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A Comparison of Metamemory in Three Groups: Patients with Washing Obsessive-Compulsive Disorder, Checking Obsessive-Compulsive Disorder, and Generalized Anxiety Disorder

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ABSTRACT

Background and Objective: Memory is a process by which information is encoded, stored, and later retrieved. Without memory and its associated skills, life rapidly falls apart. Deficits in information processing-such as bias and confidence in memory-can also affect treatment protocols. The present study was conducted to compare metamemory (specifically, memory bias and memory confidence) in three groups: washing obsessive-compulsive disorder (OCD), checking obsessive-compulsive disorder, and generalized anxiety disorder (GAD).

Methods: This cross-sectional study was conducted on 45 patients diagnosed with washing OCD, checking OCD, and GAD, who were referred to the clinic of Razi Hospital in Tabriz and had been diagnosed by a psychiatrist. Participants were divided into three groups of 15. Participants' memory was assessed and compared using researcher-developed computer-based tasks (word presentation tasks) which had been designed based on feedback from psychology experts.

Findings: The results of the present study showed a significant difference in memory bias between the washing group (6.8±1.74), the checking group (6.33±1.45), and the GAD group (8.4±1.24) ($p<0.05$). Additionally, a significant difference was found in memory confidence between these groups, with scores of 45.27±8.99, 36.33±11.72, and 50.47±16, respectively ($p<0.05$).

Conclusion: The results of the study demonstrated that the checking group had poor memory confidence, and the GAD group exhibited higher levels of memory bias compared to the other two groups.

Keywords: *Metamemory, Generalized Anxiety Disorder, Obsessive-Compulsive Disorder, Memory Confidence, Memory Bias, Checking*.

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Introduction

Emotional disorders can influence cognitive processes, including attention and memory. One important topic currently discussed in the psychological literature, particularly clinical psychology, is the effect of emotional disorders such as anxiety and obsessive-compulsive disorder on individuals' cognitive functioning (1).

Metamemory refers to the general knowledge and understanding that people have about their own memory (2). Metamemory has recently gained attention due to its relationship with personality traits and psychological disorders. Psychological disorders significantly affect metamemory processes (3). Memory bias is one of the challenges related to metamemory, through which an individual shows a preferential tendency to process threatening and negative environmental information while ignoring other surrounding information, leading to biased judgment (4). Another metamemory-related issue is memory confidence, which is defined as an individual's perception and degree of trust or belief in their own memory regarding past experiences (5).

Obsessive-compulsive disorder (OCD) is a chronic and debilitating illness associated with impairments in social, occupational, and family functioning. Patients with OCD account for 10% of psychiatric outpatients. The lifetime prevalence of OCD in the general population is estimated to be 2-3%, and it ranks as the fourth most common psychiatric diagnosis. The mean age of onset is around 20 years (6).

OCD is characterized by obsessions, compulsions, or both. Obsessions are recurrent and persistent thoughts, urges, or images that are intrusive and inappropriate, and in most individuals cause marked and significant anxiety or distress. The person attempts to ignore or suppress such thoughts, urges, or images, or to neutralize them with another thought or action. Compulsions are repetitive behaviors (e.g., hand washing, ordering, checking) or mental acts (e.g., praying, counting, repeating words silently) that the individual feels driven to perform in response to an obsession or according to rigid rules. The obsessions or compulsions are time-consuming; for example, they take more than one hour per day, or cause clinically significant distress or impairment in social, occupational, or other important areas of functioning (7).

Another issue in patients with OCD is memory confidence. These individuals experience compulsive checking, as well as intrusive and unwanted doubts, leading to a sense of failure in performing tasks correctly and appropriately. Since they constantly worry that they might perform a task incorrectly and cause harm to themselves or others, they feel compelled to verify that the task has been done correctly (8).

Generalized anxiety disorder (GAD) has been identified as the most common anxiety disorder in most studies. According to the DSM-5, its primary criterion is the presence of anxiety and worry about a number of events or activities (such as academic or occupational performance) on most days for at least six months, which the individual finds difficult to control (9). Research in clinical psychology and neurobiology has shown that the visual attention of anxious individuals is drawn to threatening emotional stimuli. When neutral and threatening visual stimuli are presented simultaneously, anxious individuals are preferentially drawn to the threatening stimuli (10-13).

Regarding memory bias, it is hypothesized that individuals with washing OCD will more readily recognize words related to washing-related content, such as blood, phlegm, saliva, etc. Individuals with checking OCD will more readily recognize words related to checking content, such as doorknob, front door, car door, gas valve, etc. Individuals with GAD will more readily recognize words that carry anxiety-related content, such as accident, death, separation, worry, etc.

In a study investigating memory processes in individuals with depression and anxiety, Wanmaker et al. (14) concluded that anxious individuals are unable to shift their attention away from negative, anxiety-provoking information toward neutral information. This state perpetuates their anxiety-laden perception of the world. In other words, they exhibit an attentional bias toward negative stimuli.

Considering the high prevalence of OCD and GAD, and the fact that many aspects of both disorders remain unknown, and since no study has simultaneously compared these disorders in terms of memory bias and memory confidence, the aim of this study is to compare metamemory in three groups: patients with washing OCD, checking OCD, and GAD.

Methods

After approval by the Ethics Committee of the Islamic Azad University, Tabriz Branch (code: IR.IAU.TABRIZ.REC.1402.179), this cross-sectional study was conducted on 45 patients with checking OCD, washing OCD, and GAD. Participants were selected through convenience sampling from among those referred to the clinic of Razi Hospital in Tabriz in 2023 and were divided into three groups of 15. The inclusion criteria were a definitive diagnosis based on DSM-5 criteria by a psychiatrist, and a review of patient records ensured that selected individuals had no comorbid disorders (e.g., major depressive disorder) and had not started pharmacotherapy. Participants included both males and females, aged 20 to 45 years, with education level above a high school diploma. After obtaining the necessary permissions, obtaining informed consent from participants, and explaining the objectives of the study, computer-based tasks were administered individually and in person. All data were collected in compliance with ethical principles and confidentiality.

In order to measure memory bias, recognition, and memory confidence, researcher-developed computer-based tasks (word presentation tasks) designed based on feedback from psychology experts were used to collect the related data.

To develop the researcher-made computer-based tasks, words with anxiety-related content, OCD-related content (checking and washing subtypes), and neutral content were first selected. These words were then rated on an emotional valence scale from 0 to 10 and provided to psychology professors and doctoral students. For each category, the 10 words with the highest scores were selected, resulting in a total of 40 words. These 40 words were presented to participants via a computer task (application). In the first phase, all 40 words appeared on a laptop screen at three-second intervals and were then automatically removed. After the first phase was completed, a time interval of approximately 15 minutes was allowed before beginning the second phase. To prevent mental rehearsal during this interval, participants were asked unrelated questions. The second phase then began. In the second phase, the original 40 words were presented along with 40 additional words (distractors) carrying the same emotional valence (anxiety-related, washing OCD, checking OCD, and neutral), all mixed together.

In the second phase, using a computer-based task (application), each time a word appeared, the participant was asked whether they had seen that word before. If they had seen it, they were asked to rate how confident they were that they had seen it. A 5-point scale was presented to the participant (Very low, Low, Moderate, High, Very high), and they had to select one of these options, with scores ranging from 1 to 5 assigned to each option, respectively. Each individual's memory confidence score was calculated based on the sum of their confidence ratings for correctly recognizing words from the first phase. Regarding the memory bias score, it was hypothesized that individuals with washing OCD would more readily recognize words related to washing-related content, such as blood, phlegm, saliva, etc. Individuals with checking OCD would more readily recognize words related to checking content, such as doorknob, front door, car door,

gas valve, etc. Individuals with GAD would more readily recognize words with anxiety-related content, such as accident, death, separation, worry, etc. The instruments used in this study included a diagnostic interview based on DSM-5 criteria, conducted by a psychiatrist to diagnose washing OCD, checking OCD, and GAD. Additionally, researcher-developed computer-based tasks, developed based on feedback from psychology experts, were used to measure recognition and confidence. The study employed an ex-post facto or causal-comparative approach, which is retrospective in nature and seeks to infer possible causes from observed effects. The non-parametric Kolmogorov-Smirnov test was used to assess the normality of variable distributions. Descriptive statistics (mean, standard deviation) and multivariate analysis of variance (MANOVA) were used to analyze the data. Bonferroni post-hoc test was used to precisely identify differences, and a p-value of less than 0.05 was considered statistically significant.

Results

In this study, 21 participants were male (46.7%) and 24 were female (53.3%). The findings showed that regarding the memory bias variable, the GAD group had a significantly higher mean value compared to the other two groups. Regarding the memory confidence variable, the checking OCD group obtained significantly lower scores than the other two groups. There was a significant difference in mean memory bias between the washing group and the GAD group, as well as between the checking group and the GAD group ($p<0.05$). Additionally, a significant difference was found between the mean scores of the checking OCD group and the GAD group ($p<0.05$) (Table 1).

Table 1. Comparison of memory bias and memory confidence across the three studied groups

Group Variable	Washing OCD group Mean±SD	Checking OCD group Mean±SD	GAD group Mean±SD
Memory bias	6.80±1.74	6.33±1.45	8.40±1.24
Memory confidence	45.27±8.99	36.33±11.72	50.47±16.00

The results of the Bonferroni post-hoc test showed a significant difference in mean memory bias between the washing group and the GAD group, as well as between the checking group and the GAD group ($p<0.05$). Additionally, a significant difference was found between the mean scores of the checking OCD group and the GAD group ($p<0.05$). Mean memory confidence was highest in the GAD group, followed by the washing group, and lowest in the checking group. The checking group was the weakest in terms of memory confidence (Table 2).

Table 2. Results of the Bonferroni post-hoc test for pairwise comparisons between groups

Dependent variable	Group (I)	Group (J)	Mean Difference (I-J)	p-value
Memory bias	Washing OCD group	Checking OCD group	0.467	1.000
		GAD group	-1.600	0.016
	Checking OCD group	GAD group	-2.067	0.001
Memory confidence	Washing OCD group	Checking OCD group	8.93	0.175
		GAD group	-5.2	0.791
	Checking OCD group	GAD group	-14.13	0.011

Results showed that there is a significant difference between the research groups (washing, checking, and GAD) in terms of memory confidence and memory bias ($p<0.05$) (Table 3).

Table 3. Results of the univariate analysis of variance for each variable

Dependent Variable	Sum of Squares	df	Mean Square	F	p-value	Eta Squared
Memory bias	35.244	2	17.622	7.930	0.001	0.274
Memory confidence	1532.978	2	766.489	4.848	0.013	0.188

Discussion

The results of the present study demonstrated a significant difference in memory bias between the research groups (washing, checking, and GAD). According to the results, the mean memory bias in the GAD group was higher than in the other two groups. This finding can be explained by the triple vulnerability model of GAD. According to Barlow et al., individuals with GAD are sensitive to stressful events due to psychological and biological vulnerability (7). Therefore, the alarm system is mistakenly activated, interpreting harmless events as threatening, which then generates anxious apprehension, leading to increased muscle tension and hypervigilance. The results of a study by Mehrinejad et al. support the findings of this part of our research. They concluded that individuals with GAD are more sensitive to threatening stimuli (15). As a result, they distort their entire perception in a biased manner. In fact, anxious individuals are prone to selective attention toward certain environmental cues while ignoring others. Excessive attention to negative cues and constant encoding of threatening environmental stimuli cause individuals with GAD to have difficulty disengaging their attention from threatening environmental cues, and these difficulties extend to most of their daily activities. The findings of this part of our study are consistent with the research conducted by Arsanjani et al., Singh et al., Mohammadi et al., Yousefi et al., Nosrati et al., and Yazdani et al. (4, 10-12, 16, 17).

The findings of the present study also showed a significant difference in memory confidence between the research groups (washing, checking, and GAD), and the checking group was the weakest in terms of memory confidence.

There are three perspectives regarding memory issues in individuals with OCD. According to one perspective, the primary source of doubt in patients with OCD has been attributed to a general memory deficit. However, Tolin et al., reviewing 14 studies conducted in this area, showed that there is insufficient evidence to support this view (18). Nevertheless, the findings of studies by Mahmoud Alilou et al., Yaghooti Azari et al., Rauf Haddadi Thani et al., and Abbasi Jandani et al. are consistent with this perspective (19-22). According to Nazarzadeh et al., patients with checking OCD have a general memory deficit, and the source of their doubts stems from this general memory impairment (23).

The results of the present study show that the GAD group has higher memory bias, which can be used to identify causes and develop therapeutic interventions for this disorder. Furthermore, the findings of this study indicate that memory confidence in the checking OCD group is weaker than in the other two groups. The results of a study by Yousefpour et al. showed that the washing group had greater bias toward disgust-related words compared to other groups, the checking group had greater bias toward checking-related words compared to the other three groups, and the GAD group had greater bias toward anxiety-related words compared to the other three groups. Overall, the findings of their study demonstrated the existence of bias in all three clinical groups (24). The results of this study also showed that the checking group had poor memory confidence.

The metamemory-related issues of checking OCD patients can be explained within the framework of psychological theories, particularly the cognitive-behavioral perspective, and may have useful implications for clinical trials and therapeutic interventions. The present study has several limitations. Since participants were selected through convenience sampling, this may limit the generalizability of the findings. Additionally, since the age range of participants was 20 to 45 years, caution should be exercised when generalizing the results to other age groups. Given the small sample size (convenience samples), it is recommended that future studies be conducted with larger sample sizes in other geographical regions to enhance the generalizability of the results. Research should also be repeated with consideration of gender and comparison of results accordingly. Based on the findings of this study, given that individuals with checking OCD have poor memory confidence and that individuals with GAD exhibit higher memory bias than the other two groups, focusing on and teaching metamemory-enhancing strategies could alleviate many of the difficulties faced by these individuals.

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