Memory Function in Patients with Obsessive Compulsive Disorder and the Problem of Confidence in Their Memories: a Clinical Study

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Aim
To examine obsessive-compulsive patients for memory of obsessive-compulsive relevant material and confidence in their memory.

Methods
Memory function was examined by a recognition task using neutral and obsessive-compulsive relevant sentences in 32 patients with obsessive-compulsive disorder and 31 control subjects. We also investigated the participants’ confidence in the accuracy of their recognition. The severity of obsessive-compulsive disorder was evaluated by using the Yale-Brown Obsessive Compulsive Scale. The Maudsley Obsessive Compulsive Questionnaire, the Hamilton Depression Rating Scale, and the State-Trait Anxiety Inventory were also administered to the two groups.

Results
Whereas obsessive-compulsive disorder patients were not significantly different from control subjects on measures of recognition memory for both obsessive-compulsive relevant and neutral material, they were significantly less confident in the memory for obsessive-compulsive relevant and neutral sentences. Also, the State-Trait Anxiety Inventory (STAI) scores were negatively correlated with the recognition performance of obsessive-compulsive disorder relevant sentences and the levels of confidence in memory in the obsessive-compulsive disorder group. The obsessive-compulsive patients with checking compulsions were not different from non-checking obsessive-compulsive patients.

Conclusion
Our results suggest that obsessive-compulsive patients experience difficulties in confidence in their memory, possibly related to anxiety rather than primary memory deficits.

Obsessive-compulsive disorder is characterized by recurrent unwanted thoughts and repetitive, ritualistic behaviors which lead to severe impairments in daily functioning (1). The clinical presentation of obsessive-compulsive disorder, which includes stereotyped thought processes and content, suggests that one might expect differences in the processing of information in this population (2,3). Patients with obsessive-compulsive disorder frequently report uncertainty about whether they have performed actions correctly, or contacted contaminants, as well as questions representing doubts of some nature. In attempting to reduce their doubts, patients are likely to engage in compulsive behavior such as checking, washing, and other repeated activities. Rachman and Hodgson (4) posited a strong relationship between pathological doubt and checking compulsions. One hypothesis about the source of doubt claims that obsessive-compulsive patients have a general memory deficit (5). Neuropsychological studies of obsessive-compulsive disorder have suggested that memory deficit is related to frontostriatal dysfunction or abnormal information processing in anxiety (6-8).

An alternative hypothesis is that obsessive-compulsive patients have memory deficits only for threat-related stimuli or activities. For ex-
ample, an individual who fears leaving the oven on will exhibit poor memory concerning whether or not she/he has turned it off, but will show normal memory performance for threat-irrelevant activities. Studies investigating this hypothesis suggested a bias in the opposite direction, with enhanced memory for threat-related information (3,6,9).

Despite the memory-deficit theory, several experimental studies have demonstrated that obsessive-compulsive patients suffer from low confidence in their memory leading to pathological doubt. Investigations of this issue have used a variety of study designs. Some studies assessed memory confidence in obsessive-compulsive patients using a reality monitoring task, in which subjects were asked to determine whether they had engaged in, or merely imagined engaging in, some action (10-12). Several other studies used obsessive-compulsive related/non related sentences or word lists (2,13). The results of studies using different methods suggested that obsessive-compulsive patients were more likely to suffer from a lack of confidence about their recognition memory than from impairment in their memory. Van den Hout and Kindt (14) have recently suggested that excessive checking leads to reduced memory confidence. The inconsistency between different studies suggests that memory in anxious individuals may be influenced by two conflicting processes: the tendency to pay attention to encoding threat-relevant material and the tendency to avoid elaboration on such material (15). An encoding bias is likely to enhance memory for threat-relevant material whereas a tendency to avoid elaboration is likely to impair memory for such material. The effects of this conflicting process may cancel each other out, thus obscuring memory deficit for threat-relevant material.

We examined the hypothesis that obsessive-compulsive patients show a memory bias for obsessive-compulsive disorder relevant material and have less confidence in their memory than healthy control subjects.

**Subjects and Methods**

**Subjects**

Subjects were 34 patients (26 women and 8 men) who met the Diagnostic and Statistical Manual of Mental Disorders-IV criteria for obsessive-compulsive disorder (1). After excluding 2 patients from the study because they refused to participate, the final obsessive-compulsive disorder group consisted of 32 patients (24 women and 8 men).

All patients sought treatment at the outpatient clinic in Psychiatry Department, Pamukkale University School of Medicine. Exclusion criteria for the patient group were mental retardation, primary psychiatric disorder (other than obsessive-compulsive disorder and depressive disorder secondary to obsessive-compulsive disorder), history of cranial trauma, and alcohol, substance, or drug abuse. None of the patients had a history of concomitant medical or neurological illness, and all were drug free (benzodiazepines and other psychotropics) for at least 2 weeks at the time of testing. The control subjects (22 women and 9 men) were selected from healthy volunteers among hospital staff members who matched the study group in age, gender, and years of education. Exclusion criteria were the history or presence of psychiatric, medical, or neurological disorders, and substance or drug use for at least 2 weeks prior to the study. All subjects gave their written informed consent to taking part in the research procedures.

**Tests**

Before the testing period, all patients and control subjects were interviewed individually to screen for lifetime psychiatric disorders, using a structured interview schedule (Structured Clinical Interview for DSM-IV-Clinical Version SCID-I/CV). This clinical interview inventory was performed by First et al (16) and the validity and reliability studies of Turkish form were performed by Ozkurkcugil et al (17).

All participants completed the State-Trait Anxiety Inventory (STAI) and the Maudsley Obsessive Compulsive Questionnaire (MOCQ) (18-19). The Hamilton Depression Rating Scale-17 for depressive symptoms (20) and the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) were administered to ascertain the severity of obsessive-compulsive disorder symptoms (21,22). Validity and reliability studies were performed using the Turkish versions of the four rating scale (23-26).

Maudsley Obsessive-Compulsive Questionnaire (MOCQ). It was used to define checkers and non-checkers. Patients who scored five or
more on the checking subscale of the MOCQ were classified as “compulsive checkers” (27).

**Sentence list.** A total of 90 sentences consisting six or seven words were used in the various phases of this study. In Turkey, there is no study on the frequency of usage of words. We made the sentence lists according to frequency of usage in the daily news. Forty-five sentences had non-obsessive-compulsive disorder content and an additional 45 sentences had obsessive-compulsive disorder content. We used the items of the MOCQ and previous studies in the selection of the obsessive-compulsive disorder related sentences (13,28,29). The sentences were in the present tense and the grammatical structure of the sentences was adapted to the Turkish language. The sentences were related to daily activities (shopping, cleaning) and hobbies (reading, travel).

**Procedure**

Participants were tested individually in a quiet room (4 x 3 m). The subject and interviewer were seated face to face, at a 1 m distance from each other. Because of the technical limitation of our institute, we were not able to use audiotaped or videotaped administration of stimuli at the onset of the study. Therefore, we performed the administration of stimuli in a face-to-face interview with the interviewer reading aloud the stimulus sentences. During the study period, the sentences were read aloud by the same interviewer, using the same intonation and volume as much as possible in each case. Each session lasted approximately 30-45 min and consisted of 3 phases. The subjects were asked to listen to and then repeat aloud each sentence immediately after its presentation. In phase 1 (the encoding phase), participants were presented with 30 sentences (15 neutral and 15 obsessive-compulsive disorder related). Next, in phase 2 (the interference phase), participants were presented with 60 sentences (30 neutral and 30 obsessive-compulsive disorder related). Fifteen of each sentence type were old (from phase 1) and 15 were new (never heard before). In phase 3 (the recognition phase) 60 sentences were heard, 30 neutral and 30 obsessive-compulsive disorder related. Fifteen of each sentence type were old (from phase 1) and 15 were new (never heard before). After hearing each sentence, participants were asked to indicate whether or not they had heard the sentence in an earlier phase of the study and to state whether or not they were confident in their memory judgments. Finally, participants completed the self-report measures.

**Statistical Analysis**

One point was scored for each accurately recognized sentence. To correct for response biases, these scores were recalculated using the following formula: for each participant and for each sentence type, the proportion of falsely recognized new sentences was subtracted from the proportion of accurately recognized old sentences (13). We calculated the mean and standard deviations separately for neutral and obsessive-compulsive related sentences.

To examine the participants’ confidence in the accuracy of their recognition judgments, we asked the patients whether they were completely confident or whether they had any doubt about their decision. If the patients expressed doubt about their response, we assessed this as a non-confident response. So we assigned 1 point for each answer of “I am completely confident” and 0 points for each answer “I am not confident or I suspect”. Confidence ratings were recalculated by the same method used for the recognition scores. We calculated the mean and standard deviations separately for neutral and obsessive-compulsive related sentences and for old and new sentences.

The differences between the obsessive-compulsive disorder and control groups were examined by $\chi^2$ test for categorical variable (gender distribution). The mean scores of sentence recognition and confidence in patients and control group, as well as checkers and non-checkers were compared using Mann-Whitney $U$ test due to small sample size. The relationship between the recognition or confidence scores and psychiatric rating scale was examined by Spearman correlation analyses.

**Results**

The mean age, number of years of education, and gender distribution were not different between the subject groups. The sociodemo- graphic and psychologic test data of those subjects are presented in Table 1. Based on MOCQ-subscales scores, 22 patients were classified as checkers. Obsessive-compulsive patients had significantly higher trait anxiety levels than state anxiety levels (STAI-trait: 59.09±8.26, STAI-state: 50.25±
Recognition

The performance of obsessive-compulsive disorder patients showed no difference from control subjects in recognition of obsessive-compulsive related sentences (Table 2). The recognition scores were not different between obsessive-compulsive checkers (n=22) and non-checkers (n=10). There was no significant relationship between sentence recognition and years of education, total Y-BOCS scores and HDRS scores (Table 2).

Confidence in Recognition

The means and standard deviations of participants’ confidence in the accuracy of their recognition judgments are presented in Table 3. The obsessive-compulsive disorder patients were significantly less confident for neutral, obsessive-compulsive disorder related and old sentences than the control group.

Confidence level of checkers was not significantly different than that of non-checkers. In the obsessive-compulsive patient group, STAI-trait scores were negatively correlated with the confidence level for old and obsessive-compulsive disorder related sentences (Pearson’s r = -0.276, P < 0.05; and r = -0.325, P < 0.01, respectively). Confidence level was not correlated with HDRS and Y-BOCS scores (Table 3).

Discussion

The findings of the present study suggest that although obsessive-compulsive patients show worse performance, their performance is not significantly different from individuals without obsessive-compulsive disorder on measures of recognition memory for obsessive-compulsive relevant and neutral material. Our results also show that obsessive-compulsive checkers tend not to be deficient in their memory when compared with non-checkers and controls.

Previous research has suggested that memory deficit may play a role in maintaining checkers’ repetitive behavior in subclinical populations (27,30). On the other hand, two earlier

Table 1. Demographic characteristics and psychiatric rating scores (mean ± standard deviation) of obsessive-compulsive patients (n=32) and controls (n=31)

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Patients</th>
<th>Controls</th>
<th>U*</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td>34.28±10.95</td>
<td>32.25±11.15</td>
<td>419.50</td>
<td>0.292</td>
</tr>
<tr>
<td>Education (years)</td>
<td>8.90±3.99</td>
<td>9.48±3.88</td>
<td>499.50</td>
<td>0.608</td>
</tr>
<tr>
<td>Age at onset of obsessive compulsive disorder</td>
<td>24.9±8.9</td>
<td>7.7±4.26</td>
<td>8.50</td>
<td>0.001</td>
</tr>
<tr>
<td>Maudsley Obsessive-Compulsive Questionnaire</td>
<td>21.81±6.72</td>
<td>41.2±2.14</td>
<td>55.00</td>
<td>0.001</td>
</tr>
<tr>
<td>Hamilton Depression Rating Scale (17 item)</td>
<td>14.53±6.44</td>
<td>35.90±10.76</td>
<td>86.50</td>
<td>0.001</td>
</tr>
<tr>
<td>State-Trait Anxiety Inventory – state</td>
<td>50.25±10.23</td>
<td>41.18±10.25</td>
<td>66.00</td>
<td>0.001</td>
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<tr>
<td>State-Trait Anxiety Inventory – trait</td>
<td>59.09±8.46</td>
<td>9.71±9.09</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yale-Brown Obsessive-Compulsive Scale:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>total score</td>
<td>22.81±7.04</td>
<td>11.56±3.99</td>
<td></td>
<td></td>
</tr>
<tr>
<td>obsession score</td>
<td>22.81±7.04</td>
<td></td>
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</tbody>
</table>

*Mann-Whitney U test.

Table 2. Sentence recognition scores (mean ± standard deviation) in obsessive-compulsive patients and controls

<table>
<thead>
<tr>
<th>Sentence type</th>
<th>Patients</th>
<th>Controls</th>
<th>U*</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obsessive-compulsive related</td>
<td>0.75±0.20</td>
<td>0.83±0.12</td>
<td>476.50</td>
<td>0.784</td>
</tr>
<tr>
<td>Neutral</td>
<td>0.85±0.18</td>
<td>0.87±0.15</td>
<td>388.50</td>
<td>0.134</td>
</tr>
<tr>
<td>Presentation:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old†</td>
<td>0.90±0.16</td>
<td>0.70±0.32</td>
<td>465.00</td>
<td>0.664</td>
</tr>
<tr>
<td>New‡</td>
<td>0.90±0.11</td>
<td>0.79±0.18</td>
<td>416.00</td>
<td>0.267</td>
</tr>
</tbody>
</table>

*Mann-Whitney U test.
†Refers to the sentences that the patients heard in an earlier phase of the study (phase 1, phase 2).
‡Refers to the sentences that the patients did not hear in an earlier phase, just heard in phase 3.

Table 3. Confidence in recognition scores (mean ± standard deviation) of obsessive-compulsive patients and control group

<table>
<thead>
<tr>
<th>Sentence type</th>
<th>Patients</th>
<th>Controls</th>
<th>U*</th>
<th>P*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obsessive-compulsive related</td>
<td>0.80±0.20</td>
<td>0.89±0.12</td>
<td>333.50</td>
<td>0.023</td>
</tr>
<tr>
<td>Neutral</td>
<td>0.76±0.25</td>
<td>0.87±0.13</td>
<td>355.00</td>
<td>0.050</td>
</tr>
<tr>
<td>Presentation:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Old†</td>
<td>0.87±0.16</td>
<td>0.95±0.00</td>
<td>297.50</td>
<td>0.04</td>
</tr>
<tr>
<td>New‡</td>
<td>0.70±0.33</td>
<td>0.82±0.16</td>
<td>431.50</td>
<td>0.371</td>
</tr>
</tbody>
</table>

*Mann-Whitney U test.
†Refers to the sentences that the patients heard in an earlier phase of the study (phase 1, phase 2).
‡Refers to the sentences that the patients did not hear in an earlier phase, just heard in phase 3.
studies have demonstrated that obsessive-compulsive checkers are not different from non-checkers and controls (10,11). A possible explanation for these findings is that subclinical checkers check in response to accurate appraisals of their memory impairment, whereas individuals with clinical levels of obsessive-compulsive disorder check in response to doubts which are related to their obsessive-compulsive symptoms rather than to actual memory deficit. Beside memory deficit, there is increasing evidence that obsessive-compulsive disorder is associated with low memory confidence (10-13,31). The results of these studies are mixed. At present, it remains unclear whether confidence is lower for threat-relevant stimuli than for threat-irrelevant stimuli or whether there is a difference between checkers and non-checkers in the degree of confidence. In our study, obsessive-compulsive patients were significantly less confident than control subjects for obsessive-compulsive related, neutral, and old sentences. The confidence level of checkers was not significantly different from that of non-checkers.

Our findings suggest that low memory confidence is characteristic of obsessive-compulsive disorder in general, rather than being content and subgroup (ie checkers) specific. Recently, two studies found no significant differences between checkers and non-checkers in degree of confidence (12,32). Whereas Hermans et al (32) reported that reduced confidence was restricted to neutral actions, Tolin et al (12) found that confidence for threat-relevant stimuli showed a progressive decline over repeated checking trials in obsessive-compulsive checkers. Authors have suggested that low memory confidence is characteristic of individuals with obsessive-compulsive disorder in general, but may be particularly pronounced among checkers in the long term.

More recently, Van del Hout and Kindt (14,33) argued that repeated checking is, in itself, sufficient to produce a type of memory distrust in healthy individuals as well as in obsessive-compulsive patients.

There is considerable evidence that anxiety is associated with a cognitive bias towards either enhanced recall or recognition for anxiety relevant information (3,34,35) or inferior memory for such information (9,36). Although we did not find any difference in recognition performance on obsessive-compulsive related sentences between patients and the control group, we observed that a higher trait anxiety level was associated with a decline in obsessive-compulsive related sentences recognition in our obsessive-compulsive patients. We also observed that the higher anxiety led to reduced confidence in memory for obsessive-compulsive related and old sentences. Cohen et al (8) indicated that obsessive-compulsive patients tend to process information more slowly when their situational anxiety increases, and they show a greater deterioration in reading time on the Stroop test. This may suggest that obsessive-compulsive patients sacrifice speed of response for accuracy on selective attention tasks. In this context, one might expect that anxiety in general may affect one's memory confidence.

Tolin et al (12) suggested that, whereas confidence problems may be characteristic of anxiety patients in general, obsessive-compulsive disorder appears to be marked specifically by a progressive worsening of confidence for memories of unsafe stimuli.

The limitations of the present study are technical disadvantages in the testing process, the measurement of confidence in a binary manner, and relatively small sample size.

In conclusion, our findings imply that obsessive-compulsive patients are characterized with a general, rather than a specific lack of confidence in their memory judgment. The results of the present study appear to converge on the facts that the psychopathology underlying obsessive-compulsive disorder involves impairment in decision-making rather than in memory and that anxiety may possibly interfere with that process. Nevertheless, due to the small sample size, our results must still be confirmed in larger clinical samples. Recent studies investigating this issue have emphasized the importance of ecologically valid, ideographically selected anxiety-producing stimuli, in order to achieve a better understanding of the nature of the information-processing deficits in obsessive-compulsive disorder. In our opinion, two possible suggestions for future research may be the evaluation of the performance of patients with obsessive-compulsive disorder on a wider range of cognitive tasks, and under differing levels of anxiety using such stimuli (ecologically valid, ideographically selected) in a short term and long term and the examination of the extension of this
experimental situation using functional brain imaging techniques (e.g. SPECT).

References


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