

Depression as an important factor in memory impairment in the elderly

La depresión como factor importante en la alteración de la memoria en el adulto mayor

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Classification:

Area: Humanities and Behavioral Sciences  
Field: Psychology  
Discipline: Psychopedagogy  
Subdiscipline: Cognitive Processes

<https://doi.org/10.35429/JOHS.2025.12.31.1.1.8>

History of the article:

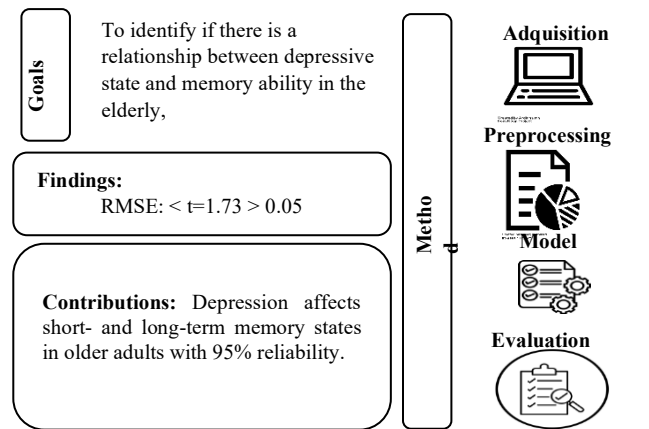
Received: April 02, 2025  
Accepted: May 30, 2025

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Abstract

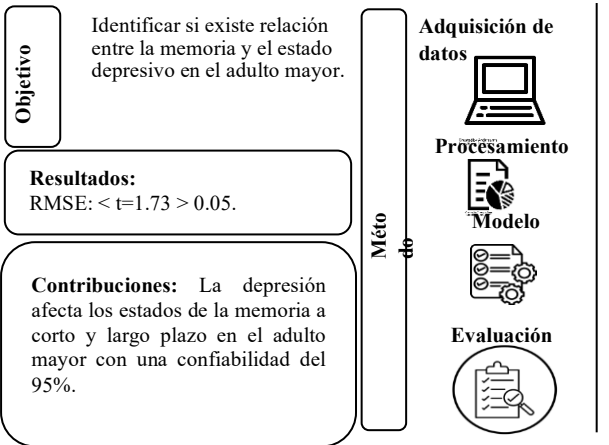
Depression negatively affects memory ability in older adults. This article addresses the correlation between depression and memory in the elderly, evaluated by the Beck Test and the Mini-Mental Test. Methodology: non-experimental, exploratory, observational research. Contribution: In a sample of 19 participants, the results show that 79% of the participants have a level of depression, which 30% of the study population requires intervention by a psychologist and 45% by a psychiatrist. Depression affects the memory status of older adults, with a  $t=1.73$  to 95% reliability



Depression, Older Adult, Memory

Resumen

La depresión afecta negativamente la habilidad para la memoria en el adulto mayor. En el presente artículo se aborda la correlación que existe entre la depresión y la memoria en el adulto mayor evaluados mediante en Test de Beck y el Test Mini.Mental. Metodología: investigación de tipo no experimental, exploratorio, observación. Contribución: en una muestra integrada por 19 participantes, los resultados muestran que el 79% de los participantes se encuentran con un nivel de depresión, el cual el 30% de la población de estudio requiere de la intervención por un psicólogo y el 45% por un psiquiatra. La depresión afecta el estado de memoria de los adultos mayores, con una  $t=1.73$  al 95% de confiabilidad



Depresión, Adulto Mayor, Memoria

Area: Promotion of frontier research and basic science in all fields of knowledge

**Citation:** Hernández-García, Ruth Indira, Ontiveros-Vargas, Angel Adrián, Santiesteban-Contreras, María Tereza and Vázquez-Ríos, Elda Raquel. [2025]. Depression as an important factor in memory impairment in the elderly. Journal of Health Sciences. 12[31]1-8: e11231108.



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## Introduction

The affective or emotional component of the daily life of the older adult, often deprived of the warmth and support of the family group or a minimum of positive social interactions, confers different meanings to the gradual reduction of various biological, cognitive or sensory functions and, with it, a greater vulnerability to various agents or pathogenic factors. [Tello, 2020]

There are elements to take into account that determine the maintenance of cognition in the elderly patient such as; pathologies of the patient, social support, mood and the presence of geriatric syndromes such as frailty and osteopenia. [Zambrano-Calozuma & Estrada-Cherre, 2020]

With aging, there is the consequence of a degenerative process at the organic level, due to the accumulation of molecular errors, including in the brain. Dr. María Sagrario Manzano, a neurology specialist in Madrid at the Infanta Cristina Hospital, mentions that in the aging brain only certain areas involved in executive functions and memory are affected. Throughout this process, neurons decrease in size and others die [Riojas, 2021]

Memory and attention are higher brain functions that, under normal conditions, allow human beings to perform appropriately in personal and social life. To a large extent we are what we remember, and in doing so we can guide and inform our present and future behavior [Zanín, Gil, & De Bortoli, 2004].

Since these functions are of utmost importance for our life, the question arises whether mood influences the alteration of these functions, hence the objective of this research which is to know the processes of attention and memory and their relationship with mood in the elderly through the application of the following tests: Hamilton test, Beck test and mini-mental screening test.

## Justification

It is known that memory and attention are main aspects of executive functions; with the passage of time the quality of life and health of people is affected by a decline in their functionality, which leads to consequences at social, mental and physical levels. [Riojas, 2021]

Age-related memory problems are a cognitive alteration considered normal, they are mild forgetfulness. It has been suggested as a normal stage in the elderly. This event is known as Age-Related Memory Impairment [ARMD], but this cognitive alteration is not considered a disease. [Sosa Sosa, 2016]

Carbajal [2007] explains that in our country most of the older adults who consult for memory loss do not have cognitive disorders, what they present are these subjective memory losses, where they believe they present a decrease of some cognitive function but in reality this loss is not made known after the corresponding tests have been performed. This subjective loss is strongly related to anxieties, fears of developing dementia, relationship conflicts and attention problems of older adults. [Sosa Sosa, 2016].

According to the above mentioned and seeing the importance of attention and memory in daily life, it was considered important to conduct this research in order to verify the impact that the mood of older adults may have in relation to the loss or deterioration of attention and memory.

Based on the above, the interest of this research is to investigate attention and memory in older adults and their relationship with mood.

## Problem

Depression is a common illness worldwide, with an estimated 3.8% of the population affected, including 5.0% among adults and 5.7% among adults over 60 years of age. Approximately 280 million people worldwide have depression. Depression can become a serious health condition. It can cause the affected person to suffer greatly and function poorly at work, at school and in the family. In the worst cases, depression can lead to suicide. More than 700 000 people die due to suicide every year [OMS, 2021].

According to the World Health Organization [WHO] dementia and depression affect approximately 5% and 7% of the world's elderly population, respectively. Anxiety disorders affect 3.8% of the older population. [OMS, 2021].

Older people with depressive symptoms have poorer functioning compared to those with chronic medical conditions such as lung disease, hypertension or diabetes. [WHO, 2017].

### Hypothesis

**Ho:** “Attention and memory processes are unrelated to mood states in the older adult.”

**Hi:** “Attention and memory processes are related to mood states in the older adult.”

### Objectives

**General objective:** to identify if there is a relationship between depressive state and memory ability in the elderly,

### Specific objectives

- To investigate the Beck test total score for depressive mood in the older adult.
- To know the total score of the memory subsection of the Mini Mental Test.

### Theoretical framework

#### Background

#### Memory

Memory is a neurocognitive function that allows recording, encoding, consolidating, retaining, storing, retrieving and recalling previously stored information. While learning is the capacity to acquire new information, memory is the capacity to retain the information learned [Portellano, 2005]. Basically, we can establish two main memory modalities according to the time elapsed for its storage: short-term memory and long-term memory. [Portellano, 2005].

#### Short-term memory [STM]

It is the process of initial retention of information for a short period of time ranging from a few fractions of a second to several minutes, although some authors place the time limit of short-term memory at 30 seconds. Before any perceptual processing of information can take place, it is necessary that a sensory encoding of the stimuli to be memorized takes place, so that within short-term memory there are several modalities: sensory memory, immediate memory and working memory. [Portellano, 2005].

#### Long-term memory [LTM]

Is the ability to retain information for longer periods of time or permanently. LTM also refers to the ability to recall information after an interval of time in which the subject has focused his attention on another task [Portellano, 2005].

#### Older adult

In Mexico, older adult is considered a person who is over 60 years old and refers to the stage that adds up all the experiences of life and goes through most of the family, professional and social goals. But it also marks the beginning of a stage where people present conditions of physical, social and economic vulnerability. [GOB, 2017]

Aging involves a series of physical, psychological and social changes related to changes in all organs, including the brain. With the passage of time, a series of cognitive modifications begins involving memory, language, perception and attention. These cognitive changes constitute one of the central factors of the late stages of life. [Ardila & Rosselli, 2007]

Individuals between 55 and 74 years of age are considered senile young, senile old those over 75, and senile older those over 85 years of age. [Ardila & Rosselli, 2007]

#### Depression

Depression is a common illness worldwide, affecting an estimated 3.8% of the population, including 5% of adults and 5.7% of adults over 60 years of age. Globally, approximately 280 million people have depression [WHO, 2017].

Depression is a common mental health disorder. It is characterized by persistent sadness and a lack of interest or pleasure in activities that were previously rewarding and enjoyable. In addition, it can disrupt sleep and appetite, and is often accompanied by fatigue and poor concentration.

Depression is a major cause of disability worldwide, and has a significant impact on the burden of disease. The effects of depression can be prolonged or recurrent, and can dramatically impair a person's ability to function and live a rewarding life [WHO, 2017].

Depression in older adults is a common pathology, which is associated with comorbidities, excessive use of health resources, suicide and mortality. It is generally underdiagnosed and undertreated. Within it, two types are distinguished: 1] Early-onset depression that begins before the age of 60 years, and occurs in older adults as recurrent or chronic depression and 2] Late-onset depression that starts after the age of 60 years and would be associated with more changes at the neurological level and dementia. [Bruning, 2019].

In people over 65 years of age, depression affects quality of life; depressed older adults generally have more anxiety, somatic complaints, poor prognosis and high mortality. Contrary to popular belief, depression is not a natural part of aging and can often be reversed with prompt and appropriate treatment. However, if left untreated, depression can accelerate physical, cognitive and social decline [Tenesaca Camacho, 2021].

### The Beck Depression Inventory, second edition [BDI-IA]

The Beck Depression Scale is one of the instruments frequently used to assess depressive symptoms [Beck, 2009]. The Beck Depression Inventory, second edition [BDI-IA] is a self-report instrument composed of 21 items, whose purpose is to measure the severity of depression in adults and adolescents aged 13 years and older.

This version of the BDI was developed to assess symptoms corresponding to the diagnostic criteria for descriptive depressive disorders in the Diagnostic and Statistical Manual of Mental Disorders Fourth Edition [DSM-IV, 2013] of the American Psychiatric Association [Beck, 2009].

The Beck Inventory meets the psychometric requirements for its valid use in our environment. In terms of factorial composition, construct validity, discriminant validity and internal consistency, they corroborated the adequate psychometric properties of the BDI-IA, which endorse it as a sufficiently valid and reliable instrument for the measurement of depressive symptoms in the Mexican population, which also supports the cross-cultural validity of the instrument [Beck, 2009]; [Beltrán, 2012].

The cut-off scores proposed by Beck et al. [1996] were found to be appropriate for discriminating the different degrees of depression.

Level of depression  
<9 Normal  
10-15 Slightly depressed  
16-24 Moderately depressed  
25-62 Severely depressed

Table 1 Total scores for the interpretation of the Beck Test inventory results.

### Mini Mental Screening Test

The Mini-Mental State Examination [MMSE] is a written test commonly used as part of the process when considering a diagnosis of dementia, with a maximum score of 30, with lower scores indicating more severe cognitive problems.

It is one of the most widely used tools worldwide for its brevity and easy application it has 10 areas of assessment: spatiotemporal orientation, three-word register, attention fixation, memory, verbal nomination, repetition and comprehension, reading, writing and visuospatial construction, The cut-off point established for the MMSE defines "normal" cognitive function and is generally set at 24, although theoretically it could be anywhere between 1 and 30 [Llamuca Quinaloa, Macías Guamangate, Miranda Caisaluisa, & Tapia Cerda, 2020].

It is mandatory when starting the test to begin by collecting the patient's data, as well as their degree of schooling and work they did before retirement [year in which they started school and year of completion, approximately]. This will also help to create a degree of trust with the patient and facilitate their collaboration.

If we analyze the MMSE, we see that it consists of 5 sections: [1°] Orientation, [2°] Fixation, [3°] Calculation and attention, [4°]

Memory and [5°] Language and praxis. When carrying it out, we should not interrupt it, especially the sequence of fixation, calculation and attention and memory.

Between the 1st and 2nd, and between the 4th and 5th we can make a brief pause if the patient gets tired or is very nervous, trying to reassure him and tell him that it is not an exam.

#### Range Level of cognitive impairment

< 24 Probable cognitive impairment

> 24 No cognitive impairment

With all this we will have reached the end of the test and we will have to make the correction for age and cultural level. After reviewing the MMSE we reach the following agreement [See Table 2].

Schooling refers to the age of completion of studies, not to the number of years of schooling. Broadly speaking, the first group includes those who have not completed primary school, the second group includes those who have completed primary school and those who have completed high school, and the third group includes those who have completed high school or a degree.

Patients with depression and anxiety usually score low on this type of test due to impaired attention and concentration, without being indicative of MCI or dementia [the response of "I don't know, I don't know" to simple orientation or calculation questions is characteristic, and they end up performing if we insist that they pay attention and make an effort.

#### Research methodology

The present study is exploratory, non-experimental, observational and cross-sectional, with a descriptive statistical analysis.

The complex variable of depression was analyzed for its relationship with neurocognitive functions by means of Mini Mental. In addition, the following variables were considered: age, gender and school grade.

For the statistical analysis of the population studied, measures of central tendency and dispersion were used.

#### Procedure

The participants were patients attending a geriatric center called "taking care of those who gave us life" in the city of Durango.

Data collection was carried out during the month of February 2021, culminating at the end of February of the same year.

Informed consent was obtained after signing the informed consent in accordance with the official Mexican standards 004-ssa3-2012 on the clinical record and 040-ssa2-2004 on information, and the instruments for data collection and interpretation of the results were applied.

The following tests were used for the study: "Beck test" and "mini mental screening test"

The identification of the signalistic variables and academic performance [gender, age and school average] was obtained through the application of a clinical survey. Statistical analysis of the information obtained was performed using Excel software.

The inclusion criterion was limited to all those patients in the group who agreed to be part of the sample and signed the informed consent corresponding to the Mexican official standards [NOM-004-SSA3-2012 for the clinical record and NOM-040-SSA2-2004 on information] prior to their participation in the evaluation.

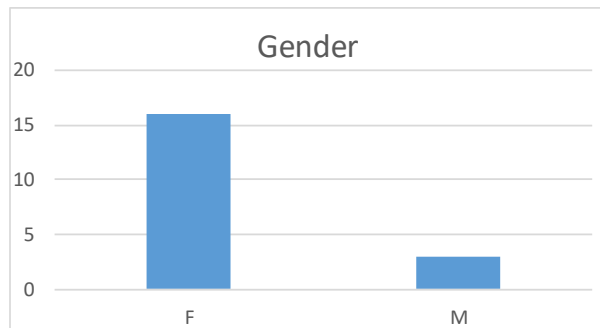
Elimination criteria were discarded for participants who left any of the evaluation tests unfinished, previous neurodegenerative diseases and non-attendance at evaluations, as well as patients who wished to withdraw from the study.

According to these criteria, out of a total of 20 patients, 1 were eliminated, leaving a total of 19 valid cases for the investigation.

#### Results

The sample studied was made up of 19 participants, who attend the "Geronto-geriatric Center: taking care of those who gave us life", of which 8 correspond to individuals of the female gender and 2 of the male gender [See graph 1].

### Box 1



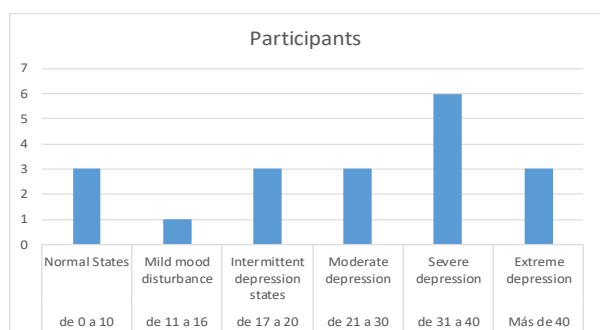
**Figure 1**

Gender of the sample

The mean age of the participants was 78.3 years, with the minimum being 55 years and the maximum being 88 years, with a mode of 71 years and a mean of 82.5, the standard deviation was 10.57. The reliability of the results obtained in the evaluation of the Beck Depression Test was with a Chronbach's alpha of .90 [excellent reliability].

Regarding the results obtained from the evaluation of depression using the Beck Test, it was found that only 3 participants [21%] did not show any level of depression, while 16 participants [79%] showed a high degree of depression [See graph 2].

### Box 2



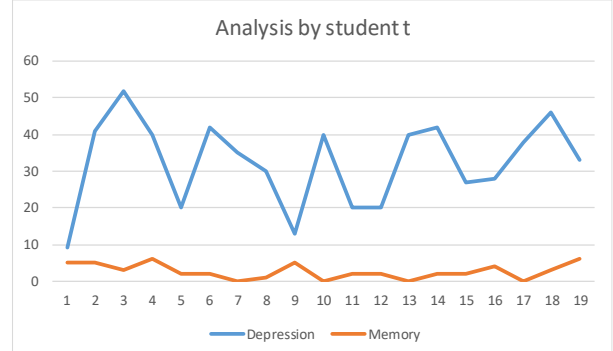
**Figure 2**

Beck Test Results

The reliability of the results obtained from the Mini-Mental Test was with Chronbach's alpha of .66 [very reliable].

Regarding the correlational analysis, the research hypothesis is accepted since, based on the results, depression affects the memory status of older adults, with a  $t=1.73$  to 95% reliability. [See graph 3].

### Box 3



**Figure 3**

Correlation between memory and depression in the elderly

In the following correlational analysis by Pearson between depression and mini-mental, a moderate positive significance level was found with an  $r = .40$ , with  $p = 0.05$  with a reliability of 95%, which refers to the fact that, in a moderate positive way, the higher the level of depression, the greater the cognitive impairment or the greater the prevalence of mild dementia.

It is essential to emphasize that the results obtained in this population cannot be extrapolated, because it is a small sample from a single site. Comparisons with other institutes would be necessary to assess the state of cognitive functions more broadly and accurately.

### Conclusion

The affective or emotional component of the daily life of the older adult, often deprived of the warmth and support of the family group or a minimum of positive social interactions, confers different meanings to the gradual reduction of various biological, cognitive or sensory functions and, with it, a greater vulnerability to various agents or pathogenic factors. [Tello, 2020]

It is known that memory and attention are main aspects of executive functions; with the passage of time the quality of life and health of people is affected by a decline in their functionality, which leads to consequences at social, mental and physical levels. [Riojas, 2021]

Age-related memory problems are a cognitive alteration considered normal, they are mild forgetfulness. It has been suggested as a normal stage in the elderly. This event is known as Age-Related Memory Impairment [ARMD]. [Sosa Sosa, 2016]

In the present study, after analyzing the results of the correlation between memory and depression, it is found that 79% of the population is depressed from 78 years of age [mean study], with a correlation  $t = 1.73$  and with a  $p = 0.05$ .

Therefore, it is recommended that as a preventive measure, cognitive stimulation workshops be carried out or implemented, complemented by mental health professionals to prevent these cognitive-behavioral alterations.

In the case of the limitations of this research, it is recommended to expand the sample by including a larger number of participants from different rehabilitation centers.

Additionally, it is suggested to increase the participation of professionals in human communication therapy during the rehabilitation steps of this addiction. In this way, along with the behavioral work, a therapeutic plan focusing on neurocognitive processes in adults could be evaluated and structured.

## Declarations

## Conflict of interest

*Hernández García, Ruth Indira.*

*Ontiveros Vargas, Angel Adrián.*

*Santiesteban Contreras, María Tereza.*

*Vázquez Ríos, Elda Raquel.*

We declare that we have no conflicts of interest, either competitive or financial. In addition, we have no interest in personal relationships that could have influenced the article.

In addition, we declare that we have no conflict of interest with the publisher, the members of the editorial and arbitration board or committee.

## Authors' Contribution

*Hernández-Grarcía, Ruth Indira:* Contributed to the project idea, research method and technique. He supported the design of the field instrument. He carried out the data analysis and systematisation of results, as well as writing the article.

*Ontiveros-Vargas, Angel Adrián:* Carried out the systematisation of the background for the state of the art. She supported the design of the field instrument. She also contributed to the writing of the article.

*Santiesteban-Contreras, María Tereza:* contributed to the research design, the type of research, the approach, the method and the writing of the article.

*Vázquez-Ríos, Elda Raquel:* He supported the design of the field instrument.

## Availability of data and materials

The data obtained were previously authorized by the geriatric center called “taking care of those who gave us life” in the city of Durango, as well as from the participants in this research by means of informed consent.

## Funding

The research did not receive any funding.

## Abbreviations

APA	American Psychiatric Association
BDI-IA	The Beck Depression Inventory, second edition
DSM-V	Diagnostic and statical manual of mental disorders
MMSE	The Mini-Mental State Examination
NOM	Mexican Official Standards
NEUROPSI	Neuropsychological Assessment
LTM	Long-term memory
SDA	Alcohol Dependence Syndrome
STM	Short-term memory
WHO	World Health Organization

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