Review

URF PUBLISHERS
connect with research world

American Journal of Psychology and Brain Studies

https://urfpublishers.com/journal/american-psychology

Vol: 2 & Iss: 2

The Impact of Anxiety and Depression on the Brain: A Scientific Study

Nora Manseur*

Citation: Manseur N. The Impact of Anxiety and Depression on the Brain: A Scientific Study. *Am J Psychol & Brain Stud*, 2025;2(2):106-107.

Received: 05 June, 2025; **Accepted:** 11 June, 2025; **Published:** 13 June, 2025

***Corresponding author:** Nora Manseur, Annaba, Algeria, Tel:+213551853311, Email: nora.mans.official@gmail.com

Copyright: © 2025 Manseur N., This is an open-access article published in Am J Psychol & Brain Stud and distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

ABSTRACT

Anxiety and depression are among the most common mental disorders worldwide, significantly affecting brain function. Recent studies have revealed that these disorders not only influence emotional well-being but also lead to structural and chemical changes in the brain, impacting memory, decision-making and emotional regulation. This research aims to explore the neurological changes associated with anxiety and depression, focusing on their neural mechanisms, the role of neurotransmitters, neuroplasticity and potential treatment options.

Introduction

Anxiety is characterized by persistent tension and excessive fear, while depression is marked by deep sadness and a loss of interest in daily activities. Research has shown that both disorders cause noticeable changes in the brain, affecting cognitive and emotional functions. Neuroimaging studies indicate that specific brain regions are significantly impacted, including the amygdala, hippocampus and prefrontal cortex[1].

Neurological changes associated with anxiety and depression

Structural changes in the brain:

- **Hippocampal shrinkage:** Studies indicate that individuals with chronic depression have a smaller hippocampus, a critical brain region involved in memory formation and emotional regulation. According to Harvard Health Publishing, elevated cortisol levels due to prolonged stress contribute to neuronal damage in this area, leading to memory impairment and difficulty processing positive emotions.
- **Hyperactivity of the amygdala:** The amygdala plays a crucial role in processing emotions, particularly fear and anxiety. Research by Stein & Stein (2020) shows that individuals with anxiety and depression exhibit hyperactivity in the amygdala, leading to exaggerated emotional responses and difficulty coping with daily stressors.
- **Dysfunction of the prefrontal cortex:** The prefrontal cortex is essential for emotional regulation and decision-making. A study published by Yale Medicine found that chronic anxiety reduces prefrontal cortex activity, impairing logical thinking and emotional control.

Neurotransmitter imbalances:

- **Decreased serotonin levels:** Serotonin is a key neurotransmitter linked to mood regulation. A deficiency in serotonin has been associated with increased symptoms of depression and anxiety. Research by Krystal & Duman, highlights that selective serotonin reuptake inhibitors (SSRIs), such as Fluoxetine, help improve mood by increasing serotonin availability in the brain.
- **Dysfunction of dopamine and norepinephrine:** Dopamine is responsible for motivation and reward, while norepinephrine influences stress responses. Studies indicate that chronic anxiety leads to excessive norepinephrine release, intensifying stress responses, while decreased

dopamine levels contribute to a lack of pleasure and motivation[2].

- **Effects on neuroplasticity:** Recent research suggests that anxiety and depression negatively impact neuroplasticity, the brain's ability to form new neural connections. A study by Singh & Karkare[2] found that individuals with chronic depression exhibit reduced neurogenesis, particularly in the hippocampus. However, certain treatments, such as physical exercise and cognitive-behavioral therapy, can enhance neuroplasticity and restore normal brain function.

Cognitive and psychological effects of anxiety and depression

- **Memory impairment:** Reduced hippocampal volume leads to difficulties in recalling information, especially positive memories[3].
- **Difficulty in decision-making:** Reduced prefrontal cortex activity results in indecisiveness and excessive overthinking[4].
- **Increased negative thinking:** Hyperactivity of the amygdala leads to exaggerated responses to negative events, reinforcing the cycle of depression and anxiety.

Treatment and neural recovery

- **Psychotherapy and cognitive-behavioral therapy (CBT):** CBT has been proven effective in rewiring neural pathways by altering negative thought patterns and enhancing prefrontal cortex activity[5].
- **Antidepressant medications:** Selective Serotonin Reuptake Inhibitors (SSRIs): Increase serotonin levels and promote hippocampal neurogenesis. Norepinephrine-Dopamine Reuptake Inhibitors (NDRIs): Such as Bupropion, help boost motivation and improve focus.
- **Non-pharmacological interventions:** Physical Exercise: Enhances brain-derived neurotrophic factor (BDNF), a protein that supports neural growth and brain function.
- **Meditation and mindfulness:** Reduces cortisol levels and restores neural balance[3].
- **Healthy diet:** Consuming foods rich in omega-3 and vitamin B12 supports brain health and neurotransmitter function.

Conclusion

Anxiety and depression profoundly affect brain structure and function, leading to changes in regions responsible for emotion, decision-making and memory. However, scientific research confirms that these changes are not permanent, as medical treatments, psychotherapy and lifestyle modifications can help restore neural balance and improve brain health. Ongoing research continues to explore new mechanisms for treating these disorders, offering promising prospects for improving the quality of life for affected individuals.

References

1. Krystal JH, Duman RS. How Depression Affects the Brain. Yale Med 2020.
2. Singh SP, Karkare S. Stress, Depression and Neuroplasticity. arXiv 2017.
3. Harvard Health Publishing. What Causes Depression? 2020.
4. Yale Medicine. Neurobiology of Depression 2020.
5. Stein MB, Stein DJ. The Critical Relationship Between Anxiety and Depression: Assessment and Treatment Options. Psychiatry Online 2020.