

The Role of the Nervous System in the Development of Psychosomatic Diseases

Leila Madadi

Mohamed El Bachir El Ibrahimi, University of Bordj Bou Arréridj, Algeria

Email: leila.madadi@univ-bba.dz

Soumission : 14/12/2025

Acceptation : 23/02/2026

Publication: 29/06/2026

Abstract

Psychosomatic diseases arise from complex interactions between psychological and physiological factors, with the nervous system serving as a central mediator of these processes. Using a descriptive-analytical approach, this theoretical study examines the neural, endocrine, and immune mechanisms through which psychological stress may contribute to physical symptoms and disease. The findings indicate that the central nervous system processes emotional experiences and coordinates stress responses, while the autonomic nervous system regulates changes in cardiovascular, respiratory, digestive, and other bodily functions. Chronic stress may disrupt hormonal regulation, weaken immune responses, and increase vulnerability to a range of physical health problems. Psychological conditions such as depression and anxiety may also be accompanied by pain, fatigue, sleep disturbance, and other somatic symptoms. In addition, posttraumatic stress disorders may be associated with functional and structural changes in neural systems involved in stress regulation. The study concludes that psychosomatic diseases should be assessed and treated through integrated approaches that address psychological, neurological, endocrine, immune, and physical dimensions.

Keywords: nervous system, psychosomatic diseases, chronic stress, autonomic nervous system, neuroimmune interaction

Introduction

In daily life, individuals are exposed to ongoing pressures and stressors that may affect bodily functions and contribute to the development of psychosomatic disorders. These disorders involve physical symptoms or functional impairments in which psychological factors may play an important role in onset, course, or severity. Their assessment, therefore, requires attention to both physical manifestations and possible underlying psychological factors. Emotional responses are associated with internal processes, including nervous system activity and endocrine secretions, as well as external life events and situations that influence an individual's feelings and behavior (Ali et al., 2018).

The nervous system is the principal regulator of bodily functions. It controls the activity of various glands while also being influenced by their secretions. It receives sensory information and transforms it into movements, thoughts, and behaviors, and it coordinates vital processes such as respiration, circulation, and mental activity. The nervous system can therefore be

understood as a central link between human behavior and diverse physiological and pathological responses (Yassin, 1986).

Researchers have examined the effects of psychological stress on the body through experimental and field studies. The work of Walter Cannon and Hans Selye helped clarify the roles of the nervous system and the adrenal glands in responses to emotion and stress. As research developed, it became evident that perceived threats can produce physiological changes, thereby advancing understanding of the mechanisms involved in coping with and adapting to stress (Saad, 2018, p).

According to Ghanem (2011), the Dutch physician J. Gerdin proposed that certain physical diseases, including bronchial asthma and gastric and colonic ulcers, may have psychological origins. Nissenhauer and Raegrant similarly argued that exposure to stressful situations activates the autonomic nervous system and produces physiological responses such as muscular contractions, increased secretions, and accelerated respiration. Persistent activation may eventually contribute to organic damage and impair organ function.

This study examines the role of the nervous system in the development of psychosomatic diseases by addressing the following research questions:

- What specific neural mechanisms link psychological stress to physical symptoms?
- What roles do sympathetic and parasympathetic nervous systems play in the development of psychosomatic diseases?
- How does the nervous system interact with the immune system in the context of psychosomatic diseases?
- How does chronic stress affect the central and peripheral nervous systems?
- How do psychological factors such as depression and anxiety affect nervous system functioning?

Significance of the Study

The significance of this study lies in clarifying the pivotal role of the nervous system in the development of psychosomatic diseases by examining interactions among psychological and physical factors and biological systems such as the endocrine and immune systems. The study also helps explain how chronic psychological stress may contribute to physical symptoms and highlights the importance of integrated diagnosis and treatment. In addition, it identifies directions for future research on neuroimmune interactions that may support the development of more effective therapeutic approaches.

Objectives of the Study

The study aims to clarify the role of the nervous system in the development of psychosomatic diseases by identifying the neural mechanisms that link psychological stress to physical symptoms; explaining the effects of chronic stress on the central and peripheral nervous systems; describing the roles of the sympathetic and parasympathetic divisions; examining interactions between the nervous and immune systems; and determining how psychological conditions such as anxiety and depression affect nervous system functioning.

Key Concepts of Study

Definition of Psychosomatic Disorders

The term *psychosomatic* consists of two components: *psych*, which refers to the psyche and encompasses psychological factors that may underlie the onset of symptoms or contribute to their progression and severity; and *soma*, which refers to the body as the organic framework within which emotional experiences and psychological conflicts are expressed (Al-Zarouq, 2013).

The term psychosomatic refers to disorders that arise primarily from psychological factors and result in physical symptoms or organic dysfunction. Some researchers distinguish these conditions from somatopsychic disorders, which begin with organic factors and subsequently produce psychological disturbances. The concept of psychosomatic disorder emphasizes the central role of psychological factors in contributing to organic dysfunction and affecting an individual's health equilibrium (Al-Zarad, 2000).

Concept of the Nervous System

The nervous system is one of the body's most important systems. It receives, processes, and transmits information; coordinates the functions of bodily systems; and controls voluntary and involuntary activities. It plays an essential role in regulating physiological processes, connecting the body with the external environment, and maintaining integration and balance among bodily systems and between the individual and the surrounding environment (Ismaili & Qashoush, 2019). The human nervous system consists of two principal divisions: the central nervous system and the peripheral nervous system.

Central Nervous System

The central nervous system includes all neural structures located within the cranial cavity and vertebral canal. It consists of the brain, brainstem, and spinal cord.

Peripheral Nervous System

The peripheral nervous system includes all neural structures located outside the cranial cavity and vertebral canal and consists of the following components:

Cranial nerves. These nerves originate from the brain or brainstem and comprise 12 pairs.

Spinal nerves. These nerves originate from the spinal cord and comprise 31 pairs.

Sympathetic and parasympathetic nerves. These nerves constitute the autonomic nervous system, which regulates the body's involuntary organs and functions (Taha, 2006).

The Autonomic Nervous System

The autonomic nervous system regulates internal organs and controls the body's involuntary functions. It includes sensory and motor pathways and is divided into two functionally opposing but complementary divisions: the sympathetic and parasympathetic nervous systems.

Sympathetic Nervous System

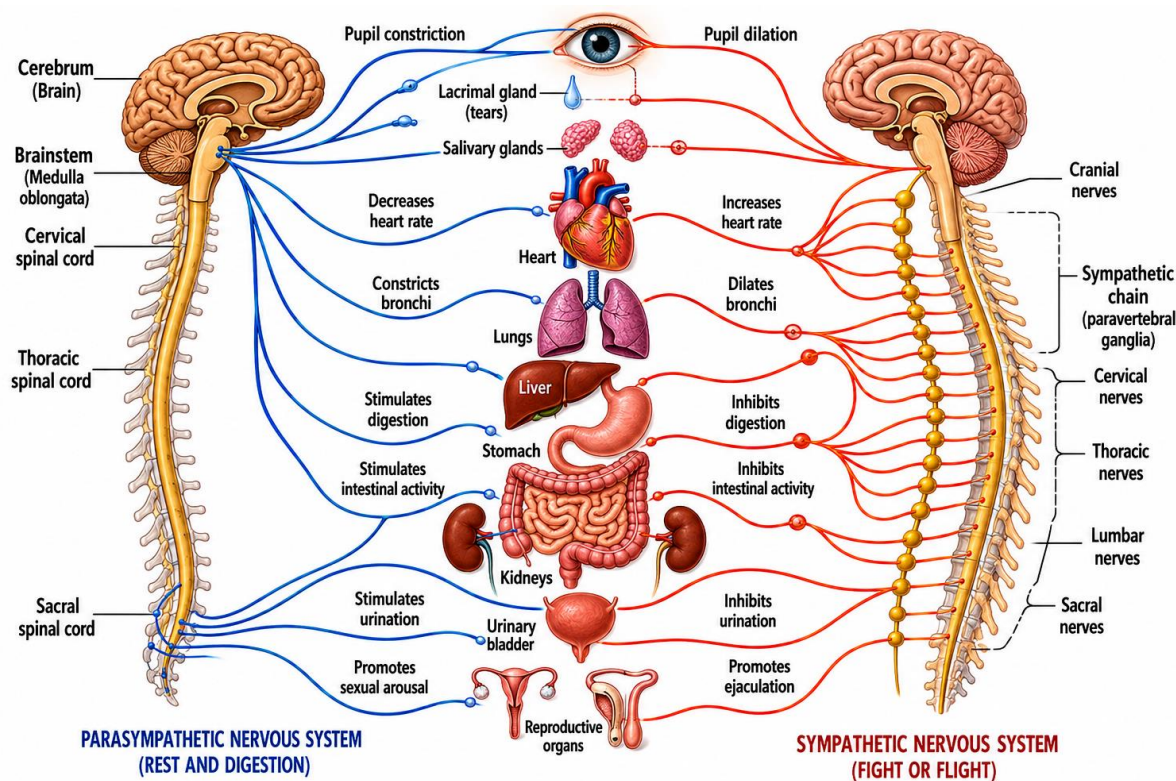
The sympathetic nervous system arises from the central nervous system and connects with most internal organs. Its principal role is to activate the fight-or-flight response during perceived danger. This activation produces physiological changes such as increasing the rate and force of the heartbeat; dilating the bronchi and pupils; increasing perspiration and the secretion of epinephrine; redirecting blood toward skeletal muscles; and reducing digestive activity, urine production, salivation, and tear secretion. These changes prepare the body to confront or escape a threat efficiently (Ahmad et al., 2018).

Parasympathetic Nervous System

The parasympathetic nervous system is associated with the brainstem and the sacral region of the spinal cord. Its primary function is to regulate bodily processes during rest and relaxation. It operates in opposition to the sympathetic nervous system to maintain physiological balance. Its major functions include reducing heart and respiratory rates, stimulating digestion and the secretion of digestive enzymes, promoting glycogen storage in the liver, constricting the pupils, and regulating urination. Thus, parasympathetic activity predominates during rest, whereas sympathetic activity increases during stress and emotional arousal (Al-Eneizat, 2021; Al-Shawish & Youssef, 2011).

Figure 1

Parasympathetic and Sympathetic Divisions of the Autonomic Nervous System



Note. The parasympathetic division supports rest-and-digest processes, whereas the sympathetic division supports fight-or-flight responses.

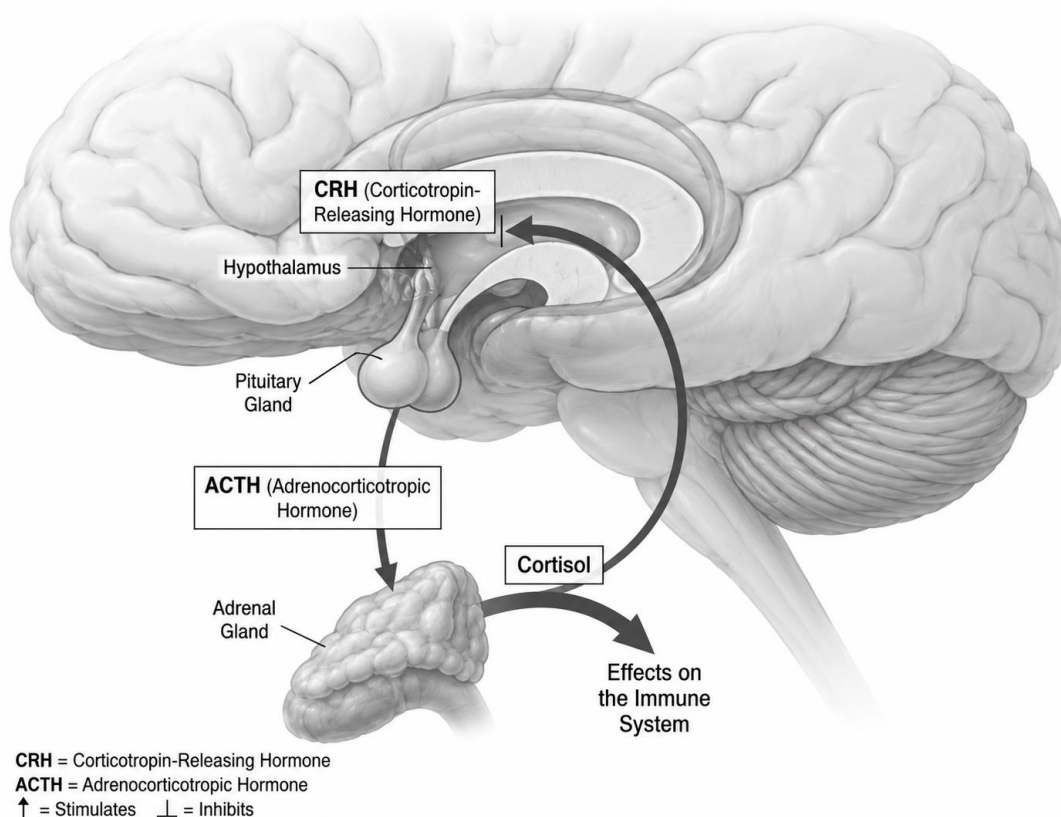
Mechanisms Through Which Nervous System Influences Psychosomatic Diseases

The limbic system regulates emotional responses and survival-related behaviors such as eating, reproduction, and self-defense, and it also contributes to memory processing. It is closely connected to the autonomic nervous system, evaluating situations and transmitting signals that prepare the body for rest or for exertion. The autonomic nervous system controls many vital organs, while its sympathetic and parasympathetic divisions operate in a coordinated and opposing manner to maintain physiological equilibrium (Rothschild, 2023).

Psychological stress, social tension, and emotional and economic deprivation can produce multiple neural and hormonal responses. Stress is associated with changes in neurotransmitters and endogenous analgesic substances, including dopamine, serotonin, acetylcholine, and endorphins, which may help the body tolerate strain. It may also stimulate the release of hormones such as epinephrine, norepinephrine, cortisol, growth hormone, and glucagon, thereby increasing cardiac activity, metabolism, and blood glucose levels. Conversely, stress may reduce the secretion of hormones such as insulin, thyroxine, and testosterone. Severe or persistent psychological stress may also disrupt sex hormones and the menstrual cycle in women.

Figure 2

The Neuroendocrine Axis



Note. The hypothalamic-pituitary-adrenal axis links corticotropin-releasing hormone, adrenocorticotrophic hormone, cortisol secretion, and effects on immune functioning.

Effects of Chronic Stress on the Central and Peripheral Nervous Systems

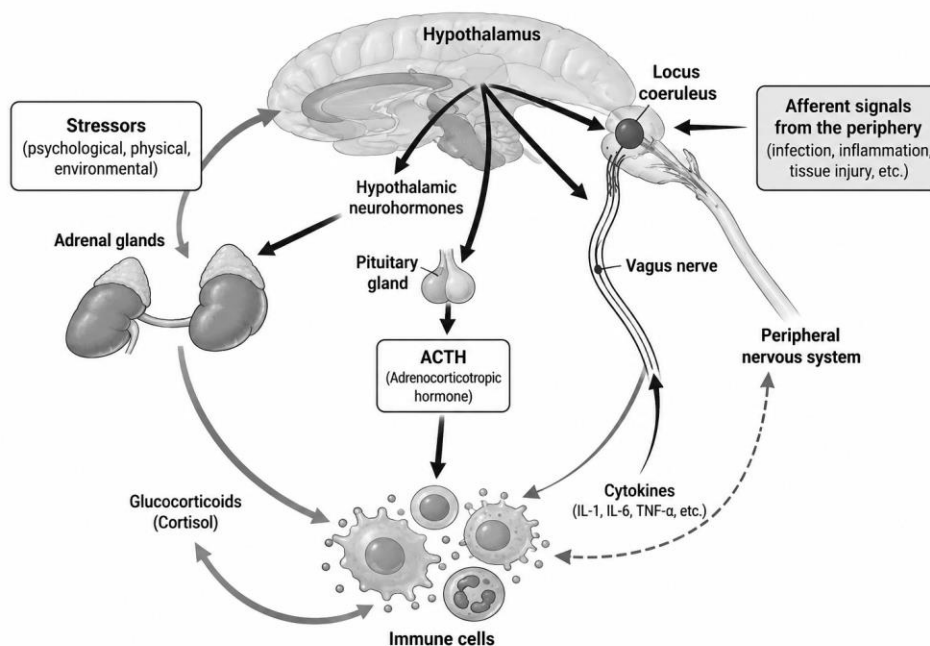
Persistent psychological stress may produce hormonal disturbances that elevate blood glucose and lipid levels, including cholesterol, as well as blood pressure, thereby increasing the risk of physical diseases, particularly cardiovascular disease. Psychological and social stress may also affect fetal development through the influence of stress hormones on the hippocampus, potentially leaving neurological effects that extend into later stages of life. In adults, chronic stress may contribute to the deterioration of certain neural cells and receptors and negatively affect brain function and the regulation of emotional and stress responses (Mallouhi, 2017).

Neuroimmune Interaction

Recent research has demonstrated continuous and complex communication between the brain and the immune system through protein molecules known as cytokines, which are secreted by white blood cells during stress or exposure to pathogens. These molecules influence the brain and may stimulate psychological and behavioral responses associated with stress, such as anxiety and vigilance. Psychological stress may also impair immune responses, reduce responsiveness to vaccination, and contribute to the exacerbation of certain diseases. The nervous system is therefore not merely connected to the immune system; it also plays an important role in regulating immune functions and coordinating their interaction with other bodily systems (Mallouhi, 2017).

Figure 3

Neuroimmune Interaction



Note. Neural, endocrine, and immune pathways communicate bidirectionally through the hypothalamus, pituitary and adrenal glands, vagus nerve, glucocorticoids, and cytokines.

Effects of Depression and Anxiety on Nervous System Functioning

From a neurological perspective, some psychological disorders are associated with altered nervous system activity and neurotransmitter function. Depression has been linked to reduced activity in neural systems involved in reward and pleasure and to changes in neurotransmitter systems, including serotonin. Posttraumatic stress disorder (PTSD) is associated with heightened activity in certain neural and hormonal systems and increased autonomic nervous system responsiveness. The role of the nervous system is also evident in anxiety disorders, particularly panic disorder, in which individuals may interpret normal bodily changes generated by the autonomic nervous system as signs of danger or an impending panic attack, thereby intensifying anxiety and fear (Bani Younes, 2019; Shuwaikh et al., 2016).

Method

Research Design

The methodological approach was determined by the nature of the topic and the objectives of the study. Because the present study is theoretical, it employed a descriptive-analytical approach to synthesize and interpret the literature concerning the role of the nervous system in the development of psychosomatic diseases.

Findings

The findings indicate a close relationship between psychological and physical health. Psychological stress activates the sympathetic nervous system and stimulates the release of hormones such as epinephrine and cortisol, thereby affecting bodily functions and contributing to the development or exacerbation of psychosomatic diseases. The central nervous system processes emotional experiences, and conditions such as anxiety and depression may be accompanied by diverse physical symptoms. The nervous system also interacts with the endocrine and immune systems; consequently, chronic stress may disrupt hormonal regulation, weaken immune responses, and increase susceptibility to disease. PTSD may likewise be associated with structural and functional changes in the nervous system that manifest as physical symptoms. Overall, the findings underscore that maintaining psychological well-being is an important component of preserving physical health.

Conclusion

This theoretical study demonstrates that psychosomatic diseases are best understood as the result of dynamic interactions among psychological processes and the nervous, endocrine, and immune systems. The limbic and autonomic nervous systems translate perceived stress and emotional experiences into physiological responses, while the sympathetic and parasympathetic divisions help regulate the body's adaptation to changing demands. When stress responses become prolonged, persistent activation of neural and hormonal pathways may disrupt physiological equilibrium, impair immune function, and contribute to the development or worsening of physical symptoms. Depression, anxiety, panic disorder, and PTSD may further

influence nervous system activity and shape how bodily sensations are perceived and interpreted. These findings support an integrated understanding of psychosomatic disease in which psychological and physical health are assessed together rather than treated as separate domains. They also highlight the value of early identification of chronic stress, coordinated psychological and medical care, and interdisciplinary research into the mechanisms connecting emotional experience with bodily functioning.

Recommendations

The study recommends increasing awareness among health care professionals and patients of the relationship between the nervous system and psychosomatic diseases, and developing integrated diagnostic and therapeutic approaches that address psychological and physical dimensions together. It also emphasizes the importance of supporting interdisciplinary research on interactions among the nervous, endocrine, and immune systems and evaluating the effectiveness of psychological treatments, early intervention programs, and stress-management strategies. In addition, future research should examine how early psychological experiences affect nervous system development and the emergence of psychosomatic diseases later in life.

References

- Ahmad, M. A.-H., Al-Ta'i, H. K., & Abd al-Malik, S. (2018). *Fizyulujia al-haraka* [Physiology of movement]. Dar Al-Kutub Al-Ilmiyya.
- Al-Eneizat, S. H. (2021). *Al-usus al-tashrihiyya wa-al-fizyulujyya li-jism al-insan* [The anatomical and physiological foundations of the human body]. Dar Al-Yazouri Al-Ilmiyya.
- Ali, I. I., Al-Mashhadani, W. T., & Ali, A. B. (2018). *'Ilm al-nafs al-fizyuluji* [Physiological psychology]. Al-Manhal.
- Al-Shawish, N. Z., & Youssef, L. K. (2011). *Al-ta'allum al-haraki wa-al-numu al-insani* [Motor learning and human development]. Dar Zahran lil-Nashr wa-al-Tawzi'.
- Al-Zarad, F. M. K. (2000). *Al-amrad al-nafsiyya al-jasadiyya: Amrad al-'asr* [Psychosomatic diseases: Diseases of the modern age]. Dar Al-Nafa'is.
- Al-Zarouq, F. A.-Z. (2013). Al-'alaqa bayna al-sihha al-nafsiyya wa-al-sihha al-jasadiyya [The relationship between mental and physical health]. In *Mawdu'at al-'ulum al-ijtima'iyya wa-al-insaniyya fi al-'alam al-Islami: Abhath muhakkama* [Topics in the social sciences and humanities in the Islamic world: Peer-reviewed research] (pp. 103–114). Al-Mu'tamar al-Duwali al-Thani li-Markaz al-Buhuth wa-al-Istisharat al-Ijtima'iyya.
- Bani Younes, M. M. (2019). *Abjadiyyat 'ilm al-nafs al-'asabi al-ikliniki* [Fundamentals of clinical neuropsychology]. Dar Al-Yazouri.
- Ghanem, M. H. (2011). *Al-idtirabat al-nafsjismiyya: Ta'sil nazari wa-dirasat maydaniyya* [Psychosomatic disorders: Theoretical foundations and field studies]. Dar Gharib.
- Ismaili, Y., & Qashoush, S. (2019). *Al-dimagh wa-al-'amaliyyat al-'aqliyya* [The brain and mental processes]. Dar Al-Yazouri.

- Mallouhi, N. (2017). *Al-tibb al-nafsi al-jasadi* [Psychosomatic medicine]. Dar Al-Ghasaq lil-Nashr.
- Rothschild, B. (2023). *Al-jasad yatadhakkar: Al-fizyulujiya al-nafsiya lil-sadma wa-'ilaj al-sadma* [The body remembers: The psychophysiology of trauma and trauma treatment] (M. M. Ouda, Trans.). Dar Ighna'.
- Saad, S. (2018). *Masdar al-dabt al-sihhi wa-istiratijiyyat muwajahat al-daght al-nafsi lada al-marda al-musabin bi-amrad saykosomatiyya* [Health locus of control and psychological stress-coping strategies among patients with psychosomatic diseases] [Doctoral dissertation, Mohamed Khider University of Biskra].
- Shuwaikh, H., Al-Huwaila, A. H., Ayad, F. S., Al-Rashid, M. J., & Al-Hamdan, N. A. (2016). *'Ilm al-nafs al-maradi* [Abnormal psychology]. Anglo-Egyptian Bookshop.
- Taha, S. K. (2006). *Mabadi' al-fizyuluji ('ilm waza'if al-a'da')* [Principles of physiology]. Maktabat Muntada Al-Iskandariyya.
- Yassin, A. M. (1986). *'Ilm al-nafs al-'iyadi (al-ikliniki)* [Clinical psychology]. Dar Al-'Ilm Lil-Malayin.