

# The Comparison of Working Memory Performance in Depressed and Non-Depressed Employees

Saeid Mahmoudi<sup>1\*</sup>, Hossein Lotfaniya<sup>2</sup>

<sup>1</sup>M.A in Clinical Psychology, Faculty of Humanities, East Azerbaijan Science and Research Branch, Islamic Azad University, Tabriz, Iran

<sup>2</sup>Ph.D in Clinical Psychology, Tabriz, Iran

\*Corresponding Author Email: [Sina\\_1972t@yahoo.com](mailto:Sina_1972t@yahoo.com)

**Abstract:** Given the prominent role of working memory in cognitive functions, this study aims to compare the working memory performance of depressed and non-depressed employees in the Organization of Industry, Mine and Trade of Tabriz. The study is causal-comparative. The population consisted of the employees of the Organization of Industry, Mine and Trade of Tabriz in 2014 and they were 320 people. Using Cochran formula, 72 subjects were selected as a sample. Sampling was performed in a stratified random way. To do this research, the Beck Depression Inventory, sub-test of numerical memory of Wechsler and visual memory test of Andre Rey were used. Independent t-test was used for data analysis. The results showed that the performance of visual memory and auditory memory in depressed people was weaker than non-depressed ones ( $p < 0.05$ ).

**Keywords:** Depression, Working Memory, Performance.

## Introduction

One of the issues raised today in clinical psychology is the impact of emotional disorders on cognitive functions (Williams et al., 1997). They believe that emotional disorders are affected from some ways of the cognitive processes such as the attention and memory. Emotional disorders A) may increase the amount of attention to stressful events; B) raise the effect of these events on the cognitive function; C) increase the frequency of times which these events are retrieved.

Today, there is a public consensus among experts that memory bias in depressed patients is common. Approximately 50 to 75 percent of depressed patients are suffering from cognitive impairment. These patients often complain of impaired concentration and forgetfulness. Ignoring the environmental discoveries shows slowness of intellectual activity and the inability of mental concentration, memory and learning deficits (Karraz, 2008).

The comparison studies of depressed and non-depressed people indicates bad functionality, and deficits in motor - cognitive and psychological functions of depressed people in actions of processing information, speed of

information processing, short-term memory, decision-making and planning. Cognitive deficiencies of depressed people can be attributed to incorrect resources and processes of information processing in these individuals (Rose & Ebmeier, 2006).

Depression is a normal biological psychological reaction (biological psycho) against stress. Depression is a disorder that the patient has symptoms of low mood and loss of energy and passion, guilt, difficulty concentrating, loss of appetite and thoughts of death and suicide (Kaplan & Sadock, 2012).

Pelosi (2000) believes that impairments of working memory is the main difficulty for the memory in depressed patients, because based on the research findings, depressed memory performance is sensitive to the complexity of the task. This means that with more complexity of the task, memory function results in the sharp decline. On the other hand, it has been shown that depression is conscious encoding, maintenance and retrieval and hampers the need of the effort. Therefore, the executive function and attention mechanisms are clearly influenced by depression.

Memory performance is one of the most complex and the most important components discussed by cognitive psychologists. All learnings signify memory. If we want to use our past experiences, we need the memory of the previous events. Our information learned will be suitable when we recall in the future and events in which we need (Robinson et al., 2007).

In the broadest sense, memory signifies on learning what has been experienced. Without memory, we will respond to any such event as if we had not experienced it (Van der Senden, 1993, quoted by Yousefi Louyeh, 2000).

Depression is said to a set of signs which human verbal and nonverbal behaviors reflect for environmental situations or some of physiological changes. Therefore, it must be said that mild depression is transient with the signs of a slight decline of the human emotional states and timed depression with increasing signs is regarded as emotional disturbance (Zavabeti, 1986). Kraepelin knows depression as a kind of poisoning (Birjandi, 1991).

Mehrtalab (2006) concluded that there was a significant relationship between visual memory and auditory memory.

Based on their research, Ramazani et al (2009) concluded that depressed mood was associated with active memory function weakness and depression is faced with difficulty in both verbal and visual processes.

According to their research, Behjati and Khabbaz (2012) concluded that depressed people had weaker emotional working memory than non-depressed people.

Reviewing the studies related to the effect of depression on cognitive functions, Castaneda (2008) concluded that executive functions including working memory performance in both verbal and visual in depressed patients were faced with difficulty.

Lagopoulos (2007) by studying the regions of the frontal lobe in depressed patients during working memory tasks showed that the performance of these people in all components of the working memory was weaker than the control group.

Based on his observations, Rose and Ebmeier (2006) also concluded that depression with fairly allocative disorders of working memory in particular the central implementation is was associated. Cognitive deficiencies of depressed people can be attributed to incorrect resources and processes of information processing in these individuals (Rose & Ebmeier, 2006).

Using meta-analysis, Vanreeswijk and De Wilde (2004) showed that depression with more holistic memory had a close relationship. In this way, memory has been less specific a description in the depressed patients compared to non-depressed ones and this had a tendency to more holistic.

Sutherland and Bryant (2007) in the study of the role of rumination on autobiographical memory showed that individuals with high depression versus mild depressed or non-depressed ones were more holistic to the higher rate in the personal memory retrieval after the presentations of assignments creating rumination.

Looking at the prominent feature of today's society and moving into the modern world and on increasing working efficiency, the attention to the working memory dysfunction or failure by affecting the depression is used. On the other hand, depression with feeling of hopelessness, inadequacy, guilt, fears of failure and worthlessness can affect memory. Due to the negative impacts of depression which results in serious learning disabilities in terms of improving the working quality and finally this leads to reducing the working efficiency. Meanwhile, due to the lack of the previous studies related to government agencies, however, the comparison of working memory performance of ordinary and depressed employees has been performed to benefit from the results and this is seeking the main research that whether the working memory performance of depressed people compared to non-depressed ones is different or not?

## Methodology

The present study is causal-comparative based on the subject from the Ex post facto kind.

The population consists of the depressed employees of the man and woman of the Organization of Industry, Mine and Trade working in Tabriz (the number of the employees was 320 people, 208 men and 112 women) that they were working in 2014.

The study sample consists of 74 people of the employees who of these, 37 people are depressed group and 37 ones are non-depressed group.

To calculate the sample size, Cochran formula is used.

Population size,  $N = 320$ , error,  $d = 0.1$ , study size,  $n = 74$  with presupposition of confidence factor,  $Z = 1$ ,  $P = q = 0.5$ , 95%: 5.

Samples were selected through stratified random sampling among the staff.

To collect data, the Beck Depression Inventory, sub-test of numerical memory of Wechsler and visual memory test of Andre Rey were used.

### The Beck Depression Inventory

The Beck Depression Inventory is the second edition (BDI-II) of a reviewed form of the Beck Depression Inventory designed to assess the severity of depression (Beck, Brown and Steer, 2002). 21 items of depression inventory were classified in three groups of emotional, cognitive and somatic symptoms. Each question has four options. In this test, the subject was asked to choose an option in each question which states his state when responding to the question. In the depression test of Beck, given that the first option for each question is 0 point, the second option 1 point, the third option 2 points and the fourth option is 3 points, the score of the subject was collected based on the responses to each question. In this test, the subjects who achieved a score of 17 and above were considered depressed people and the subjects who achieved a score less than 17 were non-depressed people.

**Wechsler numeral memory test:** This test was designed in two parts of direct digit and inverse span. This test consists of multiple sequences of numbers that will be presented for listening to the test and the participant must repeat reversely, directly and respectively. Wechsler numeral memory sub-set of the adult contained two categories of sequence and reverse numbers that the subject was asked to listen carefully and he repeats after a series of the numbers were read for him. If the participant correctly repeated the first series, the second series were offered. But if he did not repeat, the second group of the series of the numbers was read for him and if the second group was just repeated, the later series was offered. Obviously, whenever the subject was not able to repeat the numbers of the two first and second groups, the test was stopped. Then, the subject of the reverse numbers was performed.

In the test of reverse numbers, the tester explains an example to the subjects that I would say some numbers that all must state their reverse. It is worth noting the test instruction as well as the numbers was sequential. After performing Wechsler numeral memory test, the important thing for scoring was the answers provided, in order to score the test, there was two scores related to the test of ordinal numbers (a total of 9 points) and the test of negative numbers (a total of 8 points) that the final score was the sum of the test scores.

**Visual memory tests of Andre Rey:** Test of "mixed geometric images" or visual memory tests of Andre Rey was created in 1942 in order to assess the kind of the perceived activity of visual memory of visitors to clinics of psychology and psychiatry. The test consists of two phases. Firstly, the test card was placed in front of the subjects and he was asked that he pick one like it. In the second phase, the card was taken from the front of the subject. The subject was given three minutes to relax and a non-emotional chat with him. Then, after three minutes, he was asked to take on another tab on the memory of those forms.

After implementing the test, scoring was performed. Thus, the shapes on the cards constituted 18 parts. If each of the components was taken correctly, they were in their place, 2 scores. If each of the components was taken correctly, they were not in their place, 1 score. If each of the components was taken incorrectly, they were not in their place, 0.5 score. No score included to it if each of the components was taken very bad not recognized. Thus, the maximum score for each of the subject was 36 points.

To analyze the data, independent t-test was used.

## Results

In this study, 37 depressed people and 37 non-depressed ones were participated.

**First hypothesis:** There is a significant difference between visual working memory of the depressed people and non-depressed ones.

To investigate the above hypothesis, statistic t-test was used to compare the mean of the two independent groups and the results are presented in Table 1. The results show that the rate of visual memory in non-depressed employees ( $m = 22.5$ ) is more than the depressed employees ( $m = 28.37$ ) ( $p < 0.05$ ).

**Second hypothesis:** There is a significant difference between auditory working memory of the depressed people and non-depressed ones.

To investigate the above hypothesis, statistic t-test was used to compare the mean of the two independent groups and the results are presented in Table 1. The results show that the rate of auditory memory in non-depressed employees ( $m = 22.5$ ) is more than the depressed employees ( $m = 28.37$ ) ( $p < 0.05$ ).

**Table 1.** The results of the independent t-test to compare the performance of the memory of the two depressed and non-depressed groups.

	Gender	Mean	SD	T	df	p
Visual memory	Depressed	22.55	3.08	8.888	72	0.001
	Non-depressed	28.37	2.59			
Auditory memory	Depressed	8.81	1.61	10.924	72	0.001
	Non-depressed	12.32	0.98			

## Discussion and Conclusion

The aim of the present research was to compare the working memory performance (visual memory and auditory memory) of depressed and non-depressed people. For this purpose, the ex post facto method was used. In this method, the depressed patients were first identified. Then on the staff, auditory memory test of the Wechsler auditory memory test of the adults and visual memory test of Andre Rey were performed. The results showed that: there was a significant relationship between the visual working memory performance of depressed and non-depressed people. On the role of depression on visual memory, it can be said that depression results in depressing the visual memory performance in the depressed. In other words, the visual memory performance in depressed patients is weaker than non-depressed ones.

Also, there is a significant relationship between the auditory working memory performance of depressed and non-depressed people. On the role of depression on auditory memory, it can be said that depression results in depressing the auditory memory performance in the depressed. In other words, the auditory memory performance in depressed patients is weaker than auditory non-depressed ones.

A review of the previous studies shows that this finding is consistent with the results of the studies of Barrett et al (1995), Rose and Ebmeier (2006), Castaneda et al (2008), Habibpour and Sharifi (2009), Nazarboland and Farzaneh (2009), Ramazani et al (2009), Behjati and Khabbaz (2012).

In explaining this finding, it can be said that the situation which arises for the working memory in depression is that intrusive thoughts occupy a part of the limited capacity of the memory. Thus, entering and processing new information in the working memory problems are encountered (Lepore, 1997).

Ellis and Ashbrook (1998) present an interpretation which is called the allocation model of the source. They state that unconscious intrusive thoughts occupy a part of the person limited capacity of processing and as a result, this hampers learning and causes the person in recalling and applying other cognitive processes need more efforts. In this model, it is assumed that depression in terms of functional reduces cognitive resources and these resources at the service of processing emotions are irrelevant.

In addition, Wells and Matthews (1994) say that depressed people always benefit from limited processing strategies which may apply only for one-dimensional or restricted cognitive tasks. As a result, their strategy may be quite inadequate when they engage in a multiple cognitive task (such as working memory task activity).

Many depressed people complain of memory problems. For this reason, people do not have enough performance in daily activities (American Medical Association, 2002). The results of this study emphasize the point: the results show that the memory performance in depressed people is lower than in the memory performance of non-depressed people.

According to the study, it was found that depressed people are experiencing failure and impairment in the working memory, however, it is suggested that with techniques such as control of rumination and selective inhibition to the depressed individuals to improve memory performance be acted. Also, they are helped with training techniques such as distraction to leave negative rumination related to them.

#### **Conflict of interest**

The authors declare no conflict of interest.

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