received more attention for OCD. Similarly, Chamberlain et al., (2005) also stated that executive

functions take an active role in terms of the development and prolongation of the OCD symptoms. In their study Aydın et al., (2014) have examined OCD patients executive functions by using Stroop Test and Wisconsin Cart Sorting Test. Results demonstrated that OCD patients have worse performance when they compared to the healthy control group and this evidence was seen as a support for potential executive function impairment for OCD patients. Additionally, recent studies have been demonstrated deficieny in executive function of OCD patients regarding their performances on response-inhibition (Aydın et al., 2014), spatial working memory (Chamberlain et al., 2007), attentional set-shifting and selective attention (Roopesh et al., 2013, Jahangard et al., 2016). However, executive function deficiency is still a remarkable subject in the literature.

Some of studies focused on ventral-prefrontal-cortical cortex and indicated that OCD is associated with this region of brain (Schwartz, 1998; Saxen et al., 1998) which is also responsible in the cognitive processing of decision-making. High brain activation in this region of the brain might lead to problems in executive functioning (Mala, Cooney, & Peterson, 2010). Additionally, there are studies point out frontal-striatal system functions, and show its impact on memory (Shimamura, 1995). The dysfunction of frontal-striatal system thought to plays a central role in OCD (Heuvel et al., 2005). Moreover, Heuvel et al., (2005) conducted afMRI study and there were two groups (OCD and healthy control) in this study. Participants asked to perform Tower of London (ToL) and task was used to analyze the planning process of them. Behavioral findings indicated significant impairment in planning process of OCD patients in compare to control group, whereas fMRI data demonstrated that OCD

patients displayed decrease in frontal-striatal responsiveness. It can be stated that their results have supported the frontal-striatal system theory.

1.3. Cognitive Functions in OCD

According to a study done by Jenike et al. (1990), patients with OCD reported that they are uncertain about if they perform an action truly. So, due to these uncertainities, people who diagnosed with OCD might start to demonstrate repetitive rituals like checking. Furthermore, Tallis (1997) posited that due to the information processing deficits or biases which OCD patients suffer, the primary symptoms of OCD like repetitive thoughts and behaviors emerge. At this point, attention was directed to the possible memory impairment and it was thought that OCD patients might suffer from memory deficiency which lead to these uncertainities (Muller & Roberts, 2005). In the light of this information, in the last decades, researchers become more interested in the memory functioning like memory deficits and biases for OCD. It is still controversial whether there is a real memory deficit or reduced confidence in the lack of real memory deficits for OCD.

Tekcan et al (2007) was reported that groups (OCD patient, non-checkers OCD, and controls) did not show differences in terms of correct answers to general knowledge questions and it concluded that OCD patients with checking behaviors are successful as much as others group in accessing general knowledge. This study supported the notion that memory deficits in OCD patients with compulsive checking was not caused by semantic memory. However, during last years researchers became more interested to investigate the relationship between epidosic memory and OCD,

especially with compulsive checking behavior. For instance, in a study conducted by Deckerbars et al., (2000) the aim was to measure participants verbal and nonverbal episodic memory performance. In their study, to measure nonverbal memory they used The Rey–Osterrieth Complex Figure test (ROCF). Firstly participants were shown the ROCF stimulus card and then they asked to draw the figure they were given previosly. Additionally, to measure verbal memory, researchers used The California Verbal Learning Test (CVLT). They also measured other domains like general verbal abilities, attention and immediate memory. OCD patients were found to have difficulty in both verbal and nonverbal memory performance. As a consequence of their results, people with the diagnosis of OCD tended to focus on details without thinking the broad context and additionally it was stated that they could not be able to try different strategies for encoding and retrieving of new episodic memory.

Moreover, in another study done by Sher et al., (1984) checking behaviors were found negatively correlated with memory functioning and researchers reported that OCD patients with high levels of checking compulsion were simply impaired in their verbal memory. Moreover, Tallis et al., (1999) analysed OCD patient's visual memory performances in compare to healthy control group. It was claimed that OCD patients demonstrated worse performance regarding to recall and recognition of visual information. Similarly, Segalas et al., (2008) also examined memory functioning of individuals diagnosed with OCD. Participants are asked to complete several tests like Raven's Advanced Progressive Matrices, Spain-Complutense Verbal Learning Test and ROCF. Results showed that memory deficiency is present

for both recall and recognition of verbal and visual memory for OCD patients in compare to heathy control group**.**

However, there are also studies that show no memory impairment in OCD patients. For instance, Moritz et al., (2006) conducted a study with 70 participants, 30 patients with the diagnosis of depression or dysthymia and 40 participants in the healthy control group. They would like to measure the specificity of subjective cognitive dysfunction in OCD patients. To measure it, Subjective Neurocognition Inventory (SNI) was completed by participants. Finding suggests that even with the people with checking compulsions were included, memory problems were only declared by a small number of people with OCD. Moreover, in a study conducted by Mcdonald et al., (1997), there were two groups; OCD patients (checkers and non-checkers) and control group. According to their results, OCD and control groups did not indicate any difference for memory test. In accordance with their result, it was concluded that OCD patients do not have an actual memory deficit and checking behavior was evaluated as a response to the obsessive symptoms of the disorder.

In conclusion, as stated by Olley et al. (2007) it might be stated that executive functioning deficits which are also associated with selective attention and cognitive inhibition might be impact the memory functioning of people with diagnosis of OCD. Additionaly, attention bias has a crucial role on recognition of new memory and impact how well OCD patients remember and might lead to difficulties in remembering information which will be detailed in next sections.

1.4. Attention Bias in OCD

Attention bias impacts how well people remember memories; it might enhance or impair recall of a memory. During recent years, studies have been conducted on attention bias in anxiety disorder, particulary for OCD.

It has been proposed that OCD patients' high level of anxiety leads to working memory to be more engaged with task irrelevant stimuli even if this interferes the focusing on task related stimuli (Eysenck, 1992). Due to anxious people's cognitive functions tend to encode task-irrelavant stimuli preferably, this might result in performing poorly on task. Burgess et al., (1981) also put emphases on attention bias and they stated that people who are clinically anxious demonstrated better performance in terms of encoding emotionally threat relevant stimuli. So it can be mention that OCD patient might be experience similar attention bias and it might influence their information processing.

Attention is a significant component of information processing and to be able to transeference the new episodic information from sensory memory to short term memory a person should attent on it. If OCD patient attention is diverted to threat-related items it becomes difficult for them to attent to external cue and neutral stimuli. Thus, OCD patient threat-related association causes impairment in encoding of the neutral external cues. Moreover, it was also stated that clinically anxious people show tendency to grasp threat-relevant information and they exert more cognitive attempt in addition to more cognitive capacity to be able to encode this information in compare to healthy individuals (Mathews et al., 1988).

Irak and Flament (2009) also compare sub-clinical checkers recall and recognition performances with non-checkers performances. They found that while sub-clinical OC checkers' performances were higher for threat-relevant stimuli in compare to non-checkers, for neutral stimuli researchers indicated that non-checkers demonstareted better performances.

Randomsky and Rachman (1999) investigated the association between memory bias and OCD. Participants in clinical group invited the study if they indicated a fear of contamination. They compared with group of anxious controls and undergraduate students. 50 objects were showed to participants and 25 of them were contaminated by researchers and for other 25 objects researchers touched them but not contaminated. At the end of the study, it was stated that OCD group showed better memory performance for remembering contaminated objects than clean objects in compare to control groups. Researchers emphasized that other control groups did not show such bias.

At this point, it is possible to note that people with OCD react to threat related information like other anxiety disorders. Consequently, it can be indicated that patients with OCD are more likely to selectively attend to threat relevant stimuli and this might result in impairment in their performances for other presented items. On the other hand, their increased anxiety led them to use more effortful encoding strategies for threat related stimuli and result in better recognition and recall performances for them. To sum up, attentional bias experienced by OCD patients might impact the encoding of the new information. Thus, this situation might

manifest itself in their recognition performances and impact OCD patients' memory functioning.

1.5. Metacognition and Obsessive Compulsive Disorder

Metacognition was first introduced by Favell and can be defined as persons' knowledge about what they know, thought about what they thought (Tosun&Irak, 2008). It might also be explained as focusing on our cognitive process (Tosun&Irak, 2008). Metacognition has two important components and these are defined as cognitive monitoring and cognitive control. While cognitive monitoring deals with bottom-up processing such as error detection and monitoring the source of the memory in the retrieval process, the cognitive control deals with top-down processes related to conflict resolution, error correction, control of inhibition and priming. For instance when confronted with a problem possible solutions can be deduced by implying metacognitive abilities.

Wells developed a model which called as Self-Regulatory Executive Function (S-REF) and tried to explain OCD with this model (Yörük&Tosun, 2015). According to this S-REF model, anxiety and distress are important consequences of OCD and people perceives those emotions as threats (Yörük&Tosun, 2015). To decrease or control those perceived threats, metacognitive beliefs belong to peoples' thoughts might lead them to show different coping behaviors like suppressing, avoiding or monitoring those thoughts (Yörük&Tosun, 2015). Moreover it is concluded that metacognitive beliefs take an effective role in the development of dysfunctional coping behaviors which performed by OCD patients (Spada et al.,

2015). In conclusion, metacognition was seen as a crucial factor for the development of the OCD (Cucchi et al., 2012).

Myers and Wells (2013) also stated that OCD occurs independently from intrusive thoughts, they stressed that OCD occurs from metacognitive beliefs regarding importance and strength of those intrusive thoughts and also how a person response them. To simplify, rather than having intrusive thoughts, judgments on thoughts about the meaning of thoughts are crucial for the development and maintenance of psychopathology. Gwilliam et al., (2004) proposed that patients with OCD hold dysfunctional beliefs about the importance of obsessive thoughts and the consequences of those thoughts. One of the most important causes of OCD is catastrophic interpretations of people's intrusive impulses, thought, images (Rachman, 1998). As in the thought action fusions (TAF) a person might believe that thinking of an action is equal to carrying out this action in real life or having morally inappropriate thoughts is equal to demonstrate immoral behaviors (Rachman, 1998). To simplify those people who suffer from OCD give an extreme importance to their intrusive thoughts and consequences of those thoughts (Muller & Roberts, 2005).

Studies about metacognitive processes for OCD have been increased during last years and pointed out the importance of 'beliefs on thought' and 'judgments of thoughts' (Yörük & Tosun, 2015). In a study done by Cartwright-Hatton and Wells (1997), they compared three groups: generalized anxiety disorder (GAD), OCD, and healthy control. However, it was found that people who diagnosed with OCD and

GAD significantly differ from the other group in sub-scales of controllability of thoughts, the dangerousness of thoughts and negative beliefs on thoughts. Mindfulness scale was the only scale that OCD and GAD differed from each other and OCD patients had higher scores than GAD patients, which implies that OCD patients have more focused on their own thought process than GAD. Moreover, in relation with the study of Cartwright-Hatton and Wells (1997), Janeck et al. (2003) decided to examine OCD patients' tendencies of observing and being aware of thoughts. Firstly, they found that OCD patients significantly differ from other people who diagnosed with other anxiety disorders on cognitive awareness. Researchers stated that this engagement on cognitive awareness might be a reason for disproportion allocation of attentional sources and this difference might have an impact on information processing. Focusing on cognitive processing might lead to negative appraisals of intrusive thoughts and also may cause people to give more importance to those thoughts (Janeck et al., 2003). Being highly aware of thoughts also might elicit the presence of various thoughts or beliefs like TAF and responsibility (Janeck et al., 2003).

Also, there are several studies in Turkey related to the metacognitive process and OCD. One of them was conducted by Irak and Tosun (2008). They hypothesized that metacognition will be correlated with anxiety and obsessive-compulsive symptoms. Their results confirmed that metacognition, meadiated relationsips between anxiety and obsessive-compulsive symptoms. It is clear that their findings are similar with the other studies in the literature (Cartwright-Hatton & Wells, 1997; Janeck et al, 2003).

1.6. Metamemory and OCD

Metamemory is a type of metacognition and can be explained as an individual's awareness of his or her memory processes. It can also be defined as monitoring and regulating memory processes (Nelson &Narens, 1990). Nelson and Narens (1990) identified diverse type of metamemory judgments and two of them are called as Judgment of Learning (JOL) and Feeling of Knowing (FOK). JOL requires making a prediction about future recalling test on things that people have just learned. On the other hand, another FOK requires making a prediction for future performance based on currently unrecallable item. Even if this item has been learned in the learning step, participants failed to remember in the test step. Subsequently, for this unremembered items, participants give rate for the likelihood of remembering in a future recalling test (Nelson and Narens, 1990). Hart (1965) was the first pioneers who use and test FOK judgments. Additionally, FOK and JOL are regarded as prospective confidence judgment (Tuna et al., 2005).

Souchay and Isignrini (2012) analyzed two metamemory processes in their study and tested participants in terms of FOK and JOL. Participants consisted of young and older adults and the aim of the study was to detect age related differences for FOK and JOL. According to result of the study, older adults exhibited lower performance in terms of both JOL and FOK and additionally, JOL and FOK differences become more apparent for older adults. Additionally, age effect was found only for FOK. Recently metamemory processes receive more attention and there have been studies conducted with different patient populations on this subject. Some of those studies have been included patients with the diagnosis of

schizophrenia (Bacon et al., 2001), patients with diagnoses of chronic fatigue syndrome (Lakein et al., 1997), and also with OCD patients (Jurado et al., 2002). More recently researchers started to examine the metamemory processes especially in people who have checking compulsions in OCD. Tekcan et al., (2005) demonstrated that OCD patients have less confident to their memory in terms of FOK judgments in compare to subclinical and healthy control group.

Moreover, most of the studies conducted on metamemory examine memory confidence judgment and some of the studies demonstrated that OCD patients show lower confidence for their memories than subclinical and healthy control groups (MacDonald et al., 1997; McNally &Kohlbeck, 1993). In a study done by MacDonald et al. (1997) episodic memories of people with checking compulsions were analyzed. In their study, OCD checkers and control group did not differ from each other for their recall and recognition performances but they significantly differ on the self-report confidence ratings they gave for recognition judgments for items. Although people in OCD checkers group recognized words corretly, they were found less confident than other groups. When the response time of groups were compared with each other, it was seen that OCD checkers needed more time to respond. This study was showed that people with the diagnosis of OCD and checking compulsion do not have an actual memory loss; the problem might arise from not being confident in their memory. As a result of another study, it was stated that when the OCD symptom severity increases, patients display more reduction in their memory confidence (Tuna et al., 2005). Moreover, Tolin et al., (2001) conducted a study and they have identified three groups; people with OCD (OCs), anxious control group

(ACs) and non-anxious control group (NACs). Groups were presented safe, unsafe and neutral stimulus and then they asked to recall them and to rate a confidence value for each stimulus. According to their results, OCs group showed low memory confidence for unsafe items in compare to other groups. Furthermore, Tolin et al., (2001) explored that for long-term memory, people with OCD and checking compulsion defined lower memory confidence than other people with OCD.

1.7. The Goals of the Study

As previously stated, metacognitive process are important to understand memory functioning, especially for people diagnosed with OCD. Those studiesdetalied above are seen as crucial because they give insight to the etiology of the disorder as well as the information on how to treat the disorder. The aim of the present study is to demonsrate the absence of memory deficiency in OCD patients however to exhibit memory bias experienced by OCD patients. This memory bias might occur during learning or encoding phases. There were studies analyze the relationship between memory performances and metamemory by using threat-related stimuli. However neutral stimuli used in the present study to be able to observe the role of encoding and learning proceses in metocognitive processes and attention bias. In conclusion, the purpose of the study is to investigate relationship between encoding, learning, memory and metacognitive processes of OCD patients under an episodic memory task. There are four hypotheses of the study.

Hypothesis 1: There will be significant group differences (OCD and healthy group) in terms of JOL judgments for both familiar and unfamiliar picture-noun pairs

and participants with OCD will have lower JOL judgments than healthy control group.

Hypothesis 2: There will be significant group differences for FOK judgments and also OCD participants will have lower FOK judgments and FOK accuracy for unremembered pictures in compare to healthy control groups.

Hypothesis 3: There will be significant differences between participant's memory performance in terms of recognition for familiar and unfamiliar stimuli and also OCD participants will show lower performance compared to healthy control group.

CHAPTER 2

METHOD

2.1. Participants

The study was conducted with 43 participants (26 males, 17 females) who were divided in two groups namely clinical group (n=23) and healthy control group (n=20). Participants ages ranged from 18 to 41 years (*M*=27.83, *SD*=6.32). Participation in the study was on voluntary basis. Clinical group was sampled from patients who had received pharmacological treatment for Obsessive Compulsive Disorder at Marmara University Pendik Education and Research Hospital in Istanbul. All participants in the clinical group had primarily met criteria for OCD on the Diagnostic and Statistical Manual of Mental Health Disorders (DSM-5) (American Psychiatric Association, 2013).

Two groups were matched in terms of age and level of education. Participants in the healthy group were included in the study, based on their Maudsley Obsessive Compulsive Inventory (MOCI) scores. Following previous research (e.g. MacDonald, Antony, Macleod and Richter, 1997; Rubenstein, Peynircioglu, Chambless and Pigott, 1993; Tekcan, Tuna and Topcuoglu, 2005) control group was constituted with participants who scored in the range between 0 to 5 on MOCI.

Control group's participants were also screened for any psychiatric disorder with Structured Clinical Interview for DSM-5 (SCID-4). Those who did not report any diagnostic criteria of psychiatric disorder were taken in to the study. Clinical group received additional SCID-4 and Yale Brown Obsessive Compulsive Scale (Y-BOCS) in order to establish diagnosis clinically and asses severity, following previous literature patients who scored below 16 on Y-BOCS were excluded from the study (Farris, McLean, Van Meter, Simpson & Foa, 2013).

Two of the participants in the clinical group were excluded from the study due to their incompliance with the study and inability to direct their attention to the tasks. Five participants in the clinical group were later found to be receiving psychotherapy and were excluded from the study. Two participants in the control group could not complete the study due to the technical difficulties they had faced during the experiment with the computer. Two participants in the control group were excluded from the study due to being found sub-clinically eligible for OCD diagnosis after administration of SCID. Finally, in total of 43 participants were included in the study. 23 participants were taken into clinical group and 20 participants were taken into control group.

For all participants the additional exclusion criteria's were: (1) history of neurological disorder or head trauma, (2) unstable medical condition, (3) substance use disorder, (4) mental retardation, (5) color blindness. Exclusion criteria for OCD subjects specifically was (1) any other significant medical condition which might interfere with the diagnosis, (2) any other comorbid mood disorder, anxiety disorder,

attention-deficit hyperactivity disorder (ADHD), psychotic disorder and OCD and related disorder, (3) receiving any type of psychotherapy, (4) history of psychiatric medicine usage other than antidepressants and antipsychotics.

2.1.1 Socio-demographic Characteristics

Study sample's 60.5% was comprised of males and 39.5% was comprised of females. Demographic characteristics of participants were presented in Table 2.1.

Table 2.1.

Demographic Characteristics of the Participants.

Variables	**Clinical Group**			**Control Group**		
	N	**%**	**Mean (SD)**	**N**	**%**	**Mean (SD)**
Gender						
Female	8			9		
Male	15			11		
Age	23		28(6.10)	20		28(6.34)
Income (montly)						
774 and below	8	34.8 %		3	15 %	
774-1500	5	21.7 %		3	15 %	
1501-2000	3	13 %		3	15 %	
2001-3000	4	17.4 %		6	25 %	
3001-5000	3	13.6 %		4	20 %	
5001 and above				2	10 %	
Marital Status						
Married	8	34.8 %		5	25 %	
Single	13	56.5 %		14	70 %	
Other	2	8.7 %		1	5 %	
Age Onset	23		11.43(5.66)			
Type of Medication	23					
Antidepressants	12	52.1 %				
Antipsychotics	1	4.3%				
Both	10	43.3%				

2.2 Measures

2.2.1. Episodic Memory Task (word – landscape pictures)

The memory task consisted of pairs of words and familiar (eg: Eiffel Tower) and unfamiliar pictures. There were four phases of the study; learning, judgment of learning, recognition, and feeling of knowing phase. In the first phase participants received 44 paired pictures (familiar vs. unfamiliar pictures) and words on the screen. First two and last two pairs were excluded from the study to eliminate primacy and recency effects. Each word was presented for 3 seconds in 40 points Ariel type and there was 1 second between the presentations of the each pair. Participants were asked to memorize each pair before the beginning of this phase through reading of instructions. In the second phase (JOL), participants received the word of the pairs which were presented in the first phase and asked to indicate whether they can remember the picture of the pair on a 3 point Likert-type scale ("3=Definitely remember", "2=I am not sure", "1=Definitely can not remember"). Participants saw each pair for three seconds, after seeing the pairs, a blank screen appeared for 1 second and then they were expected to indicate their judgment of learning for each item. In the third phase (recognition phase) participants received a total of 80 word- picture pairs, 40 inlist and 40 outlist (40 target from learning phase, and 40 new words that were not previously presented). In this phase each pair was presented for 3 seconds on the screen and participants were asked to indicate if the pair they were currently seeing was presented in the first phase or not. Participants had to give their answers with the help of the Mouse and make left click if they had seen the pair in the first phase or make a right click if they had not seen the pair in

the first phase. The fourth phase consisted two steps, FOK judgments and a second recognition phase. For FOK judgments, participants were asked to indicate their FOK judgment for each incorrectly recognized or missed items in the third phase. They were given instructions about what FOK judgments were and asked to make a FOK judgment based on the following question: ‘‘*Even though you don’t remember the answer now, do you know the answer to the extent that you could able to pick the correct answer from among several choices in the future?’’* Participants were asked to use a 6-point Likert-type rating scale for their FOK judgment (“1=Definitely will not be able to find the correct answer”, “6=Definitely will be able find the correct answer”). After giving their FOK judgments, participants completed a second recognition test, finalizing the fourth phase. In this phase participants received a word cue from the pairs on top of the screen with four alternatives on bottom of the screen. Participants were asked to choose the right picture among the alternatives as the other item of the pair. Participant’s FOK accuracy, which refers to how well people were able to predict their future memory performance, was calculated by using the Goodman-Kruskal gamma correlation, coefficient, a commonly used measure of FOK accuracy (Nelson, 1984).

2.2.2 Socio-Demographic Information Form

Socio-Demographic form generated by the researcher. The form included of questions about participants’ age, gender, education level, employment status, income level, marital status, color blindness, preferred used hand, and history.

2.2.3 Maudlsey Obsessive-Compulsive Inventory

Maudsley Obsessive-Compulsive Inventory (MOCI) is a self- report questionnaire in a true/false format. Questionnaire is constituted of 30 items. Participant is expected to read each statement and mark true if they agree with the statement or false if they don't. Statements, which are marked as "true", are considered as 1 point and "false" as 0 points in scoring. Higher scores indicate more severe symptoms and lower scores less severe symptoms. It was developed by Hodgson & Rachman (1997) to explore level and type of obsessive-compulsive disorder. The questionnaire contains four subscales, namely cleaning, checking, slowness and doubting.

The Turkish validity of MOCI demonstrated by Erol and Savaşır (1988) in both healthy and clinical Sample. There was one more sub-scale namely "rumination" with 7 additional items was added in Turkish version of MOCI. Test-retest reliability was found .88. The Cronbach alpha coefficient was $\alpha = .86$, and ranging from .61 to .65 for subscales.

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

Goodman, et al., (1989) developed Yale-Brown Obsessive Compulsive Scale (Y-BOCS). Y-BOCS was semi-structured, clinician-used interview which consisted of 10 items. Y-BOCS was divided into two main parts, which were Obsessions and Compulsions.

Each item could be rated from 0 (no symptom) to 4 (extreme symptom) points by clinician. Participants could obtain minimum 0 and maximum 40 point on the scale. As participants received closer to 40 point, case's prognosis is considered to be longer and harder.

In the original version, internal consistency was .87. Validity and reliability studies of the Turkish version had done by Tek, Ulug, Gursoy Rezaki, Tanriverdi, Mercan, Demir and Vargel (1995). Interrater reliability found as .96 in the Turkish version and interrater reliability ranged between .85 to .97 for obsession subscale and .74 to .97 for compulsion subscale.

2.2.5 State-Trait Anxiety Inventory

Spielberger, et al., (1983) originally developed State-Trait Anxiety Inventory (STAII). Inventory had two scales, which were State and Trait. STAII was a self-report questionnaire, consisted of 40 items. 20 items measured state anxiety and 20 items measured trait anxiety. Answers were given on a four-point Likert-type scale ("1=not at all", "4=very much so"). State anxiety scale measured the momentary anxiety level of the participant during responding the questionnaire. Trait anxiety scale measured the level of anxiety the participant experienced on a regular basis.

Reliability and Validity of Turkish version demonstrated by Oner and Lecompte (1983). Cronbach alpha coefficient's was $\alpha = .87$ for trait anxiety and $\alpha =$

.96 for state anxiety. The reliability coefficient determined by the alpha correlation in adaptation of STAI to the Turkish population was .83.

2.2.6 Beck Depression Inventory

Beck, et al., (1961) originally developed Beck Depression Inventory (BDI). BDI was 21-item self-report inventory which aimed to measure severity and existence of depressive symptoms. Scores for each item range from 0 to 3. Participant could obtain minimum of 0 points to maximum of 63 points. Higher scores indicated more severe depressive symptoms.

Reliability and validity of the Turkish version demonstrated by Hisli (1988). Cronbach's alpha coefficient of the scale was $\alpha = .80$ and split-half reliability was .74.

2.2.7 Meta-Cognitions Questionnare-30 (MCQ-30)

Meta-Cognitions Questionnare-65 was originally created by Wells and Cartwright-Hatton (1997). MCQ-65 was a self-report questionnaire designed to measure different dimensions of metacognitive beliefs. Short version of MCQ-65 created by Wells and Cartwright-Hatton (2004), which consisted of 30 items and were rated on four-point Likert-type scale. 0 points indicated, "strongly disagree" and 4 points indicated, "strongly agree". Scale consisted 5 dimensions of metacognitive beliefs; (1) positive beliefs about worry, (2) negative beliefs about worry concerning uncontrollability and danger, (3) cognitive confidence, (4) beliefs about need to control thoughts (5) cognitive self-consciousness.

Tosun and Irak (2008) had conducted validity and reliability studies of the Turkish version of MCQ-30. Cronbach alpha coefficient of the scale was α=.86. An exploratory factor analysis showed that Turkish version of MCQ-30 also consists of five components same as the original version. The Turkish version showed good test re-test reliability, ranging from .40 to .94 for the full scale and from .70 to .85 for the sub-scales.

Authors also showed that Parallel- Forms reliability, participants results were correlated with other scales measured anxiety (Tosun & Irak, 2008).

2.3. Procedure

The study was initiated after the approval of the Medical Ethics Committee of Marmara University Hospital. Participants in clinical group assessed by a psychiatrist for symptom criteria and severity of their disorder. After assessing for the criteria's, if the participant was eligible for the study she/he was given an appointment. Participant was reminded of his/her experiment date through telephone by one of the experimenters. On the appointment date participant was welcomed in to the clinic and taken into the experiment room. Experiment and the questionnaires were administered in one session. All participants completed self-rated measures; MOCI , BDI, STAI, MCQ-30 in a counterbalanced order. During the experiment session participants received episodic memory tasks, which were designed by the Bahcesehir University Brain and Cognition Laboratory. Study was administered to the clinical group in an experiment room at the Hospital, and control group was taken in to the study at Brain and Cognition Lab's experiment room. All tasks were administered on

a Sony personal computer with a 15 inch monitor. Administration took approximately 45-60 minutes for each participant.

CHAPTER 3

RESULTS

Prior to analyses, data were screened for missing values. Neither univariate nor multivariate outliers were found (for $p < .001$). Analyses were carried out on 43 subjects. Independent samples t-test was performed in order to test the age and level of education differences between the groups. Results showed there were no significant differences in terms of participants' age distribution and level of education.

3.1. Group Comparisons on Psychological Measures

The mean scores and standard deviations for MCQ-30 total and subscales, MOCI total, Y-BOCS, BDI, BAI, STAII according to group status are presented in Table 3.1. OCD group's Y-BOCS total score which indicated, symptom severity was moderately severe (*M* = 24.56, *SD* = 6.59). The mean State Anxiety score for clinical group was 45.34 (*SD* = 9.29) and Trait Anxiety score was 56.43 (*SD* = 8.83) showing that clinical group had also mild anxiety symptoms.

A 2x2 MANOVA was conducted to test if there was a statistically significant group effect for MCQ-30 total and subscales. To see whether the condition of homogeneity of covariance matrices was violated or not, Box's M test was checked and it was found that homogeneity of covariance matrices was not violated $p > 0.05$. Multivariate tests revealed a significant group effect, *Wilk's* $\lambda = .518$, $F(6,37) = 6.35$, $p <. 001$; $\eta^2 = .508$. Tests of Between-Subjects Effects revealed a significant difference between groups ın MCQ-30 total scores, $F(1,42) = 37.03$, $p < .001$; $\eta 2 = .469$. Results indicated that clinical group's total scores ($M = 81.08$, $SD = 14.66$) were significantly higher than the healthy control group's total scores ($M = 58.09$, $SD = 9.61$). There was also a significant difference between for, MCQ-30 Positive Beliefs About Worry subscale, $F(1, 42) = 16.81$, $p < .001$; $\eta 2 = .286$. Thus clinical group ($M = 13.26$, $SD = 8.47$) had more positive beliefs about worry than participants in control group ($M = 8.47$, $SD = 2.52$). Significant difference was also found for the MCQ-30 Uncontrollability and Danger subscale $F(1,42) = 17.42$, $p < .001$; $\eta 2 = .293$. Participants in the clinical group reported more ($M = 17.13$, $SD = 4.32$) Uncontrollability and Danger feelings higher than participants in control group ($M = 11.9$, $SD = 3.86$). Additionally, there was a significant difference between the groups for the MCQ-30 Cognitive Confidence subscale $F(1,42) = 7.50$, $p < .001$; $\eta 2 = .152$. Showing that, participants in the clinical group ($M = 15.13$, $SD = 5.11$) had lower levels of confidence in their cognitive processes than participants in healthy control group ($M = 11.23$, $SD = 4.20$). Finally, there was a significant difference between the groups for the, MCQ-30 Need to Control thoughts subscale $F(1,42) = 14.347$, $p < .001$; $\eta 2 = .255$. Thus participants in the clinical group ($M = 17.39$, $SD = 4.39$) believed that they needed to control their thoughts more than participants in

healthy control group (M = 12.33, SD = 4.45). On the other hand group effect was found not to be significant on, Cognitive Self-Consciousness subscale however participants in OCD group (M = 16.90 SD = 3.40) scores were higher than control group's (M = 15.66 SD = 2.76).

MANOVA was also conducted to examine the effect of group status on total scores of BDI, STAI-T and STAI-S. Box's M test was checked and it was found that homogeneity of covariance matrices was not violated $p > 0.05$. Multivariate tests indicated significant group effect, *Wilk's* λ=.486, $F(3,41) = 14.47$, $p < .001$; $\eta 2$ = .514. There was significant difference between two groups in BDI total scores $F(1,43) = 19.57$, $p < .001$, $\eta 2 = .313$. Participants in the clinical group (M = 22.41, SD = 11.20) reported higher levels of depressive symptoms than participants in the healthy control group (M = 8.66, SD = 9.38).

There was significant difference between two groups for STAI-T total scores, $F(1,43) = 43.16$, $p < .001$; $\eta 2 = .501$. Results showed that participants in the clinical group (M = 56, SD = 8.80) were more anxious as a trait those in healthy control group (M = 39.28, SD = 8.25). We also find significant difference between two groups for STAI-S total scores, $F(1,43) = 16.247$, $p < .001$; $\eta 2 = .274$. Thus participants in the clinical group (M = 44.79, SD = 9.49) experienced higher levels of anxiety during their time of reporting than participants in the healthy control group (M = 35, SD = 6.20).

Addinitionally correlation analyses was done for clinical group in terms of their scores on YBOCS, JOL and FOK. However no significant differences was found.

Table 3.1.

Means and Standard for MCQ-30 Total and Subscales, MOCI, Y-BOCS, BDI, STAI-T, STAI-S According to Group Status.

Variables	**OCD (*n*=24)**	**Control (*n*=21)**
	M (SD)	*M* (SD)
MCQ-30 Total	81.08 (14.66)	58.09 (9.61)
Positive Beliefs about Worry	13.26 (4.76)	8.47 (2.52)
Uncontrollability and Danger	17.13 (4.32)	11.95 (3.86)
Cognitive Confidence	15.13 (5.11)	11.23(4.20)
Need to control thoughts	17.39 (4.39)	12.33 (4.45)
Cognitive Self-Consciousness	16.95 (3.25)	15.66 (2.76)
MOCI total	21.58 (7.42)	6.80 (3.69)
BDI total	22.41 (11.20)	8.66 (9.38)
STAI-T total	56.08 (8.80)	39.28 (8.25)
STAI-S total	44.79 (9.49)	35 (6.20)
Y-BOCS total	24.56 (6.59)	

3.2 Group Comparisons on Memory Performances

3.2.1. Jugdement of Learning (Phase 2)

The mean scores and standart deviations for participants' JoL depending on group status is presented in Table 3.2. A 2 (Familiar, Unfamilar) x 2 (OCD, Control) MANOVA was conducted to analyze the effect of group status on participants JOL. As mentioned above participants judgments for familiar, unfamiliar items and their avarage scores for all items were taken in to this analysis. Box's M Test showed that the assumption of homogenity of was not violated ($p > .05$). Multivariate tests indicated a significant group effect, *Wilk's* λ=.593, $F(3,39) = 8.93$, $p < .001$; $\eta 2$ =.407. Between-Subjects Effects test revealed that there groups significantly differed in terms of average score of JOL rating for all items, $F(1,43) = 27.42$, $p < .001$; $\eta 2 = .401$. Therefore control group ($M = 2.2$, $SD = .47$) reported more higher judgment about their learning for both familiar and unfamiliar items than participants in the clinical group ($M = 1.6$, $SD = .37$). Groups also significantly differed in terms of JOL rating for familiar items, $F(1,43) = 27.55$, $p < .001$; $\eta 2 = .402$. Revealing that control group ($M = 2.4$, $SD = .48$) gave more positive judgment about their learning abilities than participants in the clinical group ($M = 1.6$, $SD = .35$). Additionally, results indicated a significant difference between groups for participants JOL rating for unfamiliar items items $F(1,43) = 22.9$, $p < .001$; $\eta 2 = .358$. Therefore control group ($M = 2.3$, $SD = .49$) gave more positive judgment ratings for unfamiliar items than clinical group ($M = 1.5$, $SD = .43$). It could be inferred that participants in the control group significantly gave higher rating for both familiar items and unfamiliar items.

Table 3.2.

Mean and standard deviation values for JOL ratings according to group status.

Variables	**OCD (*n*=26)**	**Control (*n*=20)**
	M (SD)	*M* (SD)
Total JOL	1.6 (.37)	2.2 (.47)
JOL for Familiar Items	1.6 (.35)	2.4 (.48)
JOL for Unfamiliar Items	1.5 (.43)	2.3 (.49)
Response Time for Total JOL	4028.78 (842.11)	4005.78 (851.55)
Response Time for JOL for Familiar Items	3957.82 (838.56)	3736 (752.5)
Response Time for JOL for Unfamiliar Items	4079.13 (1056.36)	3854.1 (672.87)

Note: Response time was measured as millisecond (ms).

Group comparisons on response time (millisecond) for familiar, unfamiliar and on average in all items were not significant (see Figure 1).

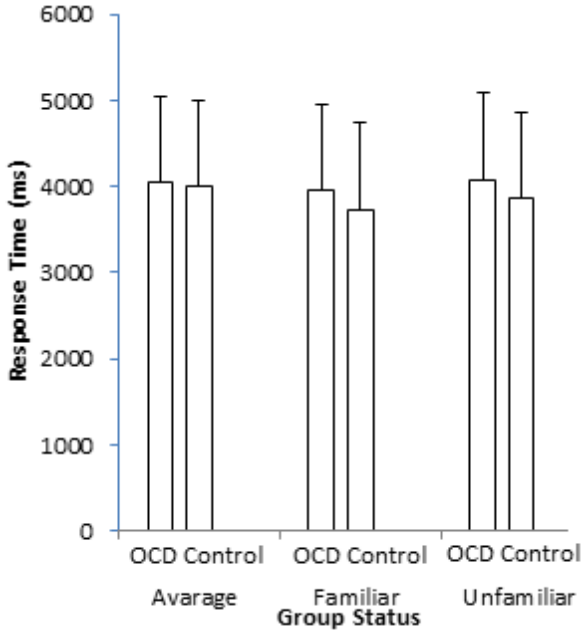

Figure 1. Response Times for JOL Ratings

3.2.2. Recognition Performance (Phase 3)

The mean scores and standard deviation for recognition performance depending on group status was presented in Table 3.3. A 2 (Familiar, Unfamilar) x 2 (OCD, Control) MANOVA was conducted to test group effect on participants number of correctly and incorrectly recognized familiar and unfamiliar items during recognition phase. However, due to possible multicollinearity and singularity effects participants' correct and incorrect responses were analyzed separately. Participants' total number of correctly recognized items, number of correctly recognized familiar items and unfamiliar items were taken into analyses. Box's M test was checked and it was found that homogeneity of covariance matrices was violated $p<.05$. The multivariate tests indicated a significant group effect, *Wilk's* $\lambda=.844$, $F(2,40) = 7,70$, $p < .001$; $\eta 2 = .256$. In terms of the total correct recognized items, tests of Between-Subjects Effects revealed that there was significant difference between the

groups $F(1,43) = 7,48$, $p < .05$; $\eta 2 = .154$. These results showed that participants in the control group ($M = 68.7$, $SD = 8.75$) recalled higher number of items in total than clinical group ($M = 61.65$, $SD = 8.12$). Results also revealed a significant difference between the groups for familiar items which were correctly recognized items $F(1,43) = 6.24$, $p < .05$; $\eta 2 = .132$. Thus control group ($M = 35.5$, $SD = 4.4$) correctly recognized higher number of familiar items than clinical group ($M = 32.08$, $SD = 4.5$). Finally groups significantly differed on unfamiliar items which were correctly recognized, $F(1,43) = 7.18$, $p < .05$; $\eta 2 = .149$. Participants in the control group ($M = 33.2$, $SD = 4.81$) correctly recognized higher number of unfamiliar items than participants in clinical group ($M = 29.56$, $SD = 4.07$). In conclusion, participants in the control group recognized items more successfully than participants in the clinical group.

A 2 (familiarity) x 2 (group status) MANOVA was conducted to test group differences on response times for correctly recognized items. However group comparisons on response time (millisecond) for familiar, unfamiliar and on average in all items were not significant (see Figure 2).

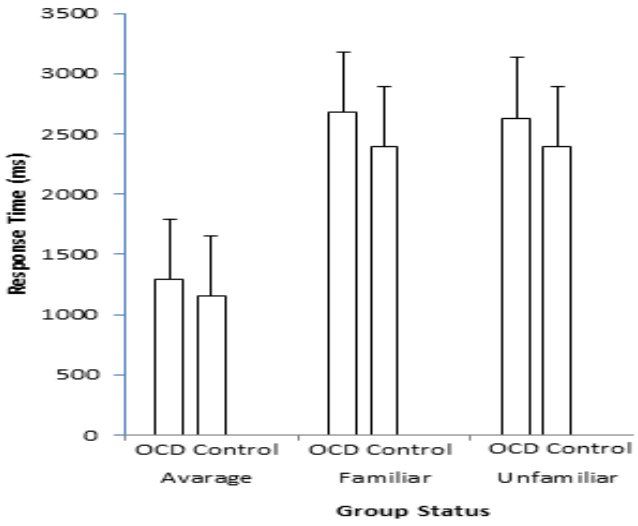

Figure 2. Response Times for Correctly Recognized Item

As mentioned earlier, a separate analyses was run to test group effect on participants' number of incorrectly recognized items. Participant's total number of incorrectly recognized items, number of incorrectly recognized familiar items and incorrectly recognized unfamiliar item was included in the analysis.Box's M test was checked and it was found that homogeneity of covariance matrices was not violated $p > .05$. The multivariate tests indicated a significant group effect *Wilk's* λ=.789, $F(3,33) = 4.95$, $p < .05$; $\eta 2 = .211$.Tests of Between-Subjects Effects revealed a significant difference between groups in total incorrectly recognized items, $F(1,37) = 8.62$, $p < .05$; $\eta 2 = .179$. Clinical group *(M* = 17.91 , *SD* = 8.6) recognized less items in total than participants in control group *(M* = 10.64, *SD* = 5.8). There was also a significant difference between the groups for incorrectly recognized familiar items $F(1,37) = 4.43$, $p < .05$; $\eta 2 = .112$. Clinical group *(M* = 7.86, *SD* = 5.1) made more errors in recognizing familiar items than control group *(M* = 5.7, *SD* = 3.02). Finally, there was significant differences between groups for

incorrectly recognized unfamilar items, $F(1,37) = 4.35$, $p < .05$; $\eta 2 = .111$. Clinical group *(M* = 10.43, *SD* = 4.95) significantly made more errors in recognizing unfamiliar items than control group *(M* = 7.21, *SD* = 3.78). Results revealed that participants in the clinical group made more errors in recognition of familiar and unfamiliar items than control group.

A separate analysis was conducted to test group differences for participants response time for total number of incorrectly recognized items, incorreclty recognized familiar items and incorrectly recognized unfamiliar items. However group comparisons on response time (millisecond) for familiar, unfamiliar and on average in all items were not significant (see Figure 3).

Table 3.3.

Mean and Standard Deviation Values for Recognition Performance According to Group Status.

Variables	**OCD (*n*=23)**	**Control (*n*=20)**
	M (SD)	*M* (SD)
Total number of correctly recognized items	61.65 (8.12)	68.7 (8.75)
Number of correctly recognized familiar items	32.08 (4.5)	35.5 (4.4)
Number of correctly recognized unfamiliar items	29.56 (4.07)	33.2 (4.81)
Total number of incorrectly recognized items	17.91 (8.68)	10.64 (5.8)
Number of incorrectly recognized familiar items	7.86 (5.1)	5.7 (3.02)
Number of incorrectly recognized unfamiliar items	10.43 (4.95)	7.21(3.78)
RT for total number of correctly recognized items	1290.3 (150.02)	1175.8 (137.38)
RT for number of correctly recognized familiar items	2677.55 (307.21)	2396.74 (545.96)
RT for number of correctly recognized unfamiliar items	2632.41 (356.28)	2397.51 (378.73)
RT for total number of incorrectly recognized items	1357.69 (175.54)	1305.34 (276.61)
RT for number of incorrectly recognized familiar items	2936.47 (451.11)	2392.85 (974.85)
RT for number of incorrectly recognized unfamiliar items	2816.11 (424.31)	2815.11 (770.68)

Note:Response time was measured as millisecond (ms).

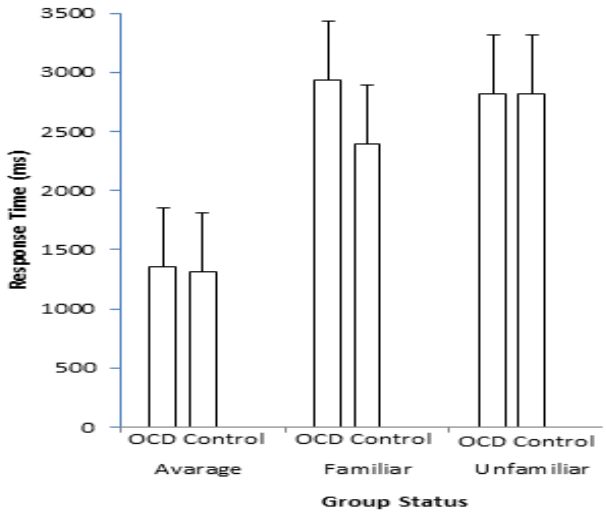

Figure 3. Response Times for Incorrectly Recognized Item

3.2.3 Feeling of Knowing and Second Recognition (Criterion Test) Performance (Phase 4)

The mean scores and standard deviation for FOK judgments depending on group status was presented in Table 3.4. A 2 (Familiar, Unfamiliar) x 2 (OCD, Control) MANOVA was conducted to analyze the effect of group status on participants FOK ratings for familiar, unfamiliar items, FOK judgments, and their FOK accuracy. Participants FOK judgment in total, for familiar items, unfamiliar items and their FOK accuracy scores were included in the analysis. Box's Test of M showed that the assumption of homogeneity of was violated $p > .05$. Multivariate tests was found to be indicating a significant group effect, *Wilk's* λ=.62, $F(4,27) = 4.15$, $p < .05$; $\eta 2 = .381$. Between-Subjects Effects test revealed a significant difference between the groups in terms of FOK judgments for all items, $F(1,30) = 8.57$, $p < .05$; $\eta 2 = .222$. Control group's ($M = 4$, $SD = 1.3$) FOK judgments were higher than clinical group's ($M = 2.5$, $SD = 1.2$). There was also a significant difference between the groups in participants FOK judgments for familiar items

$F(1,30) = 4.93$, $p < .05$; $\eta 2 = .141$. Showing control group's ($M = 3.8$, $SD = 1.2$) FOK judgments for familiar items were higher than clinical group's ($M = 2.6$, $SD = 1.5$). Additionally, between the groups significantly differed in participants' FOK judgments for unfamiliar items $F(1,30) = 6.92$, $p < .05$; $\eta 2 = .187$. Thus control group's ($M = 3.02$, $SD = 1.3$) FOK judgments for unfamiliar items were more positive than clinical group's ($M = 2.5$, $SD = 1.3$). Finally, results couldnot revealed a group effect for FOK accuracy. These results indicated participants in control group gave significantly higher FOK judgments about their previously unrecognized items.

Participants' response times during making their FOK judgments in total and for familiar and unfamiliar items were not found to be significantly different (see Figure 4).

Table 3.4.

Mean and Standard deviation values for FOK Judgments according to group status

Variables	**OCD (*n*=23)**	**Control (*n*=20)**
	M (SD)	*M* (SD)
FOK Accuracy	.50 (.14)	.54 (.13)
Total FOK	2.5 (1.2)	4 (1.34)
FOK for Familiar Items	2.6 (1.5)	3.8 (1.2)
FOK for Unfamiliar Items	2.5 (1.3)	3.02 (1.3)
Response Time for Total FOK	3311.16 (2779.5)	2759.25 (993.36)
Response Time for FOK for Familiar Items	2772.9 (1385.95)	2574.79 (1079.55)
Response Time for FOK for Unfamiliar Items	3178.09 (2399.08)	2883.28 (1056.9)

Note: Response time was measured as millisecond (ms).

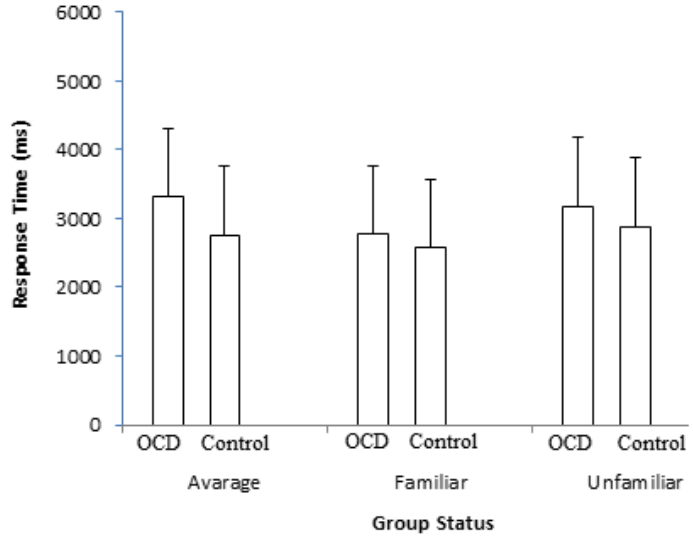

Figure 4. Response Times for FOK Judgments

The mean scores and standard deviation for second recognition performance (criterion test for FOK judgment) depending on group status was presented in Table 3.5. A 2 (familiarity) x 2 (group status) MANOVA was conducted to test group effect on participants number of correctly and incorrectly familiar and unfamiliar items. Results were found to be nonsignificant for both correct and incorrect responses. However, participants in two groups were seem to be receiving different number of items in the second recognition phase due their varying performance in first recognition phase. Participants in the clinical group were observed to be making more errors in recognition in the first phase, therefore they encountered more items compared to control group who made less errors. In order to control this proportion differences participant's performance was calculated as percentage (per subject). After the calculation of percentages, a 2 (Familiarty) x 2 (OCD, Control) MANOVA was conducted to test group effect on number of correctly matched familiar and

unfamiliar items. However, no significant difference was found between groups.

Additionally, groups effect was not significant on response times (see figure 4).

Table 3.5.

Mean and Standard deviation values for second recognition performance according to group status

Variables	**OCD (*n*=23)**	**Control (*n*=20)**
	M (SD)(%)	*M* (SD)(%)
Total number of correctly matched items	3.3 (2.5)	4.3 (3.1)
Number of correctly matched familiar items	1.6 (1.3) 30%	2.3 (.1.8) 40%
Number of correctly matched unfamiliar items	1.7 (1.5) 28%	1.9 (1.7) 38%
Total number of incorrectly matched items	5.5 (3.8)	4.8 (3.2)
Number of incorrectly matched familiar items	2.4 (2.1) 36%	1.8 (1.2) 27%
Number of incorrectly matched unfamiliar items	3.1 (1.8) 39%	3(2.3) 28%
RT for total number of correctly matched items	2145.87 (201.58)	2093.83 (362.41)
RT for number of correctly matched familiar items	2048.10 (380.58)	2027.41 (408.12)
RT for number of correctly matched unfamiliar items	2288.77 (322.05)	1937.8 (971.6)
RT for total number of incorrectly matched items	2220.64 (348.53)	1863.22 (910.88)
RT for number of incorrectly matched familiar items	2225.6 (465.53)	1709.94 (891.54)
RT for number of incorrectly matched unfamiliar items	2237.83 (332.16)	1839.9 (989.58)

Note: Response time was measured as millisecond (ms)

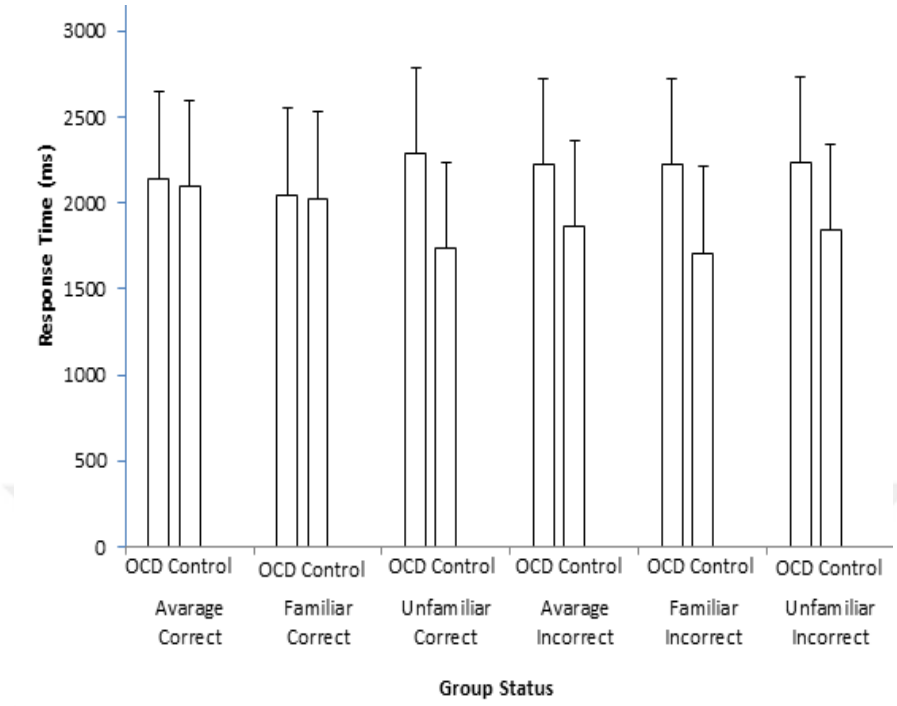

Figure 5. Response Time for Correctly and Incorrectly Matched Items

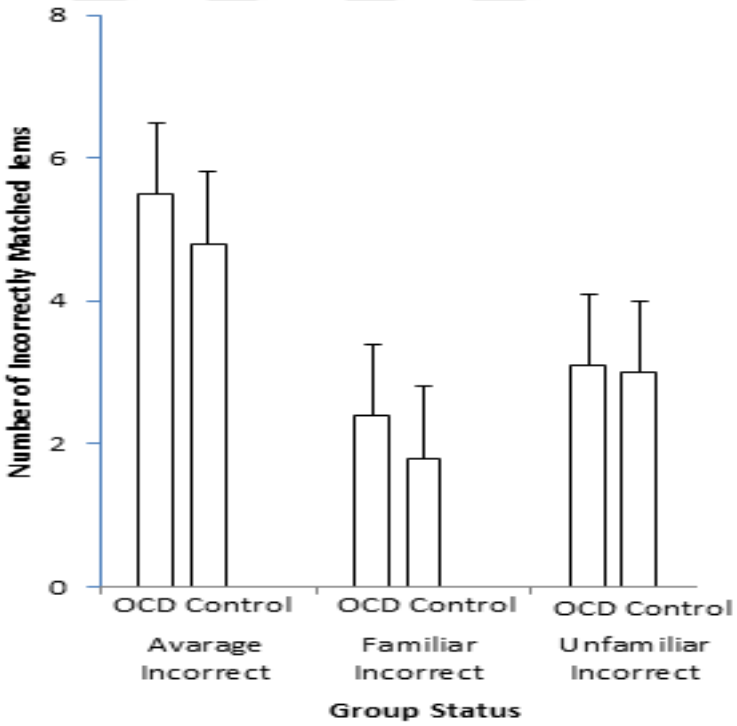

Figure 6. Number of Incorrectly Matched Items

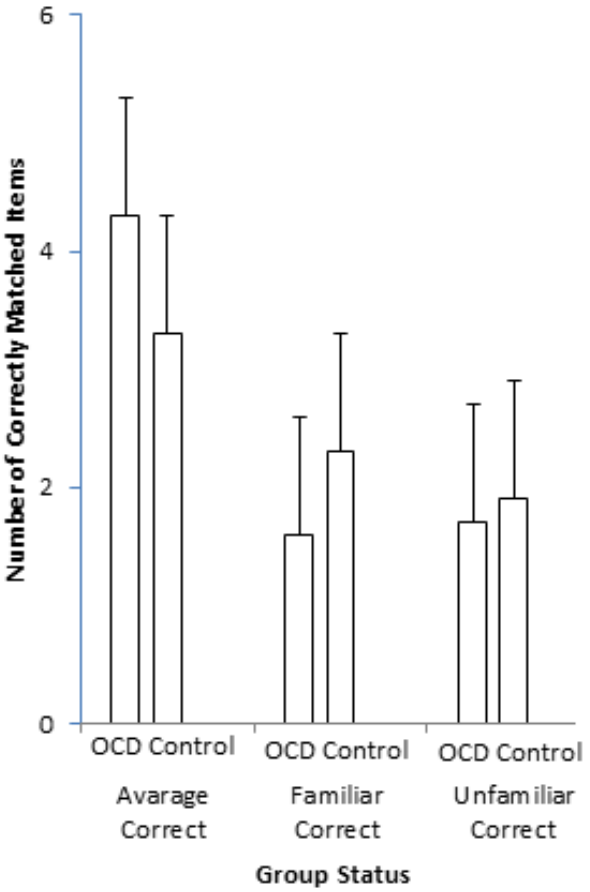

Figure 7. Number of Correctly Matched Items

CHAPTER 4

DISCUSSION

4.1. Summary of the Results

The aim of the present study was to investigate the relationships between the encoding strategy and the metacognitive judgments during the episodic memory task for people diagnosed with OCD. As stated above due to episodic memory is one kind of the memory which is mostly associated with OCD (Muller & Roberts, 2005) the recognition task was aimed to measure memory performances of participants regarding this type of memory. Additionally, the present study lay stress on memory deficits, metacognitive process, and memory confidence.

Encoding/ learning was the first phase of the study and participants were expected to learn picture- noun pairs presented them, no measurement conducted for this phase. However, while executive functions have an important impact on learning and encoding, it was stated that people with anxiety disorders indicate neuropsychological deterioration (Airaksinen et al., 2005) and this might result in poor encoding of the stimulus. Moreover, to be able to examine participants future memory confidence which is related with metamemory two task was preferred: JOL

and FOK. Additionally, current literature displays that OCD patient experience attentional bias and due to this reason neutral stimulus used in the present study to openly understand the relationship between OCD, metamemory, and recognition.

The result of the study demonstrated that people diagnosed with OCD have difficulties in recognition of stimuli meanwhile it has been found that they showed a lack of confidence for their JOL and FOK judgments. Additionally, for the first recognition phase it was found that people diagnosed with OCD demonstrated poor recognition performances in compare to healthy control group regarding familiar and unfamiliar pictures but no significant differences were found for second recognition performances. However in terms of reaction time no significant difference was found between groups. So far several explanations put forward related to the OCD patients recognition performances. However, the concepts related to encoding and metamemory will be discussed below.

4.2. Judgement of Learning

JOL is one of the important components of metamemory and it was the second phase of the study, participants were asked to give rates for their JOL judgments. In a study done by Hose et al., (2009) researchers presented a picture of a face to participants and asked participants for their JOL judgments. The result demonstrated that participants were farsighted, as they were able to successfully predict their future performances (Hose et al., 2009) like the control group of present study. However, it is noteworthy to emphasize that since there is a lack of studies on

JOL judgments in OCD patients, the main focus will be directed on relevant studies that cover the aspects of memory confidence.

Similarly, with the findings of previous researches, the results of the present study indicated that OCD patients are less confident in terms of their predictions about remembering items they just learned compared to healthy control groups for familiar, unfamiliar and total items. People diagnosed with OCD tend to generalize their low ratings for items which they cannot recognize, to their complete performances (Tuna et al., 2005). In another study, it was also found that OCD patients exhibit decreased confidence for their recognition of memory as specified to their self-report confidence rating in compare to the healthy control group (McNally & Kohlbeck, 1993). Zitterl et al., (2001) also reported similar results and they indicated that OCD patients exhibit less memory confidence judgments for their memories in compare to other groups.Thus it can be indicated that OCD patients are prone to underestimate their performances in recognition of new episodic memory which is related with their metacognitive beliefs.

There are studies which have demonstrated the relationship between face recognition and recognition of visual stimuli. For instance, Damasio et al., (1982) stated that if any impairment for face recognition presented, then impairment for visual stimulus might also present. According to Damasio et al., (1982) face recognition studies can be attributed to visual memory. According to inferential theories of monitoring judgments, if the target stimulus is a face than it was expected to have better accuracy for recognition in compare to a situation in which face is cue

(Koriat, 1997). It stated that a noun cue for the face target precipitates the visual image of the face and intensify the relationships between faces and names (Groninger, 2006). Begg et al., (1989) also found similar findings in their study and they proposed that if a name cue and if it prompts to the retrieval of face target, it can impact the effectiveness of JOLs. Moreover, there is a similar situation in our study where the cue is verbal and the target is visual and like other studies (Begg et al., 1989; Groninger, 2006) this might be impact the participant in terms of their JOL performances.

4.3 Feeling of Knowing

Most of the studies have been reported that OCD patients show reduced awareness for their own memory. Kikul et al., (2011) also suggested that metacognitive beliefs have a significant impact on visual memory which implies to memory processing and encoding of visual items. Moreover, the second hypothesis was that people in the clinical group will indicate low level of FOK compare to the healthy control group. Consistently with previous studies, we found that OCD patients were less reliably to judge their future performance which is related with FOK judgments in compare to the healthy control group.

Tekcan et al., (2005) stated that people diagnosed with OCD prone to give specific and low FOK judgments for the stimuli they cannot recall. When researchers informed the participants that they can also give other ratings on the scale, the OCD patients reported that they are not confident in their memory and they also emphasized that they will not be able to remember the information. It can be stated

that people with OCD do not give their FOK judgments based on items, rather they give their FOK judgments depending upon beliefs they hold about their memory (Tekcan et al., 2005) and this might result in low FOK judgments for OCD patients. In conclusion, having metacognitive beliefs like ‘‘my memory is very bad’’, can lead to OCD patients underestimate their current and future memory performances compared to the healthy control group.

Similarly, with the findings of the present study, Tuna et al., (2005) stated that OCD patients reported reduced FOK judgments for their future memory performances and even if there were both neutral and threat-relevant stimuli in the study. Similar findings have been reported by Nedeljkovic and Kyrios (2007), they found that people with the diagnosis of OCD demonstrated the reduction in confidence for their own memory and FOK judgment. In a study done by Dar (2004), obsessive-compulsive checkers indicated decreased confidence when compared to non-anxious individuals. In another study, researchers found that even if people with OCD reported equally elevated confidence at the beginning of the study in compare to anxious and non-anxious control groups when they repeatedly exposed the unsafe items, they exhibited decreased confidence (Tolin et al., 2001). In the light of this information, it can be said that repeated checking cannot help patients to deal with their doubts yet it affects patients negatively and paradoxically more checking compulsions leads to the reduction in confidence in term of memory.

Doubts might be seen as one of the most distinctive features for all type of OCD. At this point, we can focus on obsessional doubt and one potential explanation

for this difference between groups regarding both JOL and FOK might be related with this term. Thoughts like ‘’ maybe the window is open’’ might be an example for obsessional doubt. Additionally, when we consider the inference-based approach (IBA) for OCD, it postulates that people with OCD might be having difficulties or fail to differentiate possibilities from reality and they act as if possibilities are realities (Julien, O’connor & Aardema, 2016). To facilitate, IBA model emphasized that obsessions might be related with a deduction of doubt which beginning with a ‘maybe’, ‘perhaps’ or a questioning (Julien, O’connor & Aardema, 2016). Moreover, in their study, it was found that each participant detected an obsessional doubt for the starting point of obsessions. Our results are also might be explained by the IBA model. Due to obsessional doubts, OCD patients might show impairment in their memory confidence. On the other hand, when we consider the underlying reasons for the low FOK and JOL judgments, one of them might be related to being uncertain about events / information and with the contribution of this uncertainty, people may exhibit reduction in their confidence.

Clinically, when we consider this situation, results imply that a clinician first of all must focus on the presence of doubt which initiates all these processes when a patient with OCD indicates obsessions and compulsions. In terms of both obsessional both and metacognitive beliefs which are one of the most important factors of OCD, cognitive behavioral interventions might be quite beneficial to enhance their confidence and to help the patient to alleviate the severity of their symptoms (Muller & Roberts, 2003). Additionally, Metacognitive Therapy is also influential to address the beliefs of patients such as the power of thoughts, the importance of thoughts and

intrusive thoughts which are fundamental for development and maintaining of the disorder (Fitt and Rees, 2012; Simons et al., 2006).

Many studies have been indicated that there is no memory impairment for OCD and they experience memory bias for anxiety-eliciting stimuli which result in lower confidence and checking compulsions. In contrast to those studies, our results have also demonstrated that there is low memory confidence not only for the treat-related stimulus as indicated previous researches but also for neutral stimulus. However, another reason might be related with encoding problems of OCD patients' experience. If a problem exists during the encoding and information processing of episodic information, this situation might manifest itself in OCD patients' metamemory confidence judgments. Simply because people cannot encode the stimuli effectively, they cannot recognize the present items and with the contribution of doubt, this situation result in giving low FOK and JOL judgments in addition to low memory performance.

One of the hypotheses of the study was related with FOK Accuracy. Nevertheless, this hypothesis was not verified which asserts about finding significant differences between groups. The result of the present study contrast with the previous studies findings which found significant differences in the matter of FOK accuracy between groups (Jurado et al., 2002; Tuna et al., 2005).

Tuna et al., (2005) indicate that OCD patients FOK judgments' were not dependable factors in term of estimation of their recognition performances. On the

contrary, in the present study, it was found that the participants' FOK judgments can successfully predict their recognition performances. It can be stated that OCD patients have awareness about their future performances as well as the control group. However, the difference between the present study and the other studies might come from several points related to the task and the study design. It is important to note that to measure FOK accuracy last recognition part was taken into account. Therefore, it can be stated that the factors which impact the second recognition phase can also impact the results of this part. Additionally, another possible reason might also be related with stimuli easiness. In the present study high-frequent words/pictures pairs were used and with the contribution of exposing these items several times might lead to more accurate results in terms of this phase.

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4.4. Memory in OCD

It emphasized that people with OCD demonstrate low performance regarding their recognition of the information. Moreover, this potential memory problem is seen as a fundamental reason for obsessional doubt which contributes the lower memory confidence and compulsive checking. Consistent with previous studies (Tallis et al., 1999; Muller & Roberts., 2005; Shin et al., 2013), the result of the present study exhibited that there are differences between OCD patients and healthy control group in terms of recognition of visual information for episodic memory task. Healthy control group made more accurate recognition compared to OCD patients.

Similarly to our result, Tallis et al., (1999) found that OCD patients performed worse than the control group in terms of both recall and recognition

performances. Also, Muller and Roberts (2005) found that OCD patients exhibit poor performance for recall than people in the healthy control group. After the review of findings from 88 studies, Shin et al., (2013) reported that OCD patients exhibit significantly decreased performance especially in tasks which measured visuospatial memory, verbal memory, executive functioning, and also in the recall of complex visual information. Moreover, Harkin and Kessler (2011) also indicated that OCD patients show impairments on visual memory and working memory. Besides their apparent lack of confidence, people with diagnoses of OCD also exhibit worse memory performance in comparison to the control group.

In the light of the study results, it can be emphasized that for OCD patients this potential memory problem which causes group differences might have arisen during the encoding of new episodic memory. Additionally, Muller and Roberts (2003) stated that differences in the retrieval and encoding process might lead to difficulties in remembering the visual memory for the people diagnosed with OCD. It is clear that executive impairment which impacts the organization of the information influences visual memory (Muller & Roberts, 2003). Executive impairment plays the principal role as the underlying reason of memory problems, thus if any deterioration happens for executive functioning, it is clear that this situation directly will lead to impairment in visual memory (Olley, Malhi & Sachdev, 2007).

OCD patients' memory processing can also be influenced by their anxiety. Even if there were no potential threat from external, it is possible that internal stimulant might exist for people diagnosed with OCD. To be more specific, while

there was no threat-related information from the environment their mental process may start to interfere encoding process of new information. Being highly engaged with mental process negatively influences and decreases attention capacity, interferes to the encoding of new information (Kikul et al., 2011). Similarly, it was specified that OCD patients have difficulties in terms of ignoring external and internal stimulus due to degradation in their ability to selectively ignore (Clayton et al., 1999), which is associated the term selective attention. Another important component of the encoding process is selective attention and it is one of the significant components of executive function (Diamond, 2013). It refers to ignore the irrelevant items and be able to canalize our awareness simultaneously to task-relevant items (Clayton et al., 1999). During the encoding and transferring of information from short term memory into the long term memory, attention processes have a crucial part and if a stimulus will be transferred from sensory memory to short term memory, a person first must attend on it. Moreover, one explanation of the impairment in selective attention is seen as a failure in cognitive inhibition (Clayton et al., 1999) which is another prominent competent of executive functioning (Gigaux et al., 2013).

Attention problem in OCD might relate with cognitive inhibition. One potential explanation for this difference in recognition might be related to difficulties of cognitive inhibition and selective attention that OCD patients frequently experience. Additionally, in a study done by Muller and Roberts (2013) by using Stroop Task it was depicted that healthy control group easily ignored the distracter task and focus to target task but on the other hand OCD patients did not actively

inhibit the distracter. To sum up, briefly, executive functioning deficits encountered by OCD patients (Moritz et al., 2002; Otto, 1992) make them vulnerable to experience difficulties in encoding.

Besides another groups of studies demonstrated that OCD patients have better performance in recognition **(**Foa & McNall, 1986). Moreover, Foa and McNally (1986) used both neutral and threat-relevant stimuli and it was found that OCD patients recognized threat-relevant stimulus more easily in compare to neutral stimuli. Irak and Flament (2009) have compared the sub-clinical checkers and non-checkers' attention performances by using both neutral and threat-relevant stimuli and it was found that obsessive-compulsive checkers exhibited better performance in terms of recall and recognition of threat-relevant items. Based on studies which found OCD patients performance higher than healthy control, it can say that no memory impairment present for these individuals.

While anxious individuals have been demonstrated better performance regarding their encoding for emotional stimulus (Burgess et al., 1981), it can be stated that people diagnosed with OCD might show similar kind of attention bias for threat-relevant information which they have perceived personally (Muller & Roberts, 2005).It is distinct that attentional mechanisms enter the process of encoding information and influences its functioning, especially for OCD patients. From this point of view, Irak and Flament (2009) also emphasized the term attention bias which patients with OCD experience. Researchers suggest that due to OCD patients perceive threat-relevant stimuli quickly and predominantly this leads their attention

process to disregard another stimulus in their environment (Irak & Flament, 2009). Moreover, due to the limited capacity in memory, if the most part of memory functioning was allocated by inner sources and stimuli perceived as threats, there may not be enough domains to encode new neutral episodic memory information. Taken altogether, it can be speculated that attention bias that obsessive-compulsive checkers experience leads to memory bias which result in worse recognition of new episodic memory other than threat-relevant stimuli.

At this point, it is also important to explain the potential reasons for group differences in terms of unfamiliar and familiar pictures. In our study, as specified previously we used both familiar and unfamiliar pictures. Participants have not been encountered the unfamiliar pictures before the experiment and when they presented the unfamiliar pictures, these unfamiliar pictures might create anxiety for OCD patients due to their obscurity and can be perceived as threats by OCD patients. In the learning phase, words and familiar/unfamiliar pictures presented simultaneously and it is possible that when they encountered with an unfamiliar picture they are more likely directed their attention to those pictures (targets; which they perceive as threats) and cannot attend on the cue. This situation makes it almost impossible to encode the words (cues). Additionally for the next phase of the study, due to cues were words, we presented words and asked for the pictures to participants. Because of participants attention taken by unfamiliar pictures, when only their pairs (words) presented they cannot recognize the pairs of cues, unfamiliar pictures. For the recognition phase, even if we presented both cue and target together, this time participants might doubt about the accuracy of the pairs. Moreover, during the our

study most of the OCD patients were asking if the pictures presented were a match to the words presented. The association between the pictures and the word choices were planted in some participant's mind. Consequently, this situation might result in lower confidence judgments for JOL and FOK regarding unfamiliar picture-word pairs as well as better recognition for familiar items in compare to unfamiliar items. If OCD patients can successfully engage their attention in the learning phase of the study, this might result in the better encoding of the information.

Moreover, Deckersbach et al., (2000) proposed that there is a nonverbal and verbal memory deficit in OCD patients. They have explained these differences with inferior organizational strategies obsessive-compulsive checkers used when they try to memorize items. Also, Savage et al., (1999) used the Wechsler Adult Intelligence Scale and the Rey-Osterrieth Complex Figure Task to measure nonverbal memory performance of participants. Consistent with the result of the studies of Deckersbach et al., (2000), Savage et al., (1999) have also explored that people diagnosed with OCD show poor performance for nonverbal memory and they emphasize that disorganized encoding strategies that used by OCD patients have mediated OCD patients poor performance for these tasks and due to the fact that OCD patients bring into focus irrelevant details of the stimulus they remember, it could result in deficits in their recall performance.

To be elaborated, there are several types of organizational strategies for memory used by human beings and they help us in remembering information. Some of the memory strategies are the rote rehearsal, elaboration and chunking. Those

strategies make easier to encoding and retrieval of information. According to Klatzky's model of human information processing, it can be mentioned that three important steps present in forming memories/encoding information: sensory memory, short term memory and long term memory (Galante, 1996). The first step is associated with sensory memory (Klatzky, 1975) and a memory system for visual information is defined as iconic memory by Sperling (Galante, 1996). Information can be stored in this memory system for a short period of time and it was reported that it lasts less than 1000 ms (Mitchell, 1972). If a person decides to remember information, it must be transferred to short term memory (STM) from sensory memory and attention is a significant factor of this transference process. In the second part, which is related with STM, information can only store during 20 – 30 seconds without continuing rehearsal and at this point, a person should actively work on the information to transfer it into long term memory (LTM). The more a person works on it and the more effort to expend, the more likely the information transferred to LTM. So, this part makes the type of encoding strategies used by people highly prominent. It was proposed that due to OCD patients use poor organizational strategies at this phase, they cannot encode the new episodic information effectively (Shin et al., 2004). To be elaborate, if a person uses only rehearsal as a strategy to encode to information, most probably the information cannot be encoded because of the little effort spent on it. However, if the person uses another strategy like association which requires relating the item that person wants to learn with something they have already known lead to deep level learning and successful retrieving of the learned item due to the more effort expend on it. Savage et al. (1999) also put emphasize on organization of information. They proposed that OCD

patients have difficulties in recalling information due to deficiencies in their organization of information in the encoding phase. Shin et al., (2004) also emphasized that problems in memory of people diagnosed with OCD take its source from the deficiency in their organizational strategies rather than real memory deficits.

In contradiction to our result, in Moritz et al., (2006) study, even if OCD patients exhibit a greater reduction in several domains like selective and divided attention they did not find significant differences between groups. Differently, from the present study, they have used self-reported scales which measure and examine memory functioning of participants. At this point, it is noteworthy to mention that in their study there were 60 patients and only a few numbers of them had checking compulsions which can impact the result of the study. Additionally, in another study recently done by Karadağ et al., (2005) researchers cannot find differences in recognition performances of participants. For FOK judgments it was found that healthy control group was more confident in terms of both obsessive-compulsive relevant and neutral sentences but for recognition performance, OCD patients were not significantly differ from the control group. However, it is not important to note that even if they could not find significant differences they emphasized that OCD patients showed worse performance than the healthy control group. One of the possible reason that causes these differences between Karadağ et al., (2005) study and present study might be related with methodological differences between tasks. While we used the picture and word pairs which associated with non-verbal memory, they used sentences consisted of six or seven words which related with verbal

memory performance. In addition to this, in their study for the learning phase researchers gave direction to participants, they asked to listen and repeat aloud each sentence after they presented. Also, researchers indicated that each phase lasted approximately between 30-45 min which is pretty much from our experiment's duration for phases. Both duration and repeating aloud might be contributed to information processing of OCD patients positively.

For the last phase of our study, it was expected to found differences between groups concerning the second recognition phase. In this phase, participants were shown the words and they were expected to found the pair of the presented word among four choices of pictures. Even if there was no difference was found between groups, the control group has a higher mean value in compare to the clinical group in terms of correct answers. There might be several reasons for this outcome. Firstly, for this phase of the study, there was no sufficient number of participants and this might lead not to be able to detect differences between groups. Due to the fact that many participants were able to find pairs in the previous phase, few participants remain for the last phase of the study, especially for the control group. Additionally, this might also be related with the number of items. 40 pairs were shown to the participants and if there were more items, this would help us to observe their performances. On the other hand, increasing the number of items might lead to fatigue for participants and impact the quality of the study. Besides, participants expose items lots of time up to this phase and this might give a chance to familiarity effect. Participants might become gradually more familiar to items and it might help them to identify couples much more easily. Thus, another way might be the

removing last recognition phase from the study and get through the study after the third phase.

It was advocated that pharmacological treatments do not contribute to ameliorate in terms of visual memory (McKay, 2013). According to a study done by Kim et al., (2002) it was found that even with the implementation of pharmacological treatments OCD patients show impairment for their recall performances. Herein, it is also important to think about how to improve OCD patients memory functioning. One possible treatment action might be teaching different encoding strategies to people diagnosed with OCD in order to improve their memory performances. If they put intense mental effort into new episodic information, they are more likely to remember it, which also possibly leads the improvement in their memory confidence. In addition to organizational strategies, training on executive functioning seems to be necessary for patients with OCD. Developing personalized training programs considering individual differences and trying to rehabilitate and improve cognitive abilities in addition to selective attention might be helpful.

On the other hand, in terms of clinical implication, the finding of present study might be helpful to inform about which therapy approaches might be more effective to treat OCD. At this point, cognitive behavioral therapies take more attention. Similarly, in a study done by Kuelz et al., (2006), after implementation of cognitive behavioral therapies it was stated that participants showed remarkable development in terms of organizational strategies, visual memory and set- shifting. As well as memory performance improvement, it is also clear that cognitive

behavioral therapies help clinicians to address OCD patient's confidence related with FOK and JOL performances and lead to improvement in their confidence level. Moreover, as stated previously, Metacognitive Therapy is also beneficial in treating OCD because it focuses on to alternate negative appraisals and metacognitive beliefs such as power of thoughts and the importance of thoughts. Lastly, recent evidence demonstrates that mindfulness-based therapies help participants to improve their attention (Berto & Barbiero, 2014) and it stated that doing yoga also leads to improvement in selective attention and executive functioning (Rogers, 2016). Thus it can be conclude that, as well as cognitive behavioral therapies and metacognitive therapy, integration components of yoga and mindfulness might enhance the efficacy of treatment and clinicians can benefit from these third wave therapies in treatment of OCD.

4.5. Response time

According to the result of our results, no differences were found in terms of reaction time. Contrarily to the findings of the present study, many of researches indicated long-delayed responses for OCD patients (Martin et al., 1995). The common phenomenon shows that OCD patients have slower performance in information processing and demonstrate long-delayed responses in compare to control groups (Savage et al., 2000; Tukel et al., 2012). In terms of the present study, although there was no significant group differences, OCD patient showed slower performance in compare to healthy control groups for almost all phases. Similarly, in a study done by Derin (2014), it was found that people with OCD demonstrate lower performance in compare to control group. However, the OCD patients have a

tendency to display long-delayed responses which is also explained with the impairment in executive functioning (Harkin & Kessler, 2011). Moreover, in terms of OCD patients, the slowness was also seen related with deprivation in neural circuit (Olley et al., 2007). It was also stated that the difficulties OCD patients experience regarding their executive control might cause dysfunction in terms of modulating their alertness, sustaining effort and processing speed of information (Harkin & Kessler, 2011).

In our study participants must respond within a short period of time for most phases and this can make it difficult to explore group differences in terms of reaction time. For instance, for recognition phases, items were presented to the participants during 3 seconds and it was expected them to respond within the same period of time. Participants have to examine their memory for items presented, decide and give responses which might be challenging to do for all participants in a few seconds. In our study, if more time was given to participants, it might lead to finding significant results. Another fundamental assumption for not finding group differences in terms of reaction time is also related with the task. In the present study, the episodic memory task was easy because all participants did well in the study, few of them remain in the second recognition phase. If participants perceived the task items easily it might also result in spending a short period of time to respond. Because of those reasons, it is not surprising that finding no group differences in terms of reaction time.

Additionally it is important to consider the differences between our study and other studies which found group differences in terms of response time. In a study done by Derin (2014) it was found that OCD patient respond slower in compare to control group. Noun-noun words pairs were used to measure participants' episodic memory and these words range between 5 and 8 letters. As mentioned earlier in the present study picture-noun pairs used and using different type of stimulant might cause differences between results of the study. Penades et al., (2007) conducted a study with OCD patients and they also depicted that OCD patients demonstrated longer reaction time in compare to control group. However in their study they used GO/ NO-GO task and Stroop test which measures attention and response inhibition differ from the present study regarding procedure. Similarly to Panades et al., (2007) study, Bannon et al., (2001) also emphasized that OCD patients showed a slower reaction time in Stroop task but herein it is important to note that in their study control group was consisted of people diagnosed with panic disorder.

4.6. Limitations

In spite of the contributions of the present study to the literature, it had also some limitations. In our study, we have a small number of participants for groups and a small number of stimuli. In contrast to previous studies, we did not find group differences for the second recognition part. To not lead to fatigue for participants, small number of the stimulus were used but due to the small number of the stimulus used by the beginning of the task, few numbers of stimuli remained in the second phase which impacted the significance of the study. Additionally as discussed above, there might be similar reasons present for Fok accuracy and it results in finding no

significant group differences between groups. To be able to gather more accurate results the number of participants and stimulus must be enlarged for future studies.

The onset of the disorder is another important factor that might impact the result of the study. OCD has multiple symptoms and it might impact neuropsychological functions of patients diagnosed with OCD (Lawrence et al, 2006). People with early-onset of OCD might have various features and this might result in neuropsychology, behavioral and psychological problems in compare to participants who have late-onset of OCD. For this reason, early and late-onset of the disorder should be examined differently (Geller et al., 2001). In our study due to the limited number of participants, this could not be analyzed.

Lastly, we have some limitations related to our experiment. During the experiment, we cannot observe the organizational strategies used by participants during encoding. To be able to gather more accurate results, a statistical technique of think aloud might be applicable during the learning phase of the experiment. Also, for eye fixation, people who have recognized better and also who have not better that enough were found to have different eye fixation patterns (Muller & Roberts, 2003). For people with OCD, such differences might exist and it should be taking into account in future studies.

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APPENDIX A

INFORM CONSENT

Sayın Katılımcı,

Bahçeşehir Üniversitesi Klinik Psikoloji Yüksek Lisans öğrencisi Psikolog Sena Yüksel, Prof. Metehan IRAK'ın danışmanlığında Obsesif Kompulsif Bozuklukta Bilişsel Süreçler konulu tez çalışmasını yürütmektedir.

Bu çalışmanın size herhangi bir zararı bulunmamaktadır. Çalışmaya katılmayı kabul ettiğiniz takdirde, size sunulan ölçekleri ve bilgisayar ortamında gerçekleşecek ilgili uygulamaları tamamlamanız gerekecektir. Size verilecek olan bu ölçekleri ve bilgisayarortamında gerçekleştirilen uygulamaları tam ve doğru bir şekilde doldurmanız / tamamlamanız çalışmanın gidişatı açısından oldukça önemlidir. Bu çalışmaya katılmak tamamen isteğe bağlıdır. Katıldığınız takdirde çalışmanın herhangi bir aşamasında herhangi bir sebep göstermeden çalışmadan ayrılma hakkına sahipsiniz. Araştırma kapsamında tüm kişisel bilgileriniz ve verdiğiniz cevaplar gizli tutulacaktır. Araştırma projesi hakkında ek bilgi almak istediğiniz takdirde lütfen araştırmayı yürüten Psikolog Sevcan Aktaş ile iletişime geçebilirsiniz (E-Posta: sevcanaktas94@gmail.com).

Bu çalışma Marmata Üniversitesi İstanbul Pendil Eğitim ve Araştırma Hastanesi tarafından onaylanmıştır. Eğer bu araştırma projesine katılmayı kabul ediyorsanız lütfen aşağıdaki formu imzalayınız.

Ben (Katılımcının Adı-Soyadı) ……, yukarıdaki metni okudum ve katılmam istenen çalışmanın kapsamını ve amacını, gönüllü olarak üzerime düşen sorumlulukları tamamen anladım. Bu çalışmayı istediğim zaman ve herhangi bir neden belirtmek zorunda kalmadan bırakabileceğimi ve bıraktığım takdirde herhangi bir olumsuzluk ile karşılaşmayacağımı anladım. Bu koşullarda söz konusu

araştırmaya kendi isteğimle, hiçbir baskı ve zorlama olmaksızın katılmayı kabul ediyorum.

Katılımcının;
Adı-Soyadı:
İmzası
Tarih: (gün/ay/yıl): …/…/….
Telefon No:
E-mail:

Araştırmacının;
Adı-Soyadı:
: İmzası: