CURRENT SCIENCE

Multidisciplinary Journal With Arbitration Committee

PAGE 1 — OFFICIAL PUBLICATION IDENTITY

Yoga, Meditation, and Breathing Techniques on Stress and Anxiety : A Systematic Literature Review and a Proposal for an Integrated Neurosomatic Mental Health Model

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THIS JOURNAL INCLUDED IN MANY INDEXES, INCLUDING ADVANCED SCIENCES INDEX · CURRENT SCIENCE GEORGIA · ISSN: 2667-9515

Barcode 977266795001

ISSN	2667-9515
Barcode	977266795001
Publication Code	0099-0001-2026-0701
Volume / Issue	Volume 6, No. 69
Year	2026
Page Number	151-300
DOI	DOI-ready metadata field reserved
Status	Approved Publication Record

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VERIFICATION QR

https://csi.ge/certificate-verification/?verify=0099-0001-2026-0701

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PAGE 2 — OFFICIAL CITATION & JOURNAL INFORMATION

To cite this article: Gökben Gönültaş, Current Science, Volume 6, No. 69, 2026, p. 151-300. - 0099-0001-2026-0701.

JOURNAL INFORMATION

Journal	Current Science Georgia
ISSN	2667-9515
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Publication Code	0099-0001-2026-0701
Page Number	151-300
Verification	https://csi.ge/certificate-verification/?verify=0099-0001-2026-0701

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Yoga, Meditation, and Breathing Techniques on Stress and Anxiety : A Systematic Literature Review and a Proposal for an Integrated Neurosomatic Mental Health Model

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ABSTRACT

The Effects of Yoga, Meditation, and Breathing Techniques on Mental Health: A Systematic Literature Review and Proposal for an Integrated Neurosomatic Mental Health Model

Mental health problems associated with stress, anxiety, and reduced psychological well-being have become increasingly prevalent worldwide, highlighting the need for innovative and integrative approaches in mental health care (World Health Organization [WHO], 2022). While conventional treatment methods have made significant contributions to the field, holistic approaches that address not only cognitive processes but also bodily experiences and autonomic nervous system functioning have gained increasing attention (Engel, 1977; Porges, 2011). Within this context, mind–body practices such as yoga, meditation, and breathing techniques have emerged as complementary interventions that support mental health and psychological well-being (Cramer et al., 2018; Goldberg et al., 2022).

The aim of this study was to systematically examine the effects of yoga, meditation, and breathing techniques on mental health and to propose an Integrated Neurosomatic Mental Health Model explaining the potential mechanisms underlying these effects. The study was conducted using a systematic literature review methodology. Relevant studies published in PubMed, Scopus, Web of Science, PsycINFO, Google Scholar, TR Dizin, and DergiPark databases were reviewed. The review process was carried out in accordance with the PRISMA 2020 guidelines.

The findings indicate that yoga, meditation, and breathing techniques may contribute to reductions in stress, anxiety, and psychological distress while enhancing psychological well-being, emotional regulation skills, and psychological resilience (Galante et al., 2021; Goldberg et al., 2022; Fincham et al., 2023). Furthermore, evidence suggests that these interventions exert their effects through mechanisms including interoceptive awareness, autonomic nervous system regulation, vagal activation, and neuroplasticity (Khalsa et al., 2018; Davidson & McEwen, 2012; Porges, 2011).

Based on the findings, the Integrated Neurosomatic Mental Health Model was

In conclusion, the findings demonstrate that mind–body interventions have significant potential to support mental health and psychological well-being. The proposed model offers a comprehensive theoretical framework for understanding the mechanisms through which these practices contribute to psychological functioning and may serve as a foundation for future research and clinical applications.

Keywords: yoga, meditation, breathing techniques, mental health, psychological well-being, interoception, autonomic nervous system regulation, neuroplasticity, Polyvagal Theory, Integrated Neurosomatic Mental Health Model.

Keywords: *Meditation; Breathing; Techniques; Stress; Anxiety*

Introduction

Throughout life, individuals encounter stress, uncertainty, loss, and various life events that may affect their psychological balance. The acceleration of modern life, transformations in social relationships, and increasing performance pressures have made mental health problems more visible worldwide (WHO, 2022). In particular, stress and anxiety disorders are among the most significant factors negatively affecting individuals' quality of life, interpersonal relationships, and overall well-being (American Psychiatric Association, 2022).

Mental health is no longer defined merely as the absence of psychological disorders; rather, it encompasses an individual's ability to establish adaptive relationships with life, regulate emotions, realize personal potential, and create meaning in life (Ryff, 1989; Seligman, 2011). Consequently, contemporary mental health research adopts not only a disease-oriented perspective but also an approach aimed at enhancing psychological well-being (Diener et al., 2018).

For many years, mental health problems were primarily explained through cognitive, behavioral, and breathing techniques. These practices are no longer regarded solely as complementary health interventions but are increasingly recognized as evidence-based psychological interventions supported by scientific research (Ross & Thomas, 2010; Tang, Hölzel, & Posner, 2015).

Research has demonstrated that yoga practices can reduce stress and anxiety levels, meditation can enhance emotional regulation and attentional control, and controlled breathing exercises can support autonomic nervous system regulation (Brown & Gerbarg, 2005; Streeter et al., 2012).

Systematic reviews and meta-analyses indicate that these practices may contribute to reductions in stress, anxiety, and depressive symptoms (Cramer et al., 2018; Galante et al., 2021; Goldberg et al., 2022). Importantly, these interventions focus not only on cognitive processes but also on bodily sensations, nervous system functioning, and internal awareness. Advances in neuroscience have increasingly revealed that the relationship between the body and mind is much stronger than previously assumed (Damasio, 1999; Siegel, 2012).

The way individuals perceive bodily sensations, how their nervous systems interpret safety or threat, and their physiological responses to stress are now considered important determinants of

Accordingly, the present study aims to systematically evaluate the effects of yoga, meditation, and breathing techniques on mental health and to develop the Integrated Neurosomatic Mental Health Model based on the findings obtained. By synthesizing the existing literature on mind–body-based interventions, this study seeks to contribute to contemporary mental health approaches that emphasize the integration of body and mind. Furthermore, it is expected to provide a theoretical foundation for future applied research and contribute to the development of mental health practices.

1.1.Problem Statement

Changing living conditions and related environmental demands significantly affect individuals' psychological health, leading to notable increases in stress and anxiety levels and creating a growing need for innovative interventions in the field of mental health (World Health Organization [WHO], 2022). This situation contributes not only to an increase in psychological symptoms but also to declines in life satisfaction, subjective well-being, and overall quality of life (Diener et al., 2018).

Although conventional mental health interventions have made substantial contributions to psychological well-being, recent years have witnessed growing interest in approaches that focus not only on cognitive processes but also on bodily experiences and nervous system functioning. In particular, mind–body practices such as yoga, meditation, and breathing techniques have attracted considerable attention due to their potential to regulate stress responses, enhance bodily awareness, and promote psychological well-being (Cramer et al., 2018; Galante et al., 2021).

For many years, mental health problems were primarily explained through cognitive and behavioral frameworks, while the role of the body

Stress is defined as a psychological and physiological response that occurs when individuals perceive environmental demands as exceeding or threatening their available coping resources (Lazarus & Folkman, 1984). While short-term stress may facilitate adaptation, prolonged exposure to stress can negatively affect both psychological and physical health (McEwen, 2007). Chronic stress has been associated with depression, anxiety, sleep disturbances, cardiovascular diseases, and impairments in immune system functioning (Sapolsky, 2004).

Similarly, anxiety is characterized by excessive worry, tension, and apprehension regarding potential future threats (American Psychiatric Association, 2022). Although moderate levels of anxiety are a natural part of life, persistent and intense anxiety can significantly impair daily functioning. Anxiety disorders are currently recognized as among the most prevalent mental health conditions worldwide (WHO, 2022).

Yoga, which incorporates physical postures, breathing practices, and meditation techniques, is increasingly recognized as a holistic intervention. Research suggests that regular yoga practice may reduce perceived stress, improve quality of life, and enhance psychological well-being (Khajuria et al., 2024). Likewise, meditation practices aim to strengthen attentional control, awareness, and mental regulation processes. Evidence indicates that mindfulness-based interventions may positively influence stress, anxiety, and depressive symptoms (Goldberg et al., 2022).

Controlled breathing techniques have also received growing scientific attention. Studies have shown that breathing exercises can regulate autonomic nervous system functioning, increase heart rate variability, and reduce physiological stress responses (Fincham et al., 2023).

Despite the growing body of evidence supporting

interoception and autonomic nervous system functioning in mental health have received increasing attention, comprehensive models integrating these mechanisms with yoga, meditation, and breathing techniques remain limited (Khalsa et al., 2018).

Accordingly, the primary problem addressed in this study concerns identifying the mechanisms through which yoga, meditation, and breathing techniques influence mental health and explaining these mechanisms within a comprehensive conceptual framework. Therefore, this research systematically examines the effects of these practices on mental health and proposes the Integrated Neurosomatic Mental Health Model as a framework for explaining these relationships.

1.2 Purpose of the Study

The primary purpose of this study is to systematically examine the effects of yoga, meditation, and breathing techniques on mental health and to develop an Integrated Neurosomatic Mental Health Model based on the findings obtained from the literature.

Within this framework, the study aims to investigate the relationships among stress, anxiety, psychological well-being, interoceptive awareness, autonomic nervous system regulation, emotional regulation, neuroplasticity, and psychological resilience. In addition, the study seeks to identify the neurobiological, psychological, and physiological mechanisms through which yoga, meditation, and breathing practices influence mental health.

More specifically, the objectives of this study are:

To examine the effects of yoga on mental health and psychological well-being.

To investigate the effects of meditation practices on stress, anxiety, and emotional regulation.

psychological benefits associated with mind–body interventions.

To evaluate the effects of yoga, meditation, and breathing techniques on psychological resilience and well-being.

To synthesize the findings of previous studies through a systematic literature review.

To propose an Integrated Neurosomatic Mental Health Model that explains the mechanisms through which yoga, meditation, and breathing techniques contribute to mental health.

Ultimately, this study aims to provide a comprehensive theoretical framework that explains the interaction between bodily awareness, nervous system regulation, cognitive processes, emotional regulation, and psychological well-being. Furthermore, the study seeks to contribute to the literature by offering an integrative perspective that may guide future research and evidence-based mental health practices.

1.3 Significance of the Study

Mental health problems constitute one of the most significant public health challenges of the twenty-first century. The increasing prevalence of stress, anxiety, depression, and other psychological difficulties has highlighted the need for innovative, evidence-based, and integrative approaches to mental health promotion and intervention. In this context, yoga, meditation, and breathing techniques have attracted growing scientific interest due to their potential contributions to psychological well-being, emotional regulation, and stress management.

Although a substantial body of research has examined the individual effects of these practices, studies integrating their neurobiological, psychological, and physiological mechanisms within a comprehensive conceptual framework

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mechanisms underlying mind–body interventions.

1.3.1 Theoretical Significance

From a theoretical perspective, this study contributes to the growing body of literature examining the relationships among mental health, interoception, autonomic nervous system regulation, neuroplasticity, emotional regulation, and psychological well-being.

Previous studies have generally investigated yoga, meditation, and breathing techniques separately or focused on specific psychological outcomes. However, relatively few studies have attempted to explain the interconnected neurobiological and psychological mechanisms through which these practices influence mental health. Therefore, this study aims to bridge this gap by synthesizing findings from multiple theoretical perspectives, including the Biopsychosocial Model (Engel, 1977), Polyvagal Theory (Porges, 2011), Neurovisceral Integration Theory (Thayer & Lane, 2000), interoception research (Khalsa et al., 2018), and neuroplasticity literature (Davidson & McEwen, 2012).

In addition, the proposed Integrated Neurosomatic Mental Health Model provides a conceptual framework that explains how bodily awareness, nervous system regulation, emotional regulation, and cognitive processes interact to influence psychological well-being. Thus, the study contributes to the theoretical advancement of contemporary mind–body approaches in mental health research.

1.3.2 Practical Significance

The findings of this study are expected to have important practical implications for mental health professionals and individuals working in the field of psychological well-being.

By providing a comprehensive understanding of

Furthermore, the proposed model may serve as a practical framework for designing preventive mental health programs, stress-management interventions, resilience-enhancement programs, and well-being-oriented applications. The findings may also contribute to the development of multidisciplinary approaches that address both psychological and physiological aspects of mental health.

1.3.3 Contribution to the Turkish Literature

Although international research examining yoga, meditation, breathing techniques, interoception, and autonomic nervous system regulation has increased substantially in recent years, studies integrating these concepts within a comprehensive mental health framework remain relatively limited in the Turkish literature.

Most existing studies conducted in Türkiye focus on the individual effects of yoga, mindfulness practices, breathing exercises, or stress-management interventions. However, there is a lack of comprehensive studies that systematically synthesize these findings and explain their relationships through an integrative theoretical framework.

Therefore, this study contributes to the Turkish literature by bringing together current international evidence and presenting a comprehensive conceptual model that explains the relationships among mind–body interventions, interoceptive awareness, autonomic nervous system regulation, neuroplasticity, psychological resilience, and psychological well-being. In this respect, the study may serve as a reference source for future research and contribute to the development of interdisciplinary studies within the field of mental health in Türkiye.

1.3.4 Original Contribution of the Study

mind–body intervention literature. Rather than examining yoga, meditation, and breathing techniques as isolated practices, the model conceptualizes them as interconnected processes that influence mental health through multiple neurobiological, physiological, cognitive, emotional, and behavioral pathways.

Within the model, neurosomatic awareness is conceptualized as a multidimensional process involving interoceptive awareness, autonomic nervous system regulation, neurocognitive restructuring, emotional regulation, psychological resilience, and psychological well-being. The model proposes that improvements in bodily awareness and nervous system regulation facilitate adaptive psychological functioning and contribute to enhanced well-being.

Accordingly, this study not only synthesizes existing knowledge but also offers a novel conceptual framework for understanding the mechanisms through which mind–body interventions influence mental health. The proposed model may provide a foundation for future empirical studies, intervention programs, and theoretical developments within the field of mental health.

1.4 Research Questions

This study seeks to systematically examine the effects of yoga, meditation, and breathing techniques on mental health and psychological well-being and to develop an Integrated Neurosomatic Mental Health Model based on the findings obtained from the literature.

Accordingly, the study addresses the following research questions:

1. What are the effects of yoga, meditation, and breathing techniques on mental health and psychological well-being?

2. How do yoga, meditation, and breathing contribute to the relationship between mind–body interventions and mental health outcomes?

5. What is the relationship between neuroplasticity and the psychological benefits associated with yoga, meditation, and breathing techniques?

6. How do yoga, meditation, and breathing practices contribute to the development of psychological resilience and well-being?

7. What neurobiological, psychological, and physiological mechanisms explain the effects of these practices on mental health?

8. How can the findings obtained from the literature be integrated into a comprehensive conceptual framework, namely the Integrated Neurosomatic Mental Health Model?

1.5. Assumptions of the Study

The following assumptions were adopted in this study:

It was assumed that the studies included in the systematic review were conducted in accordance with established scientific and ethical standards.

The findings reported in the reviewed studies were assumed to be reliable and valid.

It was assumed that the studies identified through the selected databases adequately represented the research problem.

The included studies were assumed to sufficiently reflect the effects of body–mind-based interventions.

1.5.1. Limitations of the Study

The study was conducted within the following limitations:

The study was limited to research available in the selected databases.

employed.

The study was limited to research published within the specified time frame.

1.6. Key Concepts and Definitions

Stress: A set of psychological and physiological responses that emerge when individuals perceive environmental demands as exceeding their available coping resources (Lazarus & Folkman, 1984).

Anxiety: A state of worry, apprehension, and concern regarding potential future threats (American Psychiatric Association [APA], 2022).

Yoga: A holistic mind–body practice that integrates physical postures, breathing techniques, and meditation practices.

Meditation: Mental practices involving the intentional direction of attention toward a specific object, experience, or state of awareness.

Mindfulness: The practice of directing attention to the present moment in a non-judgmental manner (Kabat-Zinn, 2003).

Interoception: The capacity to perceive, interpret, and respond to internal bodily signals (Khalsa et al., 2018).

Neuroplasticity: The brain's capacity to change, adapt, and reorganize throughout the lifespan (Doidge, 2007).

Neurosomatic Awareness: An individual's awareness of the interactions among bodily processes, the nervous system, and psychological functioning.

Psychological Resilience: The capacity to adapt successfully in the face of stress, adversity, or challenging life events (Southwick et al., 2023).

Psychological Well-Being: A state characterized by life satisfaction, self-realization, and the pursuit of

Lazarus and Folkman's Transactional Theory of Stress and Coping;

Engel's Biopsychosocial Model;

Porges' Polyvagal Theory;

Khalsa and colleagues' Interoceptive Framework;

Davidson and McEwen's Neuroplasticity Perspective; and

Seligman's Positive Psychology Approach.

Within the framework of these theoretical perspectives, the effects of yoga, meditation, and breathing techniques on stress and anxiety were examined and evaluated. Based on the synthesis of the findings, an Integrated Neurosomatic Mental Health Model was developed to explain the mechanisms through which mind–body practices may contribute to psychological well-being, emotional regulation, and resilience.

2. Theoretical Framework and Literature Review

2.1. Historical Development of Mental Health

The concept of mental health has been interpreted throughout human history within the framework of different cultures and scientific paradigms. Today, mental health is generally defined as an individual's ability to maintain a psychologically, socially, and emotionally functional and productive life (World Health Organization [WHO], 2022).

2.2. Understanding Mental Health in Antiquity

The earliest approaches to mental health can be traced to the civilizations of Ancient Egypt, Mesopotamia, China, India, and Greece. During these periods, mental illnesses were largely believed to be caused by gods, evil spirits, or other supernatural forces.

In Ancient Greece, however, Hippocrates (460–370 BCE) proposed that mental disorders resulted

2.2.1. The Middle Ages and Mental Health

Throughout the Middle Ages in Europe, mental illnesses were once again interpreted through religious and supernatural explanations. During this period, individuals with mental disorders were often marginalized and excluded from society.

In Islamic civilization, Avicenna (Ibn Sina, 980–1037) emphasized the relationship between the mind and the body. In the hospitals (darüşşifas) established throughout the Islamic world, individuals with mental health problems were treated using music therapy, the sound of water, and various psychosocial interventions (Öztürk & Uluşahin, 2020).

2.2.2. The Renaissance and Enlightenment Period

The emergence of scientific thought during the Renaissance also influenced the field of mental health. Greater importance was placed on examining human behavior through observation and experimentation. Particularly during the seventeenth and eighteenth centuries, the view that mental disorders could be explained through biological and psychological processes became increasingly widespread.

2.2.3. The Emergence of Modern Psychology

The establishment of psychology as an independent scientific discipline in the late nineteenth century marked a significant turning point in mental health research. Wilhelm Wundt's establishment of the first psychology laboratory in 1879 is widely regarded as the beginning of modern psychology.

During this period, psychodynamic theory, behaviorism, and later cognitive approaches played influential roles in explaining mental health. Freud (1926/2014) argued that psychological problems stemmed from unconscious conflicts, whereas behaviorist the view that purely biological or psychological explanations were insufficient gained increasing support. The biopsychosocial model proposed by Engel (1977) suggested that mental health is shaped through the interaction of biological, psychological, and social factors.

Today, this approach is considered one of the primary theoretical frameworks in mental health research. An individual's genetic characteristics, life experiences, social environment, and psychological processes are evaluated collectively.

2.2.5. Positive Psychology and Psychological Well-Being

Since the late 1990s, the positive psychology movement has introduced a new paradigm in the field of mental health. Seligman (2011) argued that mental health cannot be understood solely as the absence of illness; rather, it should also be evaluated through an individual's strengths, sense of purpose, and psychological resources. Similarly, Ryff (1989) conceptualized psychological well-being through dimensions including self-acceptance, purpose in life, personal growth, environmental mastery, autonomy, and positive relationships.

2.2.6. The Neuroscience Era and Mental Health

Recent advances in neuroimaging technologies have contributed significantly to a better understanding of the neurobiological foundations of mental health. The concept of neuroplasticity, which refers to the brain's capacity to change throughout life, plays an important role in explaining the biological basis of psychological change and recovery (Davidson & McEwen, 2012).

Additionally, concepts such as interoception, Polyvagal Theory, and nervous system regulation have provided new perspectives for understanding mental health (Porges, 2011; Khalsa et al., 2018).

2.2.7. The Neurosomatic Perspective and

neurosomatic perspective proposes that mental health emerges from the interaction among the body, brain, and nervous system. This approach explains mental health through the integration of interoception, autonomic nervous system regulation, neuroplasticity, and emotion regulation processes.

2.3. The Contemporary Importance of Mental Health

Mental health problems are currently recognized as a major global public health concern. According to the World Health Organization, depression and anxiety disorders are among the most prevalent mental health conditions worldwide, affecting hundreds of millions of individuals (WHO, 2022). Economic uncertainty, global pandemics, wars, social transformations, and technological developments have further increased the psychological burden experienced by individuals in recent years.

2.3.1. Global Mental Health Challenges

The prevalence of mental health problems has increased substantially in recent years. According to reports published by the World Health Organization, one in every eight individuals experiences a mental disorder at some point in life (WHO, 2022). Depression and anxiety disorders are among the leading mental health problems that reduce quality of life and negatively affect well-being.

Following the COVID-19 pandemic, significant increases in mental health problems were observed worldwide. During the pandemic, uncertainty, social isolation, health-related concerns, and economic difficulties increased stress levels and contributed to the widespread occurrence of depressive and anxiety symptoms (WHO, 2022). Global studies indicate that young adults, women, and healthcare professionals are particularly vulnerable to mental health

are becoming increasingly prevalent. Elevated stress levels have been reported particularly among university students, healthcare professionals, and individuals exposed to demanding work environments (Önder, 2018). In recent years, economic conditions, social changes, and the increasing pace of life have intensified psychological burdens, while interest in psychological counseling services and mental health-supportive interventions has grown substantially.

Although efforts to improve mental health services in Türkiye continue, there remains a significant need to expand preventive mental health practices.

2.3.3. The Social Cost of Stress and Anxiety

Stress and anxiety have significant consequences at both individual and societal levels. Prolonged chronic stress may contribute to impairments in immune system functioning, cardiovascular diseases, and various psychological disorders (McEwen, 2007). Similarly, anxiety disorders can negatively affect social relationships, occupational performance, and daily functioning (American Psychiatric Association, 2022).

Therefore, maintaining mental health is important not only for individual well-being but also for public health and economic sustainability.

2.3.4. The Importance of Preventive Mental Health Approaches

Traditional mental health services have primarily focused on the treatment of existing problems. However, preventive mental health approaches have gained increasing attention in recent years. This perspective aims to prevent the development of mental disorders and enhance individuals' psychological resilience (Seligman, 2011).

Within preventive mental health frameworks, mind–body practices such as mindfulness, yoga,

2.3.5. The Need for New Approaches in Mental Health

Contemporary mental health research increasingly recognizes that approaches focused solely on symptom reduction may be insufficient. Findings from neuroscience and psychophysiology indicate that body awareness, interoception, and nervous system regulation play critical roles in mental health (Khalsa et al., 2018; Porges, 2011).

Consequently, it is important to scientifically examine the effects of mind–body practices such as yoga, meditation, and breathing techniques on mental health. Building upon this need, the present study aims to evaluate the effects of mind–body-based interventions on stress and anxiety and to develop an integrated model that explains these effects.

2.4. Stress and Contemporary Approaches

Stress, an inevitable aspect of human life, may serve adaptive and protective functions when experienced at moderate levels. However, depending on its intensity, duration, and an individual's coping capacity, stress can also lead to adverse psychological and physiological outcomes. Research has demonstrated that stress is not merely a psychological process but is also closely associated with neurobiological, hormonal, and physiological systems (McEwen, 2007). Consequently, stress is currently conceptualized as a multidimensional construct.

2.4.1. Historical Development of the Concept of Stress

The concept of stress was initially introduced within the field of physiology. Hans Selye (1956) defined stress as the nonspecific response of the organism to any demand placed upon it. According to Selye, organisms develop characteristic physiological responses when confronted with threats or challenges.

the subjective nature of stress and demonstrated that individuals may experience the same event differently.

Today, stress is viewed as a multidimensional phenomenon involving both biological and cognitive appraisal processes. According to Lazarus and Folkman's (1984) Cognitive Appraisal Theory, the manner in which individuals perceive and interpret an event significantly influences the development of stress responses. Consequently, the same life event may generate varying levels of stress across different individuals. Therefore, stress is influenced not only by environmental circumstances but also by cognitive evaluations.

2.4.2. Types of Stress

The literature generally categorizes stress into two primary forms: acute stress and chronic stress.

Acute Stress

Acute stress refers to a short-term form of stress that arises in response to a specific event or situation. Examples include examinations, job interviews, or unexpected life events. Short-term acute stress may facilitate adaptation by enabling individuals to respond effectively to environmental demands.

Chronic Stress

Chronic stress refers to prolonged and persistent stress conditions that become an enduring aspect of an individual's life. Continuous financial difficulties, long-term occupational demands, and chronic health conditions are common sources of chronic stress.

Research indicates that chronic stress exerts more severe psychological and physical health consequences than acute stress (McEwen, 2007).

2.4.3. Psychological Consequences of Stress

Prolonged exposure to stress can negatively affect

Difficulties with attention and concentration,

Sleep disturbances,

Problems with emotional regulation,

Depressive symptoms

(American Psychological Association, 2023).

Furthermore, chronic stress may negatively affect life satisfaction and overall psychological well-being.

2.4.4. Stress and Mental Health

The relationship between stress and mental health has become an important focus of contemporary neuroscience research. Chronic stress has been shown to contribute to excessive activation of the Hypothalamic–Pituitary–Adrenal (HPA) axis, the body's primary stress-regulation system, leading to elevated cortisol levels (McEwen, 2007).

Although cortisol serves protective functions when elevated temporarily, prolonged exposure to high cortisol levels may produce detrimental effects on both physical and psychological health.

Elevated cortisol levels have been associated with:

Anxiety,

Depression,

Sleep disturbances,

Memory impairments

(Sapolsky, 2004).

Therefore, effective stress management is considered essential for the maintenance and promotion of mental health.

2.4.5. General Adaptation Syndrome

In order to explain physiological responses to stress, Selye (1956) developed the General

During this stage, the organism perceives a threat and initiates defensive responses commonly referred to as the fight, flight, or freeze response. The sympathetic nervous system becomes activated, heart rate increases, and stress hormones are released into the bloodstream.

Resistance Stage

If the stressor persists, the organism attempts to adapt to the ongoing demand. During this phase, individuals strive to maintain normal functioning; however, physiological and psychological resources are increasingly consumed.

Exhaustion Stage

When exposure to stress continues for a prolonged period, the organism's adaptive resources become depleted. As a result, physical and psychological health problems may emerge. Selye's model continues to be recognized as one of the foundational theoretical frameworks in contemporary stress research.

2.4.6. Cognitive Appraisal Theory

According to Lazarus and Folkman (1984), the meaning individuals assign to an event is more important in the development of stress than the event itself. Within this framework, individuals evaluate situations through two distinct appraisal processes.

Primary Appraisal

During primary appraisal, individuals assess whether a situation represents a threat, harm, loss, or challenge.

Secondary Appraisal

During secondary appraisal, individuals evaluate their available coping resources and capabilities. Stress emerges when perceived environmental demands exceed perceived coping resources. This

endocrine system, and the autonomic nervous system.

The amygdala, hypothalamus, and prefrontal cortex play particularly important roles in the generation and regulation of stress responses (LeDoux, 2012). When a threat is perceived, the amygdala becomes activated and initiates the Hypothalamic–Pituitary–Adrenal (HPA) axis. Consequently, stress hormones such as cortisol and adrenaline are released (McEwen, 2007).

Under acute stress conditions, these systems serve adaptive functions. However, chronic stress is associated with prolonged elevations in cortisol levels. Research has demonstrated that chronic exposure to elevated cortisol is associated with:

Reduced hippocampal volume,

Impairments in memory functioning,

Difficulties in emotional regulation,

Increased anxiety symptoms

(Sapolsky, 2004).

2.4.8. The Autonomic Nervous System and Stress

The autonomic nervous system plays a critical role in stress responses. While the sympathetic nervous system prepares the organism for action, the parasympathetic nervous system supports recovery, restoration, and physiological regulation (Porges, 2011).

Under chronic stress conditions, sympathetic activation may remain elevated for extended periods, while parasympathetic functioning may become diminished. This imbalance may contribute to:

Muscle tension,

Sleep disturbances,

Heart palpitations,

by enhancing parasympathetic activity and promoting autonomic nervous system regulation (Streeter et al., 2012).

2.4.9. The Allostatic Load Framework

The concept of allostatic load, introduced by McEwen (2007), explains the cumulative biological consequences of chronic stress.

Allostatic load refers to the physiological wear and tear that results from:

Prolonged exposure to stress,

Persistent physiological activation,

Inadequate recovery processes.

Elevated allostatic load has been associated with:

Cardiovascular diseases,

Depression,

Anxiety disorders,

Metabolic dysfunction.

This framework demonstrates that stress produces not only psychological consequences but also significant biological effects.

2.4.10. Contemporary Approaches and the Mind–Body Perspective

In recent years, mind–body approaches have gained increasing prominence in stress research. Studies on interoception suggest that an individual's ability to perceive internal bodily signals may influence the experience of stress (Khalsa et al., 2018).

Similarly, Polyvagal Theory proposes that perceived safety and autonomic nervous system regulation play essential roles in stress management (Porges, 2011).

Mind–body interventions such as yoga,

Enhance emotional regulation abilities,

Strengthen psychological resilience

(Tang et al., 2015; Streeter et al., 2012).

Accordingly, stress is no longer viewed solely as a cognitive phenomenon but rather as the result of dynamic interactions among the body, brain, and nervous system.

2.5. Anxiety and Contemporary Perspectives

Anxiety is defined as a psychological state characterized by feelings of worry, tension, apprehension, uneasiness, and fear regarding potential future threats or dangers (American Psychiatric Association [APA], 2022). At moderate levels, anxiety may serve adaptive functions by helping individuals prepare for potential risks and challenges. However, when excessive in intensity, frequency, or duration, anxiety may impair daily functioning and contribute to clinically significant mental health problems.

Anxiety is currently recognized as one of the most prevalent mental health concerns worldwide. According to the World Health Organization (WHO, 2022), hundreds of millions of individuals experience anxiety symptoms during various periods of their lives. Uncertainty, economic challenges, performance pressures, and rapid social change have all contributed to increasing levels of anxiety in contemporary societies.

2.5.1. Historical Development of Anxiety

The concept of anxiety has been interpreted differently throughout history. The psychoanalytic perspective viewed anxiety as a consequence of unconscious conflicts. According to Freud (1926/2014), anxiety arises from conflicts between internal drives and external demands.

Behavioral approaches conceptualized anxiety as a learned response, whereas cognitive approaches

multidimensional phenomenon emerging from the interaction of biological, psychological, and social factors.

2.5.2. Neurobiological Foundations of Anxiety

Several brain regions play critical roles in the neurobiology of anxiety, including the amygdala, hippocampus, and prefrontal cortex (LeDoux, 2012). The amygdala is primarily responsible for evaluating potential threats and generating fear responses. Elevated amygdala activity has frequently been observed among individuals with high levels of anxiety.

The prefrontal cortex, by contrast, is involved in emotional regulation and cognitive control. Research suggests that the functional balance between the amygdala and prefrontal cortex may become disrupted under conditions of heightened anxiety (Davidson & McEwen, 2012).

2.5.3. Psychological Consequences of Anxiety

Severe anxiety may substantially impair quality of life and psychosocial functioning.

Common consequences associated with anxiety include:

Indecisiveness,

Avoidance behaviors,

Social withdrawal,

Attention difficulties,

Reduced performance.

Persistent anxiety symptoms may also increase vulnerability to other mental health problems, including depression and burnout.

2.5.4. Anxiety and Quality of Life

Research has consistently demonstrated that elevated levels of anxiety are negatively associated

preservation of mental well-being.

2.5.5. Psychological Resilience and the Neurosomatic Perspective

Recent research suggests that psychological resilience is associated not only with cognitive processes but also with bodily regulatory mechanisms. Interoceptive awareness, vagal nerve activation, heart rate variability, and emotional regulation skills have been identified as important mechanisms contributing to the development of psychological resilience.

Yoga, meditation, and breathing techniques are believed to enhance these mechanisms, thereby promoting resilience and adaptive functioning. Within this context, psychological resilience is conceptualized as one of the primary outcomes of the proposed Integrated Neurosomatic Mental Health Model.

2.5.6. Normal and Pathological Anxiety

Normal anxiety is a natural and adaptive response that enables individuals to prepare for potential threats and challenges. Feelings of nervousness before an examination, excitement prior to an important presentation, or heightened vigilance in risky situations are common examples of normal anxiety.

In contrast, pathological anxiety refers to persistent anxiety that is disproportionate to the actual level of threat and significantly impairs an individual's functioning (APA, 2022).

Symptoms of pathological anxiety may include:

Excessive and persistent worry,

Muscle tension,

Restlessness,

Sleep disturbances,

Difficulties in concentration

The central nervous system plays a critical role in the development and maintenance of anxiety. The amygdala, hippocampus, and prefrontal cortex are considered the primary brain regions involved in anxiety-related processes (LeDoux, 2012).

The amygdala is responsible for evaluating environmental stimuli and determining whether they pose a potential threat. Studies have indicated that individuals with anxiety disorders often exhibit heightened amygdala reactivity and increased threat sensitivity (LeDoux, 2012).

The hippocampus is involved in processing and storing past experiences, whereas the prefrontal cortex plays an essential role in cognitive control and emotional regulation. Dysfunction within prefrontal cortical networks may contribute to difficulties in emotional regulation among individuals experiencing anxiety (Davidson & McEwen, 2012).

One of the most important biological systems associated with anxiety is the Hypothalamic–Pituitary–Adrenal (HPA) axis. When a threat is perceived, activation of the HPA axis leads to the release of cortisol (McEwen, 2007). Although this system serves adaptive functions during acute stress, chronic activation may result in dysregulated cortisol secretion and contribute to the persistence of anxiety symptoms.

Research has consistently demonstrated associations between chronic stress, elevated cortisol levels, and anxiety disorders (Sapolsky, 2004).

2.5.8. The Autonomic Nervous System and Anxiety

The autonomic nervous system plays a fundamental role in anxiety responses. Excessive autonomic activation may contribute to symptoms such as:

Heart palpitations,

(Porges, 2011).

These physiological manifestations reflect the activation of defensive survival mechanisms and are frequently observed in individuals experiencing elevated anxiety.

2.5.9. Interoception and Anxiety

Individuals experiencing anxiety often interpret bodily sensations as indicators of threat or danger. For example, an increased heart rate may be misinterpreted as a sign of a serious medical condition, which can further intensify anxiety symptoms.

Research suggests that maladaptive interpretations of interoceptive signals may contribute to the maintenance and exacerbation of anxiety disorders. Consequently, interoception has become an important area of investigation within contemporary anxiety research.

2.5.10. Anxiety and Emotion Regulation

Emotion regulation refers to an individual's capacity to monitor, manage, and modify emotional experiences (Gross, 2015).

Studies indicate that individuals with high levels of anxiety often exhibit reduced emotion regulation abilities. In particular, avoidance behaviors, rumination, and excessive worry may interfere with adaptive emotional processing.

Mindfulness-based interventions have been shown to improve emotion regulation by helping individuals observe their thoughts and emotions in a nonjudgmental manner (Kabat-Zinn, 2003).

2.5.11. Contemporary Treatment and Intervention Approaches

A variety of evidence-based interventions are used in the treatment of anxiety disorders, including Cognitive Behavioral Therapy (CBT), Acceptance and Commitment Therapy (ACT), mindfulness-

al., 2022).

These interventions have been reported to:

Support autonomic nervous system regulation,

Increase vagal tone,

Enhance emotion regulation abilities,

Strengthen psychological resilience

(Tang et al., 2015; Streeter et al., 2012).

2.6. Approaches to the Mind–Body Relationship

Throughout history, efforts to understand human behavior, emotions, and mental processes have sought to explain the relationship between the body and the mind. Findings from research on body awareness, interoception, autonomic nervous system regulation, and neuroplasticity indicate that bodily and mental processes operate in a dynamic and reciprocal manner (Khalsa et al., 2018).

2.7. Polyvagal Theory and Perceived Safety

Polyvagal Theory, developed by Porges (2011), is one of the contemporary theoretical frameworks that explains the relationship between the body and the mind. According to the theory, an individual's perceived sense of safety, capacity for social connection, and ability to regulate emotions are closely associated with the functioning of the vagus nerve and the autonomic nervous system.

The theory proposes that the nervous system continuously monitors environmental cues and evaluates whether they are safe, dangerous, or life-threatening. This unconscious process, referred to as neuroception, enables individuals to respond rapidly to environmental demands and plays a critical role in physiological, emotional, and behavioral regulation (Porges, 2011).

When a sense of safety is established, the ventral

environment.

In contrast, when a threat is perceived, defensive survival responses are activated. Depending on the nature and intensity of the threat, the autonomic nervous system may initiate fight, flight, or freeze responses. These responses are associated with increased physiological arousal, heightened vigilance, and the mobilization of adaptive resources necessary for survival.

Polyvagal Theory provides an important framework for understanding the neurophysiological mechanisms underlying stress, anxiety, emotional regulation, and social functioning. The theory emphasizes that psychological well-being is influenced not only by cognitive processes but also by autonomic nervous system regulation and the individual's perception of safety within the environment.

Recent studies suggest that mind–body interventions such as yoga, meditation, and breathing techniques may promote autonomic nervous system regulation, enhance vagal functioning, and increase perceived safety. These effects may contribute to reductions in stress and anxiety while supporting emotional regulation, psychological resilience, and overall psychological well-being (Porges, 2011; Streeter et al., 2012; Tang et al., 2015).

Accordingly, Polyvagal Theory constitutes one of the principal theoretical foundations of the proposed Integrated Neurosomatic Mental Health Model, as it provides a comprehensive explanation of how perceived safety, autonomic regulation, and vagal functioning contribute to mental health outcomes.

TABLE-1 POLYVAGAL THEORY

2.8. Neurosomatic Approach

One of the most contemporary approaches explaining the body–mind relationship is the

Autonomic nervous system regulation,

Neuroplasticity,

Emotion regulation processes.

The neurosomatic approach focuses not only on individuals' thoughts but also on signals originating from the body and the functioning of the nervous system.

Mind–body-based practices such as yoga, meditation, and breathing techniques can support mental health by influencing these mechanisms (Tang, Hölzel, & Posner, 2015; Streeter et al., 2012).

2.9. Increasing Interest in Mind–Body-Based Practices

Recent developments in the field of mental health have increased interest in approaches aimed not only at reducing psychological symptoms but also at enhancing overall well-being. Alongside traditional treatment methods, practices that holistically address individuals' physical, mental, and emotional processes have attracted growing attention. Among these practices, yoga, meditation, mindfulness, and breathing techniques are among the most widely utilized mind–body interventions.

These practices aim to enhance bodily awareness, support nervous system regulation, and strengthen psychological well-being. Scientific studies conducted over the past two decades have demonstrated that such interventions may have positive effects on stress, anxiety, depression, and quality of life (Cramer et al., 2018; Goldberg et al., 2022).

2.9.1. The Rise of Complementary and Integrative Health Approaches

Interest in complementary and integrative health practices has increased significantly worldwide. The World Health Organization (WHO) states

An increase in lifestyle-related diseases,

The growing prevalence of mental health problems,

Greater interest in preventive healthcare approaches.

Among complementary practices, yoga, meditation, and breathing techniques have become particularly prominent due to their accessibility and relatively low cost.

3. Yoga, Mindfulness, Breathing, and Meditation Practices

3.1. The Growing Popularity of Yoga Practices

Although yoga originated thousands of years ago, it is now regarded not only as a form of physical exercise but also as a holistic method for supporting mental health.

Yoga practices typically include:

Physical postures (asanas),

Breathing exercises (pranayama),

Meditation practices.

Research indicates that regular yoga practice can reduce stress levels, alleviate anxiety, and enhance psychological well-being (Ross & Thomas, 2010; Cramer et al., 2018).

Furthermore, yoga has been reported to positively influence autonomic nervous system regulation and promote parasympathetic activation (Streeter et al., 2012).

3.2. The Growing Popularity of Meditation and Mindfulness Practices

Meditation refers to a collection of mental practices involving the deliberate direction of attention toward a specific object, thought, or experience. In recent years, mindfulness-based nonjudgmental awareness of the present moment (Kabat-Zinn, 2003).

Research has shown that mindfulness practices can:

Reduce stress levels,

Improve emotion regulation skills,

Enhance psychological resilience,

Decrease symptoms of depression and anxiety (Galante et al., 2021; Goldberg et al., 2022).

Neuroimaging studies have demonstrated that meditation practices can produce structural and functional changes in brain regions associated with attention, self-awareness, and emotion regulation (Hölzel et al., 2011; Tang et al., 2015).

3.3. Increasing Interest in Breathing Techniques

Breathing is one of the few physiological processes that individuals can consciously control. Consequently, breathing techniques have gained an important role among mental health-supportive interventions.

Research indicates that controlled breathing practices can:

Increase heart rate variability (HRV),

Support parasympathetic nervous system activation,

Reduce stress levels,

Alleviate symptoms of anxiety (Brown & Gerbarg, 2005; Zaccaro et al., 2018).

In particular, slow and rhythmic breathing practices have been reported to contribute to nervous system regulation through vagus nerve activation (Porges, 2011).

3.4. Contributions of Neuroscience Research

Support neuroplasticity,

Reduce cortisol levels,

Enhance interoceptive awareness,

Improve emotion regulation skills (Davidson & McEwen, 2012; Tang et al., 2015).

These findings indicate that the scientific evidence supporting the effectiveness of mind–body interventions continues to grow stronger.

3.4.1. Interest in Mind–Body-Based Practices in Türkiye

Interest in yoga, meditation, and mindfulness practices has also increased in Türkiye in recent years. Studies conducted at universities have demonstrated that mindfulness and yoga interventions may positively affect students' stress levels (Demir, 2017; Canbay & Yaşar, 2025).

Additionally, mindfulness-based programs are becoming increasingly common within corporations, healthcare institutions, and educational settings.

These developments suggest that mind–body-based practices are gaining greater importance within the field of mental health in Türkiye.

3.5. Common Mechanisms of Mind–Body-Based Practices

Although yoga, meditation, and breathing techniques are often examined as distinct interventions in the literature, these approaches are believed to influence several common physiological and psychological systems. These shared mechanisms include:

Increased body awareness,

Enhanced interoception,

Regulation of the autonomic nervous system,

One of the primary foundations of the present study is the holistic evaluation of these shared mechanisms and their potential contributions to mental health outcomes.

3.6. Neuroscience and Mental Health

Recent advances in neuroscience have made significant contributions to the understanding of mental health. While psychological processes were traditionally examined primarily through behavioral and cognitive perspectives, contemporary research recognizes that interactions among the brain, nervous system, and body play a central role in the development and maintenance of mental health (Davidson & McEwen, 2012).

With the advancement of neuroimaging technologies, the neurobiological mechanisms underlying emotions, thoughts, behaviors, and consciousness have been investigated in greater detail. These developments have demonstrated that psychological well-being, stress, anxiety, and emotion regulation are not solely mental experiences but also possess important biological foundations.

3.7. The Relationship Between the Brain and Mental Health

The brain serves as the central organ underlying cognitive, emotional, and behavioral functioning. In particular, brain regions such as the prefrontal cortex, amygdala, hippocampus, and insula play critical roles in mental health processes (LeDoux, 2012).

The prefrontal cortex is responsible for functions including:

Decision-making,

Attentional control,

Self-regulation,

Emotion management

The hippocampus plays a crucial role in learning and memory processes, whereas chronic stress has been associated with impairments in hippocampal functioning (McEwen, 2007).

The insula is an important brain region associated with body awareness and interoceptive processing (Craig, 2009). Collectively, these findings indicate that mental health is closely linked to brain functioning and neural processes.

3.8. Neuroplasticity

Neuroplasticity is defined as the brain's capacity to change, reorganize, and form new neural connections throughout life (Doidge, 2007). Although it was long believed that the brain ceased to change after a certain age, contemporary research has demonstrated that experiences, learning, and environmental interactions can modify synaptic connections.

According to Davidson and McEwen (2012), neuroplasticity is associated not only with learning processes but also with psychological recovery and adaptation.

Research suggests that mindfulness practices may contribute to:

Increased hippocampal volume,

Enhanced prefrontal cortex functioning,

Improved emotion regulation abilities

(Hölzel et al., 2011).

Similarly, yoga and breathing practices have been reported to influence nervous system functioning and promote adaptive neural changes (Streeter et al., 2012).

These findings suggest that neuroplasticity represents one of the key mechanisms through which mind–body-based interventions may

research has demonstrated that experiences, learning processes, and environmental interactions can alter synaptic connections. Davidson and McEwen (2012) suggest that psychological interventions can produce both structural and functional changes in the brain. In particular, mindfulness and meditation practices have been shown to induce changes in brain regions associated with attentional control, emotion regulation, and self-awareness.

Hölzel et al. (2011) observed increased gray matter density in the hippocampus following an eight-week mindfulness intervention. Similarly, Tang et al. (2015) reported that meditation practices may strengthen prefrontal cortex functioning.

According to Doidge (2015), neuroplasticity is associated not only with learning processes but also with recovery and healing. This suggests that psychological interventions may lead to long-lasting changes in brain structure and function.

Yoga practices have also been reported to support neuroplasticity. Regular yoga practice appears to have positive effects on attentional processes, body awareness, and stress regulation mechanisms (Streeter et al., 2012). These findings indicate that neuroplasticity is one of the primary mechanisms through which yoga, meditation, and breathing techniques may influence mental health.

3.9. Autonomic Nervous System

The autonomic nervous system (ANS) regulates the body's involuntary physiological functions.

It consists of two primary components:

Sympathetic Nervous System

The sympathetic nervous system is responsible for the fight-or-flight response.

When a threat is perceived:

CSG • VERIFIED • CSG • SECURE • CSG • VERIFIED

Energy resources are mobilized.

Parasympathetic Nervous System

The parasympathetic nervous system is responsible for rest, recovery, and restoration processes.

When activated:

Heart rate decreases,

Breathing becomes regulated,

Digestive activity increases,

The organism enters a recovery state.

Under conditions of chronic stress, excessive activation of the sympathetic nervous system may have adverse effects on mental health (McEwen, 2007).

3.10. The Vagus Nerve and Polyvagal Theory

The vagus nerve is one of the most important components of the autonomic nervous system. According to Polyvagal Theory, developed by Porges (2011), the nervous system continuously evaluates environmental cues to determine whether they are safe or threatening.

When safety is perceived, the social engagement system becomes activated. However, when threat is detected, the organism may respond through:

Fight,

Flight,

Freeze reactions.

Today, Polyvagal Theory is widely recognized as an important theoretical framework in stress, anxiety, and trauma research.

3.11. Interoception and Mental Health

Signals such as heartbeats, breathing rhythms, gastrointestinal activity, and muscle tension are associated with:

Emotion regulation,

Self-awareness,

Psychological resilience,

Psychological well-being.

Disruptions in interoceptive processing have been observed among individuals experiencing anxiety disorders (Khalsa et al., 2018).

3.12. Emotion Regulation and Brain Networks

Emotion regulation refers to an individual's capacity to manage emotional experiences (Gross, 2015).

Neuroscience research suggests that emotion regulation processes involve interactions among:

The prefrontal cortex,

The amygdala,

The anterior cingulate cortex,

The insula.

Meditation and mindfulness practices have been reported to strengthen functional connectivity among these neural networks (Tang et al., 2015). This may help explain the beneficial effects of mind–body-based practices on emotion regulation.

3.13. Emergence of the Neurosomatic Approach

Research in neuroscience, psychophysiology, trauma studies, and body-oriented approaches has demonstrated the significant influence of the relationship between the body and the nervous system on mental health (van der Kolk, 2014; Porges, 2011).

As a result of these developments, new approaches emphasizing the reciprocal interaction

3.13.1. The Concept of Neurosomatic Mental Health

In the present study, the concept of neurosomatic mental health is used to emphasize that mental health is not solely a product of cognitive and emotional processes but rather a dynamic construct shaped through the interaction of body awareness, interoception, autonomic nervous system regulation, neuroplasticity, and emotion regulation mechanisms.

Traditional approaches to mental health have primarily focused on cognitive processes, behavioral patterns, and emotional experiences. However, recent research has demonstrated that reciprocal interactions between the body and the brain are critically important for psychological functioning (Damasio, 1999; Siegel, 2012).

According to Damasio (1999), emotions and bodily states are inseparable components of decision-making processes. Similarly, Siegel (2012) argues that the mind should be understood not solely as a product of the brain but as an integrated process shaped through the body and interpersonal relationships.

Research on interoception indicates that the capacity to perceive internal bodily signals is closely associated with emotion regulation, self-awareness, and psychological well-being (Khalsa et al., 2018). Khalsa et al. (2018) identify interoception as a fundamental component of mental health and suggest that disruptions in interoceptive processes are evident across various psychological disorders.

Polyvagal Theory further proposes that mental health cannot be explained exclusively through psychological processes; rather, perceived safety and autonomic nervous system regulation play central roles in psychological functioning (Porges, 2011).

Research on neuroplasticity also demonstrates a fixed characteristic but rather a dynamic and modifiable process.

Within the scope of this study, the concept of neurosomatic mental health is conceptualized as an integrative framework synthesizing somatic psychology (Ogden et al., 2006), the interoceptive approach (Khalsa et al., 2018), Polyvagal Theory (Porges, 2011), the Neurovisceral Integration Model (Thayer & Lane, 2009), and neuroplasticity research.

Accordingly, neurosomatic mental health may be regarded as an integrative paradigm that explains mental health through the reciprocal interactions among the body, brain, and nervous system. The Integrated Neurosomatic Mental Health Model proposed in this study provides the theoretical framework for this paradigm.

3.13.2. Theoretical Foundations of the Integrated Neurosomatic Mental Health Approach

The first theoretical foundation of this approach is the Biopsychosocial Model developed by Engel (1977). This model proposes that health and illness emerge through the interaction of biological, psychological, and social factors.

The second theoretical foundation is Polyvagal Theory (Porges, 2011).

The third theoretical foundation is the interoceptive approach.

The fourth theoretical foundation is the concept of neuroplasticity. According to Davidson and McEwen (2012), experiences and psychological interventions can produce structural and functional changes in the brain.

The fifth theoretical foundation is positive psychology. Positive psychology focuses on individuals' strengths, psychological resources, and capacity for growth and development (Seligman, 2011).

Yoga,

Meditation,

Breathing techniques

primarily enhance body awareness.

Increased body awareness contributes to the development of interoception. Enhanced interoceptive awareness supports nervous system regulation, which in turn promotes greater vagal activation.

Improved nervous system regulation strengthens emotion regulation processes and contributes to the development of psychological resilience.

Ultimately, these processes lead to increased levels of psychological well-being.

The Integrated Neurosomatic Mental Health Model developed in this study was designed to explain these relationships within a unified theoretical framework.

3.13.3. Transition to the Integrated Neurosomatic Mental Health Model

The present study proposes that the shared effects of yoga, meditation, and breathing techniques are mediated through mechanisms including:

Interoception,

Autonomic nervous system regulation,

Vagal activation,

Neuroplasticity,

Emotion regulation,

Psychological resilience.

Accordingly, the Integrated Neurosomatic Mental Health Model, which will be presented in the subsequent sections of this study, aims to

research, Polyvagal Theory, interoception research, and neuroplasticity studies collectively constitute the theoretical foundations of this approach.

3.14. Development of the Somatic Psychology Approach

Somatic psychology is an approach that emphasizes the central role of the body in psychological processes. The fundamental assumption of this perspective is that emotions are not solely mental experiences but are also experienced through bodily processes (Levine, 2010).

According to somatic psychology, stress, anxiety, and traumatic experiences leave traces not only at the cognitive level but also within the muscular system, breathing patterns, and the autonomic nervous system.

Levine (2010) suggests that traumatic experiences may result in incomplete defensive responses within the organism, leading to prolonged physiological activation. Similarly, Ogden, Minton, and Pain (2006) emphasize the importance of body awareness and somatic experiences in trauma treatment.

These contributions have facilitated a more comprehensive understanding of the relationship between the body and psychological functioning.

3.15. Trauma Research and the Body

Research in the field of trauma has played a significant role in the development of the neurosomatic approach. According to van der Kolk (2014), traumatic experiences are not stored solely as verbal memories but may also be encoded as bodily sensations, muscular tension patterns, and nervous system responses.

Individuals who have experienced trauma frequently exhibit:

Hyperarousal,

Freeze responses.

These observations suggest that trauma is not merely a psychological phenomenon but also a somatic process.

Contemporary trauma research highlights the importance of body awareness, nervous system regulation, and interoceptive processes in facilitating recovery and healing.

3.16. Contributions of Polyvagal Theory

Polyvagal Theory constitutes one of the major theoretical foundations of the neurosomatic approach. Rather than explaining mental health solely through cognitive mechanisms, Polyvagal Theory emphasizes the role of nervous system regulation.

This perspective has made substantial contributions to understanding the mechanisms underlying stress, anxiety, and trauma-related symptoms.

3.17. Contributions of Interoception Research

Research on interoception has also made significant contributions to the development of the neurosomatic approach. According to Craig (2009), interoception represents the biological foundation of self-awareness.

Research has demonstrated that interoceptive awareness is closely associated with:

Emotion regulation,

Self-awareness,

Psychological resilience,

Psychological well-being.

Interoception is defined as an individual's capacity to perceive internal bodily signals, including heartbeat, respiration, muscle tension, individuals to recognize their emotional states earlier and manage stress responses more effectively. Individuals with higher levels of interoceptive awareness have been reported to demonstrate stronger emotion regulation abilities and higher levels of psychological well-being.

Practices such as yoga, meditation, and breathing techniques are believed to enhance interoceptive awareness, thereby strengthening both bodily and emotional development. Consequently, interoception is considered one of the core mechanisms of the proposed Integrated Neurosomatic Mental Health Model.

As a result, body awareness is becoming increasingly important within contemporary mental health research.

3.18. Neuroplasticity and Psychological Change

An important component of the neurosomatic approach is the concept of neuroplasticity. Neuroplasticity refers to the brain's capacity to change and reorganize throughout the lifespan (Doidge, 2007). According to Davidson and McEwen (2012), experiences, learning processes, and psychological interventions can produce structural and functional changes in the brain.

Mind–body-based practices such as meditation, yoga, and breathing techniques have been reported to support neural reorganization and strengthen brain networks associated with emotion regulation (Tang, Hölzel, & Posner, 2015). These findings suggest that psychological change occurs not only at the cognitive level but also at the neurobiological level.

3.19. The Relationship Between Trauma, the Body and Interoception

Recent advances in trauma research have demonstrated that traumatic experiences are stored and processed not only at the psychological level but also within the body (van der Kolk,

(Khalsa et al., 2018).

According to Levine (2010), defensive responses that remain incomplete during traumatic experiences may result in accumulated physiological activation within the nervous system. Consequently, trauma recovery involves not only cognitive restructuring but also the restoration of body awareness. Ogden, Minton, and Pain (2006) emphasize the importance of body-oriented approaches in trauma treatment and suggest that rebuilding interoceptive awareness can enhance emotion regulation abilities.

Complex trauma is a multidimensional condition resulting from prolonged and repeated exposure to traumatic experiences. Experiences such as childhood neglect, abuse, and insecure attachment have been reported to exert long-term effects on nervous system development (Walker, 2013). Individuals exposed to complex trauma frequently experience difficulties with emotion regulation, interpersonal relationships, self-worth, and chronic stress.

Continuous exposure to traumatic experiences may cause the autonomic nervous system to remain threat-focused, thereby weakening an individual's sense of safety. Fisher (2017) emphasizes that recovery from trauma requires increasing awareness of bodily sensations, re-establishing a sense of safety, and supporting nervous system regulation.

Therefore, understanding complex trauma requires attention not only to cognitive processes but also to bodily and neurophysiological mechanisms.

3.19.1. Neurobiological Foundations of Trauma

During traumatic events, the organism experiences an intense perception of threat. This process activates a significant stress response through the hypothalamic–pituitary–adrenal

Reduced prefrontal cortex functioning,

Impaired hippocampal functioning,

Dysregulation of the autonomic nervous system

(van der Kolk, 2014).

These alterations may lead individuals to remain in a persistent state of vigilance, experience disruptions in their sense of safety, and interpret environmental stimuli as threatening.

3.19.2. Trauma and the Autonomic Nervous System

Polyvagal Theory provides important insights into the understanding of trauma (Porges, 2011).

According to the theory, when an individual perceives a threat:

The social engagement system becomes deactivated.

The sympathetic nervous system is activated.

Fight-or-flight responses emerge.

If the threat persists, dorsal vagal shutdown (freeze response) may occur.

Individuals who have experienced trauma often struggle to return to a state of physiological safety. As a result, they may remain in prolonged states of hyperarousal or immobilization.

According to Porges (2011), one of the primary goals of trauma treatment is the restoration of nervous system regulation and the re-establishment of a sense of safety.

3.19.3. Trauma and Interoception

Following traumatic experiences, two primary patterns may emerge:

Hypersensitivity to bodily sensations,

Research suggests that restoring interoceptive awareness plays an important role in trauma recovery.

3.19.4. Trauma and Body Memory

According to van der Kolk (2014), traumatic experiences are not stored solely as verbal memories. They may also be encoded as bodily sensations, muscular tension patterns, and autonomic nervous system responses.

This phenomenon is often described through the concept of "body memory."

Even after the traumatic event has ended, the following may persist:

Muscular tension,

Altered breathing patterns,

Changes in heart rhythm,

Bodily defensive responses.

Levine (2010) argues that trauma recovery requires the completion of unfinished defensive responses within safe therapeutic conditions.

3.19.5. Yoga and Trauma

The effects of yoga on trauma recovery have been increasingly investigated in recent years. Van der Kolk et al. (2014) reported that trauma-sensitive yoga interventions may reduce trauma-related symptoms.

Yoga practices have been shown to:

Increase body awareness,

Support feelings of safety,

Enhance interoception,

Strengthen emotion regulation skills.

Lanius, & McKinnon, 2018).

Researchers suggest that mindfulness enables individuals to observe thoughts, emotions, and bodily sensations related to traumatic experiences in a nonjudgmental manner. This process may reduce avoidance behaviors, enhance emotion regulation abilities, and contribute to improvements in certain neurobiological functions associated with post-traumatic stress disorder.

Meditation practices facilitate nonjudgmental observation of experience and may reduce excessive emotional reactivity associated with traumatic memories. However, mindfulness interventions for individuals with trauma histories should ideally be conducted under professional guidance.

3.19.7. Breathing Techniques and Trauma

Irregular breathing patterns are frequently observed among individuals who have experienced trauma.

Research indicates that controlled breathing practices can:

Increase vagal tone,

Improve heart rate variability,

Support autonomic nervous system regulation

(Zaccaro et al., 2018).

Therefore, breathing techniques are considered important tools in trauma recovery processes.

3.19.8. Post-Traumatic Growth

Trauma does not always result exclusively in negative outcomes. Some individuals experience significant psychological growth following traumatic experiences.

According to Tedeschi and Calhoun (2004), post-

Stronger interpersonal relationships,

Increased sense of personal strength,

Development of new life purposes.

Yoga, meditation, and breathing techniques may support post-traumatic growth by enhancing self-awareness and psychological resilience.

3.20. Mind–Body Practices from a Positive Psychology Perspective

The positive psychology perspective defines mental health as the ability to realize one's potential and experience a meaningful life (Seligman, 2011).

According to Fredrickson's (2001) Broaden-and-Build Theory, positive emotions expand individuals' cognitive and behavioral repertoires and contribute to long-term psychological well-being.

Research suggests that mindfulness practices increase positive affect, enhance life satisfaction, and strengthen self-acceptance (Galante et al., 2021). Similarly, yoga has been reported to positively influence purpose in life, personal growth, and psychological well-being (Ross & Thomas, 2010).

From the perspective of Ryff's (1989) model of psychological well-being, mind–body-based practices may support all six dimensions of well-being:

Self-acceptance,

Purpose in life,

Personal growth,

Environmental mastery,

Autonomy,

Positive relationships.

While traditional approaches in mental health focused primarily on reducing psychopathology, the emergence of positive psychology shifted attention toward individual strengths, life satisfaction, and well-being (Seligman, 2011).

Psychological well-being encompasses dimensions such as life satisfaction, self-realization, the ability to establish positive relationships, and the capacity to derive meaning from life experiences (Ryff, 1989).

The positive psychology approach emphasizes not only the reduction of problems but also the realization of individuals' potential. Within this framework, psychological well-being is considered one of the most important indicators of overall quality of life.

4.1.1. Ryff's Model of Psychological Well-Being

One of the most widely recognized models of psychological well-being was developed by Ryff (1989). According to Ryff, psychological well-being consists of six fundamental dimensions:

Self-Acceptance: The ability to accept oneself, including both strengths and weaknesses.

Positive Relations with Others: The capacity to establish trusting, supportive, and healthy interpersonal relationships.

Autonomy: The ability to make independent decisions and act according to one's own values rather than external pressures.

Environmental Mastery: The ability to effectively manage life circumstances and adapt to environmental demands.

Purpose in Life: The capacity to derive meaning from life and establish future-oriented goals.

Personal Growth: The ongoing effort to develop oneself and realize one's potential.

Taken together, these dimensions demonstrate

levels of psychological well-being cope more effectively with stress, develop stronger social relationships, and report greater life satisfaction (Keyes, 2002).

Psychological well-being is also considered a protective factor against mental health problems such as depression, anxiety, and burnout. Individuals with strong psychological well-being are reported to evaluate life events more flexibly and adapt more successfully to challenging circumstances.

Recent studies have further demonstrated that mind–body-based practices, including yoga, meditation, and breathing techniques, may positively influence psychological well-being (Galante et al., 2021).

4.1.3. Psychological Well-Being and Mind–Body-Based Practices

Yoga, meditation, and breathing techniques enhance body awareness, regulate attentional processes, and support emotion regulation abilities.

Research indicates that regular meditation practice may improve dimensions of psychological well-being such as self-awareness, self-acceptance, and purpose in life (Goldberg et al., 2022).

Similarly, yoga has been reported to improve body image, reduce stress levels, and increase life satisfaction. Breathing techniques are believed to support psychological well-being through the activation of the relaxation response.

Therefore, mind–body-based practices are increasingly recognized as important intervention tools for enhancing psychological well-being.

4.2. Psychological Resilience

4.2.1. The Concept of Psychological Resilience

adversity but also the ability to learn, grow, and adapt through challenging experiences.

Today, psychological resilience is widely regarded as one of the most important protective factors supporting mental health.

4.2.2. Core Components of Psychological Resilience

The literature identifies several factors that contribute to resilience, including:

Self-awareness,

Emotion regulation,

Problem-solving skills,

Social support,

Cognitive flexibility,

Hope and optimism

(Southwick et al., 2023).

These factors help individuals cope more effectively with difficult life circumstances.

4.2.3. Psychological Resilience and Stress

Research indicates that individuals with higher resilience tend to exhibit fewer psychological symptoms when confronted with stressful situations.

Resilience contributes to the realistic appraisal of stressors and the development of more adaptive coping strategies. Consequently, resilience is considered an important buffer against the adverse effects of stress.

4.2.4. Psychological Resilience and Anxiety

Psychological resilience has been reported to be negatively associated with anxiety symptoms.

Individuals with higher levels of resilience appear

Yoga is an ancient system of practice with origins dating back approximately five thousand years. It aims to cultivate harmony among the body, mind, and consciousness.

Derived from the Sanskrit word yuj, the term yoga refers to union, integration, and harmony (Feuerstein, 2008). Yoga originated in India and gradually evolved into a multifaceted system encompassing philosophical, spiritual, and practical dimensions.

The Yoga Sutras of Patanjali are considered one of the foundational texts of yoga philosophy. Patanjali (2009) defined yoga as the process of regulating mental fluctuations and achieving integration with one's authentic self. Similarly, Iyengar (2002) described yoga as a path toward self-awareness and inner balance.

In the modern era, yoga is viewed not only as a spiritual practice but also as a holistic intervention utilized to promote physical health, psychological well-being, and stress management.

Over the past two decades, the effects of yoga on mental health have become a major focus of scientific investigation.

5.2. Types of Yoga

Yoga encompasses a wide variety of approaches and practice styles. Although all yoga traditions share common philosophical foundations, they differ considerably in their methods of application.

Hatha Yoga is among the most widely practiced forms of yoga and incorporates physical postures (asanas), breathing exercises (pranayama), and relaxation techniques.

Vinyasa Yoga is a dynamic style emphasizing coordination between movement and breath.

Kundalini Yoga combines breathing techniques, specifically designed to facilitate relaxation and stress reduction.

Within psychological health research, Hatha Yoga and mindfulness-based yoga interventions are among the most extensively studied approaches.

5.3. Yoga and Stress

The effects of yoga on stress have been extensively investigated in recent years. Systematic reviews and meta-analyses indicate that regular yoga practice is associated with significant reductions in perceived stress levels (Khajuria et al., 2024).

Controlled breathing exercises and body-awareness practices performed during yoga activate the relaxation response. This process may reduce sympathetic nervous system activity while enhancing parasympathetic activation.

Research further suggests that yoga can lower cortisol levels and regulate physiological processes associated with stress (Pascoe & Bauer, 2015).

Additionally, yoga appears to enhance self-awareness, attentional control, and emotion regulation skills, all of which contribute to effective stress management.

5.4. Yoga and Anxiety

The effects of yoga on anxiety symptoms have been examined in numerous studies. Meta-analytic findings indicate that yoga may contribute to reductions in mild to moderate anxiety symptoms (Cramer et al., 2018).

The excessive physiological arousal commonly observed in anxiety disorders may be alleviated through yoga practice. In particular, breathing regulation techniques may enhance an individual's sense of control over bodily symptoms.

Yoga also encourages present-moment awareness and may reduce threat-focused thinking patterns

psychological well-being.

Studies indicate that individuals who engage in regular yoga practice may experience improvements in:

Self-acceptance,

Life satisfaction,

Self-awareness,

Psychological resilience,

Emotion regulation skills

(Ross & Thomas, 2010).

Yoga is believed to foster a healthier relationship with oneself and one's body, leading to positive changes across multiple dimensions of psychological well-being.

5.6. Yoga and Neurobiological Mechanisms

In recent years, considerable research has focused on neurobiological mechanisms to explain the effects of yoga practices.

Studies suggest that yoga may be associated with:

Regulation of the autonomic nervous system,

Increased heart rate variability (HRV),

Activation of the vagus nerve,

Reduced cortisol levels,

Support of neuroplasticity processes

(Streeter et al., 2012).

Functional neuroimaging studies indicate that yoga practice may produce changes in brain regions associated with attention, emotion regulation, and self-awareness. In particular, increased prefrontal cortex activity and decreased amygdala activity have been reported.

Overall, the current literature suggests that yoga may exert significant effects not only on physical health but also on psychological and neurobiological processes.

5.7. Expanded Evaluation of Yoga Research

Yoga should not be viewed solely as a system of physical postures. Rather, it is a multidimensional mind–body practice that integrates body awareness, breath regulation, attentional focus, relaxation, and self-observation.

Therefore, the effects of yoga on mental health should be explained through both physiological and psychological mechanisms.

Research indicates that yoga may effectively reduce stress levels. This effect appears to be mediated through regulation of the hypothalamic–pituitary–adrenal (HPA) axis, reductions in cortisol levels, increased parasympathetic nervous system activity, and enhancement of the relaxation response (Streeter et al., 2012; McEwen, 2007).

Additionally, directing attention toward bodily postures and breathing during yoga practice contributes to increased interoceptive awareness.

When examining the relationship between yoga and anxiety, evidence suggests that yoga may alleviate anxiety symptoms by reducing physiological arousal. Symptoms such as muscle tension, rapid breathing, palpitations, and bodily restlessness may be regulated through yoga practice.

These findings indicate that yoga may influence not only the cognitive aspects of anxiety but also its physiological manifestations.

Meta-analytic evidence further suggests that yoga interventions may produce beneficial effects on symptoms of depression, anxiety, and stress (Cramer et al., 2018). However, considerable variation exists among studies with respect to

yoga interventions.

6. MEDITATION AND MINDFULNESS

6.1. Meditation and Stress

The effects of meditation on stress have been examined extensively in the literature. Meta-analytic findings indicate that regular meditation practice can lead to significant reductions in perceived stress levels (Goldberg et al., 2022).

During meditation, individuals direct their attention toward the present moment and disengage from automatic thought processes. This may reduce the intensity of cognitive processes associated with stress.

Research suggests that meditation may be associated with reductions in cortisol levels, regulation of heart rate, and activation of the relaxation response (Pascoe et al., 2023).

Additionally, meditation appears to help individuals evaluate stressful life events in a more adaptive and constructive manner.

6.2. Meditation and Anxiety

Anxiety disorders represent one of the most extensively studied areas within meditation research.

Particularly, mindfulness-based interventions have been reported to produce beneficial effects on generalized anxiety symptoms (Goldberg et al., 2022).

Meditation enables individuals to observe their thoughts rather than perceiving them as threats. This process enhances cognitive flexibility and may weaken maladaptive anxiety cycles.

Research indicates that meditation may serve as a supportive intervention for reducing anxiety symptoms. However, meditation is generally recommended as a complementary approach

Mindfulness-Based Stress Reduction (MBSR) is an eight-week structured intervention program developed by Kabat-Zinn (2003).

The program includes:

Mindfulness meditation,

Body scan practices,

Mindful movement exercises.

Research demonstrates that MBSR can reduce symptoms of stress, anxiety, and depression.

6.3.2. Mindfulness-Based Cognitive Therapy (MBCT)

Mindfulness-Based Cognitive Therapy (MBCT) is a structured intervention that integrates cognitive therapy principles with mindfulness practices (Segal et al., 2013).

MBCT is considered particularly effective in preventing recurrent symptoms of depression and anxiety.

The program aims to help individuals recognize automatic thought patterns and develop a more flexible relationship with their thoughts.

6.4. Meditation and Neurobiological Changes

Recent neuroimaging studies have demonstrated that meditation is associated with structural and functional changes in the brain.

Research suggests that meditation may:

Increase prefrontal cortex activity,

Reduce amygdala activity,

Strengthen attentional networks,

Support neuroplasticity processes

(Tang et al., 2015).

Meditation has been shown not only to reduce psychological symptoms but also to enhance psychological well-being.

Research indicates that regular meditation practice may positively influence:

Self-awareness,

Self-acceptance,

Life satisfaction,

Psychological resilience,

Emotion regulation skills

(Galante et al., 2021).

Meditation may enhance psychological flexibility by helping individuals develop a more conscious relationship with their thoughts and emotions. Consequently, meditation is increasingly regarded not only as a clinical intervention but also as a preventive and health-promoting practice.

In addition, self-compassion refers to the ability to approach oneself with understanding, acceptance, and kindness during difficult life experiences and personal failures.

According to Neff (2011), self-compassion consists of three primary components:

Self-kindness,

Common humanity,

Mindfulness.

Research indicates that individuals with higher levels of self-compassion experience lower levels of stress, anxiety, and depressive symptoms. Self-compassion has also been associated with greater resilience, higher life satisfaction, and enhanced psychological well-being.

Rather than engaging in self-criticism during

6.6. Meditation, Interoception, and Neurosomatic Awareness

Contemporary research suggests that meditation may have significant effects on interoceptive awareness.

During meditation, directing attention toward breathing, heart rhythm, and bodily sensations may contribute to the development of interoceptive awareness.

Enhanced body awareness is believed to support emotion regulation, psychological resilience, and psychological well-being.

6.7. Evaluation of Meditation and Mindfulness

Meditation and mindfulness practices aim to direct attention toward the present moment and encourage nonjudgmental observation of thoughts and emotions.

These practices have demonstrated important effects on stress, anxiety, rumination, emotion regulation, and psychological well-being.

The effects of mindfulness-based interventions on stress are often explained by their ability to reduce automatic thought cycles and promote a more conscious engagement with experience.

Kabat-Zinn (2003) emphasized that mindfulness involves directing attention to the present moment with nonjudgmental awareness. This approach may reduce the tendency to interpret stressful events as threatening and enhance psychological flexibility.

The effects of meditation on anxiety are primarily explained through mechanisms related to threat perception, cognitive fusion, and rumination. Meditation helps individuals observe anxious thoughts rather than accepting them as objective reality.

This process supports cognitive reappraisal and

These findings indicate that meditation provides not only psychological relief but may also contribute to neuroplasticity-related changes in the brain.

7. Breathing Techniques, The Autonomic Nervous System, And Mental Health

7.1. The Psychological and Physiological Importance of Breathing

Breathing is one of the fundamental physiological processes necessary for sustaining life. However, breathing is not merely a biological mechanism that facilitates oxygen intake. Contemporary research indicates that breathing plays a significant role in emotional regulation, stress management, attentional control, and psychological well-being (Brown & Gerbarg, 2005).

The respiratory system is one of the few physiological systems directly connected to the autonomic nervous system. While many physiological processes, such as heart rate, digestion, and hormone secretion, occur involuntarily, breathing can be regulated both voluntarily and involuntarily. This unique characteristic makes breathing techniques valuable tools for managing stress and anxiety (Zaccaro et al., 2018). Research has demonstrated that rapid and shallow breathing increases sympathetic nervous system activity, whereas slow and controlled breathing practices enhance parasympathetic nervous system functioning (Porges, 2011). Consequently, modifying breathing patterns can directly influence both physiological and psychological states.

7.2. The Relationship Between Breathing and the Autonomic Nervous System

The autonomic nervous system (ANS), consisting of the sympathetic and parasympathetic branches, is responsible for regulating involuntary

increases, resulting in elevated heart rate, shallow respiration, and increased muscle tension. Although this response is adaptive during acute threats, prolonged activation may negatively affect mental health. Breathing techniques serve as important regulatory mechanisms in this context. In particular, slow-paced breathing practices have been reported to enhance vagal activity and strengthen parasympathetic functioning (Porges, 2011). As a result, individuals may transition into physiological states associated with safety, relaxation, and recovery.

7.3. Diaphragmatic Breathing and Mental Health

Diaphragmatic breathing is a breathing technique that emphasizes abdominal rather than thoracic respiration. During this practice, the diaphragm is actively engaged, allowing for more efficient utilization of lung capacity.

Research has demonstrated that diaphragmatic breathing may:

Reduce heart rate;

Decrease muscle tension;

Lower cortisol levels; and

Alleviate symptoms of anxiety

(Brown & Gerbarg, 2005).

Furthermore, diaphragmatic breathing promotes present-moment awareness and may reduce mental distraction, thereby supporting attentional regulation and emotional stability.

7.4. Pranayama and Yoga-Based Breathing Techniques

Pranayama refers to controlled breathing practices within the yogic tradition. In Sanskrit, prana denotes life force or vital energy, whereas ayama refers to expansion or regulation.

Common pranayama techniques include:

Kapalabhati; and

Anulom Vilom.

These techniques have been reported to support autonomic nervous system regulation and reduce stress-related symptoms (Streeter et al., 2012). In particular, alternate nostril breathing has been associated with improved attentional functioning and increased mental calmness.

7.5. Resonance Breathing and Heart Rate Variability

One of the most extensively studied breathing techniques in recent years is resonance breathing. During this practice, individuals typically breathe at a rate of approximately five to six breaths per minute. This rhythm promotes optimal synchronization between the cardiovascular and respiratory systems (Shaffer & Ginsberg, 2017).

Research indicates that resonance breathing may:

Increase heart rate variability (HRV);

Enhance vagal tone;

Improve emotion regulation abilities; and

Reduce perceived stress.

For this reason, resonance breathing has become a widely utilized intervention within psychological counseling and stress management programs.

7.6. Effects of Breathing Techniques on Anxiety

Individuals experiencing anxiety disorders frequently report symptoms such as shortness of breath, chest tightness, and rapid breathing. These physiological symptoms often exacerbate anxiety levels, creating a self-perpetuating cycle of distress.

Breathing techniques may help interrupt this cycle by regulating respiratory rhythms. A systematic review conducted by Fincham et al. (2023)

7.7. Neurobiological Mechanisms of Breathing Techniques

The effects of breathing techniques cannot be explained solely through psychological processes.

Research suggests that controlled breathing practices may:

Reduce amygdala activation;

Strengthen prefrontal cortex functioning;

Increase vagus nerve activity; and

Regulate hypothalamic-pituitary-adrenal (HPA) axis activity

(Zaccaro et al., 2018).

Through these mechanisms, perceived threat levels may decrease, while emotion regulation capacities may improve.

7.8. Breathing Techniques and Interoception

Breathing practices play a significant role in the development of interoceptive awareness. As individuals direct attention toward their breath, they become increasingly aware of internal bodily sensations.

This process may contribute to:

Enhanced self-awareness;

Improved emotion regulation abilities; and

Reduced anxiety symptoms.

Accordingly, breathing-based interventions may facilitate stronger connections between bodily awareness and psychological functioning.

7.9. Breathing Techniques and Psychological Well-Being

Research indicates that individuals who regularly engage in breathing practices tend to report

Promote self-awareness; and

Improve life satisfaction

(Brown & Gerbarg, 2005).

Consequently, breathing techniques are increasingly recognized not only as clinical interventions but also as preventive mental health strategies. The literature suggests that controlled breathing practices contribute to autonomic nervous system regulation, increased vagal activity, enhanced interoception, and improved psychological well-being. These findings indicate that breathing techniques may serve both therapeutic and preventive functions in mental health promotion.

7.10. Breathing and Emotion Regulation

Emotion regulation refers to an individual's capacity to identify, evaluate, and manage emotional experiences (Gross, 2015). Recent research has demonstrated that breathing regulation techniques play a significant role in emotion regulation processes. Slow and rhythmic breathing practices have been reported to reduce amygdala activation, support prefrontal cortex functioning, and enhance individuals' ability to manage emotional responses more effectively. Consequently, breathing-based interventions may contribute to greater emotional stability and adaptive coping in stressful situations.

7.11. Breathing Techniques, Interoception, and Neurosomatic Regulation

Breathing practices are important tools that help individuals recognize and interpret bodily sensations. Directing attention toward the breath may:

Enhance interoceptive awareness;

Strengthen the mind–body connection;

Support nervous system regulation; and

regulation. Overall, the current literature suggests that breathing techniques influence not only respiratory functioning but also emotion regulation, psychological well-being, and broader mental health outcomes.

7.12. Findings on Breathing Techniques and Mental Health

Breathing techniques have become one of the most extensively studied mind–body interventions in the fields of stress, anxiety, and psychological well-being. These practices are considered powerful tools capable of influencing psychological functioning (Brown & Gerbarg, 2005). Research indicates that controlled breathing practices may decrease sympathetic nervous system activity while simultaneously enhancing parasympathetic activation (Zaccaro et al., 2018).

In particular, diaphragmatic breathing, pranayama, resonance breathing, and slow-paced breathing techniques have been found effective in reducing stress levels. Diaphragmatic breathing involves directing respiration toward the abdominal region rather than the chest. During this process, the diaphragm is actively engaged, resulting in increased respiratory depth. Studies have shown that diaphragmatic breathing supports physiological relaxation responses and may reduce anxiety symptoms (Brown & Gerbarg, 2005).

Pranayama refers to controlled breathing practices within the yogic tradition. These techniques aim to consciously regulate the rhythm, duration, and depth of respiration. Evidence suggests that pranayama practices exert regulatory effects on the autonomic nervous system and may attenuate stress responses (Streeter et al., 2012).

Among contemporary breathing interventions, resonance breathing has received considerable

of stress.

A systematic review conducted by Fincham et al. (2023) reported that breathing techniques may produce beneficial effects on stress, anxiety, and depressive symptoms. The authors concluded that controlled breathing interventions can yield meaningful psychological benefits even during relatively brief intervention periods.

The psychological effects of breathing techniques are not solely explained by physiological mechanisms. During breathing practices, individuals intentionally direct their attention toward the breath and the present moment. This process may reduce mental distraction, weaken ruminative thinking patterns, and enhance self-awareness (Kabat-Zinn, 2003).

Overall, the available evidence suggests that breathing techniques represent an effective approach for managing stress and anxiety, with their benefits emerging through both physiological and cognitive mechanisms.

7.13. Evaluation of Breathing Techniques

Because breathing can be regulated both voluntarily and involuntarily, it serves as a unique bridge between physiological and psychological processes and therefore occupies an important place in psychological interventions. Diaphragmatic breathing, slow-paced breathing, resonance breathing, and pranayama practices have been shown to reduce sympathetic activation while enhancing parasympathetic functioning. These effects are associated with improved heart rate regulation, decreased muscle tension, and strengthened physiological relaxation responses (Brown & Gerbarg, 2005; Zaccaro et al., 2018).

The effects of breathing techniques on anxiety may be explained primarily through their influence on bodily symptoms. Individuals experiencing anxiety frequently exhibit rapid and shallow breathing patterns. Controlled breathing

Nevertheless, several limitations remain within the current literature. Considerable variation exists among intervention protocols, sample sizes are often limited, and relatively few studies have examined long-term outcomes. Therefore, further large-scale and longitudinal investigations are needed to establish the long-term effectiveness and underlying mechanisms of breathing-based interventions.

8. NEUROBIOLOGICAL MECHANISMS

8.1. Neurobiological Foundations of Stress and Anxiety

Stress and anxiety are complex phenomena that cannot be explained solely through psychological processes. Advances in neuroscience have demonstrated that these experiences emerge from dynamic interactions among the brain, nervous system, endocrine system, and immune system (McEwen, 2007). The stress response begins with the perception of environmental threats and functions as a biological adaptation mechanism designed to promote survival. However, prolonged activation of this system may lead to significant psychological and physiological difficulties (Sapolsky, 2004).

When a stressful stimulus is perceived, the amygdala is activated and sends signals to the hypothalamus. The hypothalamus subsequently initiates the stress response through the autonomic nervous system and the hypothalamic–pituitary–adrenal (HPA) axis (LeDoux, 2012). During this process, hormones such as adrenaline, noradrenaline, and cortisol are released, preparing the organism to respond to potential threats.

While acute stress responses are generally adaptive and protective, chronic activation of these systems may negatively affect mental health. Prolonged exposure to stress has been associated with depression, anxiety disorders, sleep disturbances and impairments in cognitive

neuroendocrine systems responsible for regulating the body's response to stress (Sapolsky, 2004). When stress is perceived, the hypothalamus releases corticotropin-releasing hormone (CRH), which stimulates the pituitary gland to secrete adrenocorticotropic hormone (ACTH). ACTH subsequently triggers the adrenal glands to release cortisol (McEwen, 2007). This process mobilizes energy resources and enables the organism to cope with perceived threats.

Research indicates that chronically elevated cortisol levels are associated with reductions in hippocampal volume, impaired memory performance, and difficulties in emotion regulation (Sapolsky, 2004). In contrast, yoga, meditation, and breathing techniques have been reported to contribute to reductions in cortisol levels (Streeter et al., 2012).

8.3. The Amygdala and Threat Perception

The amygdala is one of the primary brain structures involved in fear processing, threat perception, and emotion regulation (LeDoux, 2012). Increased amygdala activity has been consistently observed in individuals with anxiety disorders, leading them to perceive environmental stimuli as more threatening than they objectively are.

Neuroimaging studies investigating meditation practices have demonstrated reduced amygdala activation among individuals who engage in regular meditation (Hölzel et al., 2011; Tang et al., 2015). This reduction may contribute to more balanced emotional responses and improved coping with stressful situations.

8.4. The Hippocampus and Memory Processes

The hippocampus is a critical brain region involved in learning and memory processes. Chronic stress and prolonged exposure to elevated cortisol levels have been shown to exert detrimental effects on hippocampal functioning

remodeling and adaptive neuroplastic changes within the brain.

8.5. The Prefrontal Cortex and Emotion Regulation

The prefrontal cortex is responsible for executive functions such as attentional control, planning, decision-making, and emotion regulation (Davidson & McEwen, 2012). In healthy individuals, the prefrontal cortex contributes to emotional balance by regulating amygdala activity.

Research has demonstrated that meditation practices may strengthen prefrontal cortex functioning and improve attentional capacities (Tang et al., 2015). Enhanced prefrontal functioning may enable individuals to respond to stressful events in a more adaptive and controlled manner.

8.6. Findings on the Autonomic Nervous System and Heart Rate Variability

The autonomic nervous system (ANS), consisting of the sympathetic and parasympathetic branches, regulates involuntary physiological functions such as heart rate, respiration, digestion, and hormonal responses (Porges, 2011).

During periods of stress and anxiety, sympathetic nervous system activity increases, preparing the body for a fight-or-flight response. This process is accompanied by elevated heart rate, increased muscle tension, and heightened cortisol secretion (McEwen, 2007). When chronic, however, these physiological changes may negatively affect mental health.

According to Polyvagal Theory, the vagus nerve plays a central role not only in physiological regulation but also in feelings of safety, social engagement, and emotion regulation (Porges, 2011). Effective vagal functioning contributes to greater adaptability in response to stressful

consecutive heartbeats. Higher HRV levels are associated with stronger parasympathetic activity, greater psychological resilience, and more effective emotion regulation abilities (Shaffer & Ginsberg, 2017).

The Neurovisceral Integration Model proposed by Thayer and Lane (2009) suggests that HRV reflects not only cardiovascular functioning but also cognitive and emotional regulatory capacities. According to this model, higher HRV levels indicate stronger self-regulatory abilities.

A substantial body of research investigating yoga, meditation, and breathing techniques has shown that these practices may positively influence HRV. Streeter et al. (2012) reported that yoga practices enhance parasympathetic nervous system activity and support autonomic balance. Similarly, meditation practices have been associated with increased vagal tone and improvements in physiological indicators of stress (Tang et al., 2015).

Collectively, these findings suggest that mind–body interventions influence not only psychological symptoms but also the biological mechanisms underlying stress. The literature therefore indicates that yoga, meditation, and breathing techniques support autonomic nervous system regulation, improve HRV, and contribute to reductions in stress and anxiety symptoms.

8.7. Cortisol and the Stress Response

Cortisol is commonly referred to as the body's primary stress hormone and plays a crucial role in adaptation to stressful circumstances. Although cortisol secretion may be beneficial during acute stress, chronically elevated cortisol levels can lead to various adverse outcomes.

These outcomes include:

Suppression of immune system functioning;

(Sapolsky, 2004).

Research has shown that yoga, meditation, and breathing techniques may contribute to reductions in cortisol levels, thereby supporting both physiological and psychological well-being.

8.8. The Relationship Between Trauma, the Body, and Interoception

A detailed discussion of the relationship between trauma, the body, and interoception is presented in Section 3.9 of this dissertation. Within the context of the present chapter, it is important to note that traumatic experiences may alter bodily awareness, autonomic nervous system functioning, and the perception of internal bodily signals, thereby influencing emotional and psychological well-being.

8.9. Neuroplasticity

For many years, the adult brain was believed to possess only limited capacity for change. However, contemporary research has demonstrated that the brain retains the ability to adapt and reorganize throughout the lifespan.

Meditation, yoga, and breathing practices have been reported to:

Promote the formation of new synaptic connections;

Strengthen attentional networks; and

Support emotion regulation processes

(Davidson & McEwen, 2012).

Consequently, neuroplasticity is considered one of the primary mechanisms through which mind–body interventions exert their beneficial effects on mental health and psychological functioning.

8.10. Default Mode Network (DMN)

The Default Mode Network (DMN) consists of a

Reflection on past experiences,

Future-oriented planning, and

Ruminative thought patterns.

Research suggests that excessive DMN activity may be associated with symptoms of anxiety and depression (Brewer et al., 2011). Meditation practices have been reported to modulate DMN activity and reduce ruminative thinking processes, thereby contributing to improved psychological well-being and emotional regulation.

8.11. Interoception

In recent years, interoception has become a central focus of research on stress, anxiety, and emotion regulation. Interoception refers to the ability to perceive, interpret, and respond to internal bodily signals.

Research indicates that higher levels of interoceptive awareness are associated with more effective emotion regulation abilities, improved self-awareness, and enhanced psychological resilience. Consequently, interoception is considered one of the key mechanisms through which mind–body interventions may influence mental health outcomes.

8.12. Embodied Cognition

According to the embodied cognition perspective, cognitive processes such as thinking, perception, decision-making, and problem-solving do not occur solely within the brain but emerge through continuous interactions among the body, the brain, and the surrounding environment (Shapiro, 2019).

This perspective provides an important theoretical framework for understanding the effects of yoga, meditation, and breathing practices. Changes in bodily awareness may influence cognitive processes, emotional experiences, and behavioral interaction between the brain and the autonomic nervous system (Thayer & Lane, 2009).

The model emphasizes the interconnected functioning of:

The prefrontal cortex,

The amygdala,

The hypothalamus, and

The autonomic nervous system.

According to this model, higher levels of Heart Rate Variability (HRV) are associated with more effective emotion regulation, greater psychological resilience, and stronger self-regulatory capacities. The model therefore provides a valuable explanatory framework for understanding the physiological mechanisms underlying mental health and adaptive functioning.

8.14. Brain–Body Interaction and the Integrated Neurosomatic Approach

Continuous interactions exist among the brain, nervous system, endocrine system, and bodily experiences. The shared effects of yoga, meditation, and breathing techniques are thought to emerge through several interconnected mechanisms, including:

Enhanced interoceptive awareness,

Improved autonomic nervous system regulation,

Strengthened emotion regulation abilities, and

Increased psychological resilience.

Within this context, the Integrated Neurosomatic Mental Health Model proposed in this dissertation brings these mechanisms together within a single explanatory framework.

Overall, contemporary neuroscience literature highlights the importance of integrative

9. Applicability of the Integrated Neurosomatic Mental Health Model in Mental Health Services in Türkiye

The Integrated Neurosomatic Mental Health Model developed in this study provides not only a theoretical explanatory framework but also a practical approach that may be implemented within mental health services. The fundamental assumption of the model is that mental health should be evaluated not solely through cognitive processes but through the interaction of body awareness, interoception, autonomic nervous system regulation, and neurocognitive functioning.

Today, some of the most common mental health concerns in Türkiye include stress, anxiety, depression, burnout syndrome, and post-traumatic symptoms. The World Health Organization (WHO, 2022) has emphasized the global increase in mental health challenges and the growing importance of preventive mental health interventions. Similarly, elevated levels of stress and anxiety have been observed among young adults, university students, healthcare professionals, and corporate employees in Türkiye.

Within this context, the proposed model may be applicable across a variety of settings and populations.

Use in Psychological Counseling Services

Many difficulties encountered in counseling settings are not solely related to cognitive content. Individuals experiencing anxiety disorders, performance anxiety, social anxiety, and chronic stress frequently report significant bodily symptoms (American Psychiatric Association, 2022).

The Integrated Neurosomatic Mental Health Model recommends evaluating not only clients' thoughts but also their bodily experiences.

Interoceptive awareness exercises,

Emotion regulation skills training, and

Mindfulness-based interventions.

Such practices may support regulation at both cognitive and physiological levels.

Use in Psychotherapy

In recent years, trauma-focused therapeutic approaches have increasingly emphasized the role of the body in psychological healing. Van der Kolk (2014) argues that traumatic experiences are stored not only cognitively but also somatically.

Accordingly, the proposed model may be particularly applicable in addressing:

Post-traumatic stress disorder (PTSD),

Generalized anxiety disorder,

Panic disorder,

Somatic symptom disorders, and

Difficulties in emotion regulation.

Within this framework, interventions aim to enhance body awareness, facilitate nervous system regulation, and strengthen interoceptive safety and trust.

Use in University Counseling Centers

Stress, examination anxiety, and concerns about the future are highly prevalent among university students in Türkiye. Previous research has demonstrated that mindfulness-based interventions may reduce students' stress levels (Demir, 2017; Önder, 2018).

Programs implemented within university counseling centers may include:

Mindfulness training,

Yoga-based stress management programs

These interventions may contribute not only to students' academic performance but also to their overall psychological well-being.

Use with Healthcare Professionals

Healthcare professionals are frequently exposed to high workloads, emotional exhaustion, and chronic stress. The need for mental health support programs has become even more evident following the COVID-19 pandemic.

Research suggests that mindfulness and yoga interventions may reduce burnout symptoms among healthcare workers (Galante et al., 2021). Programs developed within the framework of the Integrated Neurosomatic Mental Health Model may include:

Pre-shift breathing exercises,

Mindfulness practices,

Emotion regulation training, and

Psychological resilience programs.

Use in Corporate and Organizational Settings

Stress, performance pressure, and burnout have become significant concerns in modern workplaces. Chronic stress has been shown to negatively affect both job performance and quality of life (Seligman, 2011).

The Integrated Neurosomatic Mental Health Model may be incorporated into workplace well-being programs through:

Breathing awareness practices,

Mindfulness breaks,

Emotion regulation training, and

Psychological resilience development programs.

Such interventions may reduce stress levels while simultaneously enhancing organizational

Areas of application include:

Developing self-confidence, self-esteem, and self-compassion,

Addressing visibility anxiety,

Performance enhancement,

Leadership development, and

Goal-setting processes.

Within these contexts, attention is directed not only toward cognitive goals but also toward nervous system regulation and bodily awareness. This approach may facilitate more sustainable and long-lasting personal change.

Contribution to Mental Health Policies

Preventive mental health services have become increasingly important worldwide. The proposed model may provide a theoretical foundation for community-based psychoeducational programs implemented in:

Schools,

Universities,

Municipalities,

Community mental health centers, and

Workplace well-being programs.

Methodology

10.1. Research Design

This study is a qualitative investigation aimed at systematically evaluating scientific research examining the effects of yoga, meditation, and breathing techniques on stress and anxiety. The study was conducted within the framework of a theoretical model development approach based on a systematic literature review.

objective of the present study was not only to summarize the existing literature but also to synthesize the findings and develop an Integrated Neurosomatic Mental Health Model.

In this respect, the study differs from traditional narrative reviews and may be characterized as a theory-building study grounded in a systematic review methodology.

10.2. Literature Search Process

A comprehensive literature search was conducted across national and international databases.

The following databases were utilized:

PubMed

Scopus

Web of Science

PsycINFO

Google Scholar

TR Dizin

DergiPark

The following keywords were used in various combinations during the search process.

Keywords

Yoga

Meditation

Mindfulness

Breathing Techniques

Breathwork

Anxiety

Stress

Vagus Nerve

The search process was conducted systematically, and all identified studies were evaluated according to predetermined eligibility criteria.

10.3. Inclusion Criteria

Studies were included in the review if they met the following criteria:

Published in peer-reviewed scientific journals.

Full-text access was available.

Published in either Turkish or English.

Investigated yoga, meditation, or breathing techniques.

Examined variables related to stress, anxiety, psychological well-being, or psychological resilience.

Conducted with human participants.

10.4. Exclusion Criteria

Studies meeting any of the following criteria were excluded:

Publications without accessible full texts.

Conference abstracts.

Letters to the editor.

Book reviews.

Duplicate publications.

Publications presenting only theoretical perspectives without empirical data.

Studies not directly related to the research topic.

10.5. Data Sources

The data used in this study were obtained directly from the scientific literature.

CSG • VERIFIED • CSG • SECURE • CSG • VERIFIED

Research design

Sample characteristics

Type of intervention

Measurement instruments

Main findings

Conclusions

The collected information was systematically recorded and comparatively analyzed.

10.6. Data Analysis

A thematic content analysis approach was employed in the study.

The findings of the reviewed studies were classified under common thematic categories. The following themes were identified:

Yoga and stress

Yoga and anxiety

Meditation and stress

Meditation and anxiety

Breathing techniques and mental health

Interoception

Autonomic nervous system regulation

Heart rate variability

Psychological resilience

Psychological well-being

Subsequently, the relationships among these themes were evaluated, leading to the development of the Integrated Neurosomatic Mental Health Model.

10.7. Validity and Reliability

Databases were explicitly specified.

Search keywords were reported.

The search process was conducted systematically.

Findings were compared with the existing literature.

These procedures were considered to strengthen the scientific reliability of the study.

10.8. Limitations of the Study

Several limitations should be acknowledged.

First, the study is based on a systematic literature review. Therefore, the findings are limited by the methodological characteristics of the studies included in the review.

Second, only studies published in Turkish and English were considered.

Third, the Integrated Neurosomatic Mental Health Model proposed in this study is a theoretical model and has not yet been empirically tested.

Accordingly, future research should evaluate the model across different populations and research settings.

10.9. Ethical Considerations

Since this study did not involve human participants, ethical approval was not required.

Throughout the research process, principles of scientific integrity were maintained, and all sources were appropriately cited.

Academic ethical standards were observed, and every effort was made to prevent plagiarism.

10.10. PRISMA Process

This study was conducted in accordance with the

The identified studies were processed through the following stages:

Identification

Screening

Eligibility Assessment

Inclusion

10.11. PRISMA Flow Diagram

The study selection process is presented in. TABLE-2

The PRISMA flow diagram illustrates the identification, screening, eligibility assessment, and inclusion stages of the reviewed studies. It provides a transparent overview of the literature search process and the rationale for the inclusion and exclusion of studies throughout the review.

10.12. Theoretical Model Development Process

In the final stage of this study, the findings obtained through the systematic review were evaluated in an integrated and comprehensive manner. The relationships among interoception, autonomic nervous system regulation, neurocognitive restructuring, emotion regulation, and psychological resilience were examined.

As a result of this synthesis process, the Integrated Neurosomatic Mental Health Model was developed to explain the effects of yoga, meditation, and breathing techniques on mental health.

The proposed model provides an explanatory theoretical framework that integrates mechanisms that have often been examined separately and fragmented throughout the existing literature. By bringing together neurobiological, physiological, cognitive, and psychological processes within a single conceptual structure, the model offers a more comprehensive understanding of the pathways through which mind–body

The Integrated Neurosomatic Mental Health Model developed in this study combines the complementary and overlapping aspects of existing approaches that explain the effects of yoga, meditation, and breathing techniques on mental health. While many models presented in the literature focus on a specific mechanism or intervention method, the proposed model conceptualizes mental health within the framework of multidimensional interactions among the body, brain, and nervous system.

For example, Mindfulness-Based Stress Reduction (MBSR) programs primarily focus on mindfulness, attentional regulation, and stress management processes (Kabat-Zinn, 2003). Similarly, Acceptance and Commitment Therapy (ACT) emphasizes psychological flexibility and values-based living (Hayes et al., 2016), yet it does not provide a detailed explanation of the underlying neurophysiological mechanisms.

Likewise, Polyvagal Theory offers a valuable framework for understanding the role of the autonomic nervous system in emotional and social functioning; however, it does not directly provide an integrated intervention model explaining the combined effects of yoga, meditation, and breathing techniques. According to Polyvagal Theory, when individuals experience a sense of safety, they become more open to social engagement, demonstrate enhanced emotion regulation abilities, and exhibit greater psychological resilience.

In contrast, persistent threat perception may cause the nervous system to operate in a defensive mode, thereby increasing stress responses. The experience of safety supports social engagement behaviors, enhances the quality of interpersonal relationships, and promotes psychological well-being.

Mind–body-based practices such as yoga, meditation, and breathing techniques are believed

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these theoretical approaches by examining interoception, nervous system regulation, vagal activation, neuroplasticity, and emotion regulation processes within a unified conceptual framework. In this respect, the model approaches mental health not only from the perspective of symptom reduction but also from the perspective of enhancing psychological resilience and psychological well-being.

TABLE-3

When the table is examined, it becomes evident that the proposed model is not based on a single theoretical perspective. Rather, it integrates multiple theoretical frameworks commonly used to explain mental health within a unified system. This integration enables the model to provide a comprehensive framework that may be utilized in both theoretical and applied mental health settings.

10.14. Contribution to the Literature

The proposed model is considered to make three primary contributions to the literature:

Conceptual Contribution: It provides an integrated framework explaining the common mechanisms through which yoga, meditation, and breathing techniques influence mental health.

Theoretical Contribution: It integrates interoception, Polyvagal Theory, and neuroplasticity within a single conceptual model.

Practical Contribution: It offers a framework that may be applied in psychological counseling, psychotherapy, coaching, educational settings, and preventive mental health interventions.

Through these contributions, the Integrated Neurosomatic Mental Health Model may be regarded as an original contribution to the literature by providing a comprehensive explanation of the mechanisms through which mind–body-based interventions influence mental

and Stress

A substantial body of research has examined the effects of yoga on stress. Overall, findings indicate that yoga practices may reduce perceived stress levels, support psychological well-being, and improve physiological indicators of stress (Ross & Thomas, 2010; Streeter et al., 2012).

Stress is a natural adaptive response that enables the organism to respond to environmental demands. However, when stress becomes chronic, it may negatively affect both psychological and physical health. According to McEwen (2007), chronic stress results in prolonged activation of the hypothalamic–pituitary–adrenal (HPA) axis and elevated cortisol levels. Increased cortisol has been associated with anxiety, depression, sleep disturbances, and impairments in cognitive functioning.

One of the primary mechanisms through which yoga may influence stress involves regulation of the HPA axis. Streeter et al. (2012) reported that yoga supports autonomic nervous system regulation and exerts positive effects on neuroendocrine mechanisms involved in the stress response. Regular yoga practice has been associated with reductions in cortisol levels and enhancement of the relaxation response.

Meta-analytic studies have produced similar findings. Pascoe and Bauer (2015) reported that yoga is effective in reducing perceived stress and improving psychological well-being. Likewise, Cramer et al. (2018) suggested that yoga may be considered a valuable complementary intervention for stress management.

Yoga is also believed to influence cognitive processes. During yoga practice, individuals direct their attention toward breathing, bodily postures, and present-moment experiences. This process may reduce rumination, strengthen attentional control, and promote greater psychological flexibility when responding to stressful situations

body awareness, and changes in cognitive processes.

11.2. Findings on the Relationship Between Yoga and Anxiety

The effects of yoga on anxiety symptoms have also been extensively investigated. Research findings indicate that yoga may reduce anxiety symptoms in both clinical and non-clinical populations (Shohani et al., 2018).

Individuals experiencing anxiety disorders commonly report physical tension, heart palpitations, shortness of breath, and excessive worry. These symptoms are associated with heightened autonomic nervous system activity. Yoga may contribute to reductions in physiological arousal by enhancing breath awareness and supporting parasympathetic nervous system activation (Porges, 2011).

Research further suggests that yoga may positively influence the functional relationship between the amygdala and the prefrontal cortex. According to LeDoux (2012), the amygdala plays a central role in threat perception and fear responses. Meditation and yoga practices have been reported to reduce amygdala activity, thereby contributing to lower levels of anxiety (Hölzel et al., 2011).

Studies conducted among university students have demonstrated that yoga can reduce examination anxiety and performance-related anxiety. Similarly, research involving healthcare professionals and individuals experiencing chronic stress has reported significant improvements in anxiety symptoms following yoga interventions (Shohani et al., 2018).

Another mechanism through which yoga may influence anxiety is interoception. According to Khalsa et al. (2018), increased body awareness enables individuals to interpret bodily sensations more accurately and evaluate anxiety-related physiological symptoms in a more adaptive

emotion regulation processes.

11.3. Findings on the Relationship Between Meditation and Stress

The effects of meditation on stress have become one of the most extensively investigated topics in mental health research over the past three decades. In particular, studies examining Mindfulness-Based Stress Reduction (MBSR) programs have demonstrated that meditation can reduce individuals' perceived stress levels.

During meditation practice, individuals direct their attention to the present moment and learn to observe their thoughts without judgment. This process may reduce the impact of cognitive mechanisms that contribute to stress.

Research indicates that meditation enhances attentional control, reduces ruminative thinking patterns, and increases psychological flexibility. Significant improvements in perceived stress levels have been reported among individuals experiencing chronic stress.

Neuroscientific studies further suggest that meditation may produce structural and functional changes in brain regions associated with stress regulation. Regular meditators have demonstrated reduced amygdala activity, increased prefrontal cortex activation, and strengthened attentional networks. These findings indicate that meditation exerts effects not only at the psychological level but also at the neurobiological level.

11.4. Findings on the Relationship Between Meditation and Anxiety

The effects of meditation on anxiety symptoms have been evaluated in numerous systematic reviews and meta-analyses. Overall, findings indicate that meditation can lead to significant reductions in anxiety levels.

Individuals with anxiety disorders often develop

Functional magnetic resonance imaging (fMRI) studies have shown that meditation can reduce amygdala activity while strengthening the functioning of brain regions associated with emotional regulation. These findings are considered among the key neurobiological mechanisms underlying the effects of meditation on anxiety.

11.5. Findings on Breathing Techniques and Mental Health

Breathing techniques have become increasingly prominent within mental health research in recent years. Diaphragmatic breathing, pranayama, resonance breathing, and controlled slow-breathing techniques are widely recognized as effective approaches for managing stress and anxiety while simultaneously directing attention toward the present moment.

11.6. Findings on the Autonomic Nervous System and Heart Rate Variability

The autonomic nervous system (ANS) is one of the primary systems responsible for regulating involuntary physiological functions. It consists of two major components: the sympathetic and parasympathetic nervous systems.

While the sympathetic nervous system activates the fight-or-flight response, the parasympathetic nervous system supports rest, recovery, and energy conservation processes. Stress and anxiety are associated with increased sympathetic activity and reduced parasympathetic activity. Consequently, autonomic nervous system regulation is considered an important indicator of mental health.

Heart Rate Variability (HRV) is one of the most widely used biological markers for assessing autonomic nervous system functioning. As discussed previously, higher HRV levels are associated with stronger vagal tone, more effective

hunger, thirst, muscle tension, and visceral sensations are processed through the interoceptive system. Recent research indicates that interoception is closely related not only to physiological functioning but also to emotion regulation, self-awareness, and mental health.

Individuals frequently recognize their emotional states through bodily signals. Changes in heart rate, breathing patterns, and muscle tension are often regarded as important indicators of emotional experiences.

Yoga, meditation, and breathing techniques are among the practices that enhance interoceptive awareness (Mehling et al., 2012). In yoga practice, individuals direct attention toward their breath, body postures, and internal sensations. This process promotes body awareness and improves the interpretation of physiological signals.

Research suggests that enhanced interoceptive awareness improves emotion regulation abilities. Individuals become better able to detect stress-related signals early and apply regulatory strategies before symptoms intensify (Khalsa et al., 2018).

This process is particularly relevant to anxiety disorders, as anxious individuals often interpret bodily sensations as threatening, thereby increasing anxiety levels.

Mindfulness practices have also been reported to enhance interoceptive awareness and foster a more open and accepting attitude toward bodily experiences (Kabat-Zinn, 2003). Consequently, interoception is considered one of the primary mechanisms through which mind–body-based practices influence mental health.

Overall, the literature suggests that yoga, meditation, and breathing techniques enhance interoceptive awareness, thereby improving self-awareness, emotion regulation abilities, and psychological adjustment.

Contemporary perspectives regard resilience not merely as a personality trait but as a skill that can be developed. Research indicates that yoga, meditation, and breathing techniques may enhance psychological resilience by increasing self-awareness and promoting more flexible responses to stressful situations (Davidson & McEwen, 2012).

The effects of meditation on resilience have received particular attention. Mindfulness-based interventions have been reported to help individuals develop more adaptive coping strategies when confronted with stressful life events (Galante et al., 2021). These interventions may reduce maladaptive thought patterns and strengthen psychological flexibility.

Yoga has likewise been shown to support resilience. Individuals who engage in regular yoga practice report higher levels of self-efficacy, stronger coping abilities, and greater life satisfaction (Ross & Thomas, 2010).

The effects of breathing techniques on resilience are largely explained through autonomic nervous system regulation. Stronger vagal tone and higher HRV levels are associated with more adaptive responses to stressful situations (Shaffer & Ginsberg, 2017).

Overall, the literature suggests that mind–body-based practices enhance psychological resilience and help individuals remain adaptive and effective when facing life's challenges.

11.9. Findings on Psychological Well-Being

Psychological well-being refers not only to the absence of psychological distress but also to the ability to derive meaning from life, realize one's potential, and experience life satisfaction (Ryff, 1989).

Positive psychology emphasizes psychological

Purpose in life,

Environmental mastery,

Autonomy,

Personal growth,

Positive relationships.

The literature suggests that yoga, meditation, and breathing techniques positively influence many of these dimensions.

Mindfulness practices have been shown to increase self-awareness and foster greater self-acceptance (Kabat-Zinn, 2003). Similarly, yoga has been associated with enhanced body awareness and self-acceptance (Ross & Thomas, 2010).

Galante et al. (2021) demonstrated through meta-analysis that mindfulness-based programs significantly improve life satisfaction, positive affect, and psychological well-being. Meditation has also been reported to support a greater sense of purpose in life and personal growth.

From the perspective of Seligman's (2011) PERMA model, yoga and mindfulness practices appear to support Positive Emotion, Engagement, Relationships, Meaning, and Accomplishment.

Overall, the literature suggests that yoga, meditation, and breathing techniques not only reduce symptoms of stress and anxiety but also strengthen psychological well-being.

11.10. Findings from Studies Conducted in Türkiye

Scientific research on yoga, meditation, and mindfulness practices has increased substantially in Türkiye in recent years. Studies involving university students, healthcare professionals, teachers, and adult populations have examined the effects of these practices on stress, anxiety, and psychological well-being.

lower stress levels (Önder, 2018).

Demir (2017) found that an eight-week mindfulness-based intervention significantly reduced stress among university students. The study suggested that mindfulness enhances attentional control and promotes more adaptive coping strategies.

Although yoga-related studies remain less common than mindfulness research in Türkiye, existing findings are promising. Canbay and Yaşar (2025) reported significant reductions in perceived stress and anxiety among midwifery students participating in yoga and meditation interventions. The authors concluded that these practices support psychological adjustment processes.

Research conducted in Türkiye has also increasingly focused on psychological well-being. Studies involving healthcare professionals have shown that mindfulness-based programs may reduce burnout symptoms and enhance psychological resilience, particularly in the post-pandemic period.

Overall, findings from Türkiye suggest that yoga, meditation, and mindfulness practices may:

Reduce perceived stress,

Alleviate anxiety symptoms,

Improve emotion regulation abilities,

Enhance psychological resilience,

Increase psychological well-being.

However, limitations include relatively small sample sizes, a lack of long-term follow-up studies, and limited examination of biological markers. Future experimental and longitudinal studies may therefore make important contributions to the literature.

common mechanisms. The findings were synthesized into seven major themes.

Theme 1: Neurosomatic Awareness

One of the shared characteristics of yoga, meditation, and breathing techniques is their capacity to increase awareness of the body. Regular practice enables individuals to perceive bodily sensations more consciously and recognize stress-related signals at an earlier stage (Khalsa et al., 2018).

Theme 2: Strengthening of Interoception

The reviewed studies indicate that mind–body-based practices enhance interoceptive awareness. Individuals become more capable of accurately interpreting internal signals such as breathing rhythms, heartbeats, and bodily sensations.

Theme 3: Autonomic Nervous System Regulation

Research suggests that yoga, meditation, and breathing techniques exert regulatory effects on the autonomic nervous system. In particular, increased vagal activation and enhanced parasympathetic functioning contribute to reductions in stress responses (Porges, 2011).

Theme 4: Neurocognitive Restructuring

Meditation and mindfulness practices have been shown to improve attentional control, reduce rumination, and increase cognitive flexibility (Tang et al., 2015). These processes allow individuals to evaluate stressful situations more adaptively.

Theme 5: Emotion Regulation

Yoga, meditation, and breathing techniques facilitate greater awareness and management of emotional experiences. Reduced amygdala activation and enhanced prefrontal cortex functioning appear to support emotion regulation processes (Hölzel et al., 2011).

(Southwick et al., 2023).

Theme 7: Psychological Well-Being

The literature suggests that yoga, meditation, and breathing techniques support dimensions of psychological well-being, including life satisfaction, self-acceptance, purpose in life, and personal growth (Ryff, 1989; Seligman, 2011).

Taken together, these seven themes indicate that the effects of yoga, meditation, and breathing techniques extend beyond symptom reduction. These practices appear to influence body awareness, nervous system regulation, cognitive functioning, and psychological resilience, thereby facilitating multidimensional change.

Based on these findings, the Integrated Neurosomatic Mental Health Model may be proposed as a comprehensive framework for explaining the effects of yoga, meditation, and breathing techniques on mental health.

11.12. Meta-Analytic Findings and Comparative Evaluation of Studies

The current literature contains numerous systematic reviews and meta-analyses examining the effects of yoga, meditation, and breathing techniques on stress and anxiety. Overall, these studies suggest that mind–body-based interventions may produce beneficial effects on stress, anxiety, depressive symptoms, psychological well-being, emotion regulation, and psychological resilience.

Meta-analyses investigating yoga have reported that regular yoga practice may reduce perceived stress and anxiety levels. Cramer et al. (2018) concluded that yoga interventions have positive effects on stress and anxiety symptoms. Similarly, Ross and Thomas (2010) emphasized that yoga supports not only physical health but also mental health outcomes.

reduce psychological symptoms and promote psychological well-being.

Research on breathing techniques indicates that controlled breathing, slow-paced breathing, diaphragmatic breathing, and pranayama practices exert regulatory effects on the autonomic nervous system. Zaccaro et al. (2018) reported that slow-breathing practices may enhance vagal activity and reduce stress responses. Similarly, Fincham et al. (2023) found that breathing interventions may provide psychological benefits even when implemented as short-term interventions.

Comparative evaluation of these studies suggests that yoga primarily exerts its effects through enhanced body awareness, improved flexibility, reduced muscular tension, and regulated breathing patterns. Meditation and mindfulness practices, in contrast, appear to operate mainly through attentional control, reduced rumination, increased cognitive flexibility, and improved emotion regulation. Breathing techniques are particularly notable for their direct effects on autonomic nervous system functioning, vagal tone, and heart rate variability.

These findings indicate that although yoga, meditation, and breathing techniques represent distinct practices, they may support mental health through shared neurosomatic mechanisms. Consequently, the integration of these approaches provides a strong theoretical foundation for the proposed Integrated Neurosomatic Mental Health Model.

Literature Review

This section should be reviewed during editorial preparation. If the original manuscript does not provide this section separately, the editorial office should decide whether the existing article content already covers it or whether author-approved

preparation. If the original manuscript does not provide this section separately, the editorial office should decide whether the existing article content already covers it or whether author-approved expansion is required.

Findings

This section should be reviewed during editorial preparation. If the original manuscript does not provide this section separately, the editorial office should decide whether the existing article content already covers it or whether author-approved expansion is required.

Argument

12.1. General Evaluation of the Findings

This study systematically reviewed the literature concerning the effects of yoga, meditation, and breathing techniques on stress and anxiety. The findings indicate that these interventions possess substantial potential for supporting mental health.

Collectively, the reviewed studies demonstrate that yoga, meditation, and breathing techniques not only reduce psychological symptoms but also enhance psychological well-being, self-awareness, and psychological resilience.

The literature suggests that mind–body-based interventions influence stress and anxiety through multiple interconnected mechanisms. Therefore, these practices should be viewed not only as symptom-reduction strategies but also as interventions that promote mental health and psychological growth.

When all reviewed studies are considered together, it becomes apparent that the effects of yoga, meditation, and breathing techniques

Interoception,

Autonomic nervous system regulation,

Neuroplasticity,

Emotion regulation,

Psychological resilience,

Psychological well-being.

Accordingly, mind–body-based interventions may be regarded as multidimensional approaches that support holistic well-being rather than merely reducing symptoms. These findings constitute the theoretical foundation of the Integrated Neurosomatic Mental Health Model proposed in this study.

12.2. Discussion of Findings Related to Yoga

The studies reviewed within this research indicate that yoga may reduce symptoms of stress and anxiety. These findings are consistent with previous systematic reviews and meta-analyses.

The capacity of yoga to enhance body awareness, incorporate controlled breathing techniques, and regulate attentional processes appears to represent key mechanisms underlying its effectiveness in stress management.

The effects of yoga cannot be explained solely through physical exercise. Research suggests that yoga may also influence emotion regulation, self-awareness, and interoceptive awareness.

Therefore, yoga should be conceptualized as a multidimensional intervention that promotes body–mind integration.

12.3. Discussion of Findings Related to Meditation

Findings concerning meditation indicate reductions in anxiety symptoms and ruminative thinking processes.

The effects of meditation are largely explained

This approach may reduce the intensity of threat-focused cognitive processes and increase psychological flexibility.

The literature suggests that meditation is particularly effective in influencing cognitive processes associated with stress.

12.4. Discussion of Findings Related to Breathing Techniques

The studies reviewed in this research indicate that controlled breathing practices may play an important role in reducing stress and anxiety symptoms.

One of the most distinctive characteristics of breathing techniques is their ability to create a bridge between voluntary behavior and autonomic nervous system functioning.

Through this mechanism, individuals can directly influence physiological processes and regulate stress responses.

Research indicates that slow-paced breathing practices may increase parasympathetic nervous system activity and promote physiological relaxation.

These findings suggest that breathing techniques may represent valuable tools in mental health interventions.

12.5. The Role of Interoception and Neurosomatic Awareness

One of the most important findings of this study concerns the influence of interoception and body awareness on mental health.

The reviewed studies indicate that one of the shared effects of yoga, meditation, and breathing techniques is the enhancement of awareness of bodily sensations.

This process may enable individuals to:

12.6. Autonomic Nervous System Regulation and Heart Rate Variability

The literature suggests that yoga, meditation, and breathing techniques may exert regulatory effects on the autonomic nervous system.

In particular, findings related to heart rate variability indicate increased parasympathetic nervous system activity.

Higher HRV levels have been associated with:

More effective emotion regulation,

Lower anxiety levels,

Greater psychological resilience.

These findings are consistent with both Polyvagal Theory and the Neurovisceral Integration Model.

12.7. Neuroplasticity and Brain Changes

Research suggests that meditation and yoga practices may be associated with structural and functional changes in the brain.

Changes have been reported in regions including:

The prefrontal cortex,

The hippocampus,

The amygdala.

These alterations may contribute to improvements in attentional control, emotion regulation, and stress management.

Consequently, the effects of mind–body-based practices can be explained not only at the psychological level but also at the neurobiological level.

12.8. Evaluation from a Positive Psychology Perspective

The positive psychology perspective

Build Theory, positive emotions expand individuals' cognitive and behavioral repertoires and contribute to the development of long-term psychological resources.

Research indicates that mindfulness practices increase positive affect, support life satisfaction, and enhance self-acceptance (Galante et al., 2021). Similarly, yoga has been associated with improvements in purpose in life, personal growth, and psychological well-being (Ross & Thomas, 2010).

From the perspective of Ryff's (1989) model of psychological well-being, mind–body-based interventions may support all six dimensions of well-being:

Self-acceptance,

Purpose in life,

Personal growth,

Environmental mastery,

Autonomy,

Positive relationships.

Therefore, yoga, meditation, and breathing techniques may be regarded not only as interventions for reducing stress and anxiety but also as approaches that promote psychological development.

12.9. Evaluation of the Model from a Trauma Perspective

Following trauma, individuals may experience disruptions in autonomic nervous system functioning, hyperarousal, avoidance behaviors, and freeze responses.

Within the proposed model, interoception, vagal activation, and nervous system regulation play important roles in understanding post-traumatic recovery processes.

for conceptualizing recovery following traumatic experiences.

12.10. Comparative Evaluation with Existing Literature

Existing models generally focus on specific psychological or neurophysiological processes. For example:

Polyvagal Theory focuses primarily on the autonomic nervous system.

Interoception models emphasize body awareness and internal bodily perception.

Mindfulness models concentrate on attentional processes and present-moment awareness.

In contrast, the model proposed in this study integrates these mechanisms within a single theoretical framework, providing a more comprehensive explanation of the relationships among body awareness, nervous system functioning, cognitive processes, and mental health outcomes.

12.11. Strengths and Limitations of the Integrated Neurosomatic Mental Health Model

One of the primary strengths of the proposed model is its conceptualization of mental health not solely through cognitive processes but through the reciprocal interactions among the body, nervous system, and psychological functioning.

In this respect, the model extends Engel's (1977) Biopsychosocial Model by incorporating contemporary concepts such as interoception, autonomic nervous system regulation, and neuroplasticity.

A second major strength lies in its integration of Polyvagal Theory (Porges, 2011), interoception research (Khalsa et al., 2018), neuroplasticity studies (Davidson & McEwen, 2012), and the psychological resilience literature within a unified

Despite these strengths, several limitations should be acknowledged. First, the model is theoretical in nature and has not yet been empirically tested. Furthermore, methodological differences among the studies included in the literature may limit the generalizability of the findings.

Future experimental and longitudinal studies are needed to evaluate the validity and applicability of the proposed model.

12.12. Clinical and Applied Implications

The findings of this study suggest that yoga, meditation, and breathing techniques may be utilized as complementary interventions within mental health practice.

The incorporation of body-awareness-based interventions by counselors, psychologists, and psychiatrists may contribute to reductions in stress and anxiety symptoms.

Particularly among individuals experiencing elevated levels of stress, breathing practices and interventions designed to enhance vagal activation may facilitate nervous system regulation.

Similarly, mindfulness and meditation practices may contribute to the development of emotion regulation skills.

It is also recommended that yoga and breathing-based interventions be considered within preventive mental health programs implemented in educational institutions, workplaces, and community-based mental health settings.

12.13. Recommendations for Future Research

Based on the findings of this study, the following recommendations are proposed for future research:

The Integrated Neurosomatic Mental Health Model should be empirically tested through

with trauma histories should be investigated.

The biological foundations of the model should be evaluated using heart rate variability, cortisol, and neuroimaging measures.

Longitudinal studies should examine the long-term effects of the model.

Cross-cultural research should assess the applicability of the model across diverse populations.

From this perspective, the proposed model appears to offer a more holistic framework for understanding mental health.

13. INTEGRATED NEUROSOMATIC MENTAL HEALTH MODEL

13.1. Rationale for Model Development

The literature reviewed in this study provides substantial evidence supporting the effects of yoga, meditation, and breathing techniques on stress and anxiety.

However, the majority of existing studies explain these effects through separate mechanisms.

While some studies focus primarily on interoceptive processes, others emphasize autonomic nervous system regulation, attentional control, or emotion regulation mechanisms. This fragmented structure within the literature makes it difficult to explain the effects of mind–body-based practices on mental health in a comprehensive manner.

Accordingly, findings from diverse lines of research were synthesized to develop the Integrated Neurosomatic Mental Health Model, which aims to explain these mechanisms within a unified theoretical framework.

The primary purpose of the model is to identify and explain the common mechanisms through

1. Interoception Theory

The first component of the model involves the development of body awareness through interoceptive processes.

2. Polyvagal Theory

Polyvagal Theory explains the role of the vagus nerve in social engagement, perceived safety, and stress regulation (Porges, 2011).

Within the proposed model, Polyvagal Theory serves as the primary framework for understanding autonomic nervous system regulation.

3. Neurovisceral Integration Model

The Neurovisceral Integration Model explains the bidirectional relationship between the brain and the autonomic nervous system (Thayer & Lane, 2009).

Particular emphasis is placed on the regulatory influence of the prefrontal cortex on autonomic functioning. The relationship between heart rate variability (HRV) and emotion regulation constitutes an important component of the model.

4. Mindfulness Theory

The mindfulness approach refers to the intentional direction of attention toward present-moment experience while observing thoughts, emotions, and sensations without judgment (Kabat-Zinn, 2003).

Within the model, mindfulness theory provides the explanatory framework for neurocognitive restructuring processes.

5. Psychological Resilience Theory

Psychological resilience refers to an individual's capacity to adapt successfully to stressful life events and adversity (Southwick et al., 2023).

Based on the findings of the present study, the model consists of six primary components.

Neurosomatic Awareness

Yoga, meditation, and breathing techniques increase body awareness.

This process enables individuals to become more conscious of their physical sensations, emotional responses, and internal experiences.

Interoception

Enhanced body awareness contributes to the development of interoceptive processes.

As a result, individuals become more capable of accurately interpreting bodily signals.

Autonomic Nervous System Regulation

As interoception improves, individuals become better able to regulate stress responses.

Increased heart rate variability and vagal activation play critical roles in this process.

Neurocognitive Restructuring

Meditation and mindfulness practices may promote changes in attentional control, cognitive flexibility, and thinking patterns.

These changes help individuals manage stress-related cognitive processes more effectively.

Emotion Regulation

Improvements in autonomic regulation and neurocognitive functioning contribute to more effective management of emotional responses.

Psychological Resilience and Psychological Well-Being

In the final stage of the model, reductions in stress and anxiety are expected alongside increases in psychological resilience and psychological well-

Model proposes that mental health emerges through dynamic interactions among the body, brain, and nervous system.

The operational process of the model is not linear but rather consists of a dynamic and cyclical system characterized by reciprocal influences and feedback loops. Nevertheless, the general sequence of the process can be described through several stages.

The model begins with yoga, meditation, and breathing techniques. Research indicates that these practices can reduce stress, enhance emotion regulation abilities, and support psychological well-being (Tang, Hölzel, & Posner, 2015; Streeter et al., 2012).

In the first stage, these practices are assumed to increase neurosomatic awareness. Neurosomatic awareness is defined as the capacity to recognize bodily sensations, nervous system responses, and psychological processes. As this awareness increases, individuals become more capable of consciously observing their internal experiences.

In the second stage, increased neurosomatic awareness is expected to enhance interoceptive capacity. Greater interoceptive awareness contributes to earlier recognition and more effective regulation of emotional experiences.

In the third stage, enhanced interoception supports autonomic nervous system regulation. As individuals become more accurate in perceiving bodily signals, they are better able to recognize and regulate stress responses. This process promotes a more balanced interaction between sympathetic and parasympathetic nervous system activity.

In the fourth stage, improved nervous system regulation contributes to increased vagal activation. Enhanced vagal tone supports greater flexibility in responding to stress and facilitates emotional balance.

and breathing practices may lead to structural and functional changes within neural networks associated with self-awareness and emotion regulation.

In the sixth stage, these neural changes are expected to enhance emotion regulation abilities. Emotion regulation refers to an individual's capacity to manage emotional experiences effectively (Gross, 2015). Improved emotion regulation contributes to the development of more adaptive coping strategies in response to stress and anxiety.

In the seventh stage, enhanced emotion regulation promotes psychological resilience. Psychological resilience is defined as the capacity to adapt and recover in the face of adversity (Southwick et al., 2023). Individuals with greater resilience tend to respond more flexibly and adaptively to life challenges.

Finally, increased psychological resilience contributes to higher levels of psychological well-being.

In summary, the model proposes a holistic process progressing through the following sequence:

Body Awareness → Interoception → Nervous System Regulation → Perceived Safety → Emotion Regulation → Psychological Resilience → Neural Adaptation → Psychological Well-Being

However, this process should not be viewed as strictly linear. Rather, it represents a dynamic system characterized by continuous reciprocal feedback mechanisms among its components.

TABLE-3

Model Flow

Yoga / Meditation / Breathing Techniques

↓Body Awareness

↓Psychological Resilience

↓Neural Adaptation and Development

↓Psychological Well-Being

13.5. Integrated Neurosomatic Mental Health Model

The processes included in the model are conceptualized as mutually interactive rather than strictly linear. Each stage supports and reinforces the others. For example, stronger interoceptive awareness facilitates autonomic nervous system regulation, while improved emotion regulation skills contribute to greater psychological resilience. Consequently, increases in psychological well-being are expected to emerge.

The present model was developed within the scope of this research to explain the common mechanisms through which yoga, meditation, and breathing techniques influence mental health.

13.6. Model Propositions

Proposition 1: As regular participation in yoga, meditation, and breathing practices increases, levels of body awareness increase.

Proposition 2: Increases in body awareness positively influence interoceptive awareness.

Proposition 3: As interoceptive awareness increases, autonomic nervous system regulation becomes stronger.

Proposition 4: Improvements in autonomic nervous system regulation are associated with increases in heart rate variability (HRV).

Proposition 5: Higher levels of HRV predict lower levels of perceived stress.

Proposition 6: Higher levels of HRV predict lower levels of anxiety symptoms.

Proposition 7: Regular participation in yoga,

Proposition 9: Improvements in nervous system regulation positively influence emotion regulation abilities.

Proposition 10: Enhanced emotion regulation abilities increase psychological resilience.

Proposition 11: Higher levels of psychological resilience are associated with lower levels of perceived stress.

Proposition 12: Higher levels of psychological resilience are associated with lower levels of anxiety symptoms.

Proposition 13: Higher levels of psychological resilience are associated with greater psychological well-being.

Proposition 14: Interoception functions as a mediating variable in the relationship between yoga, meditation, breathing techniques, and psychological well-being.

Proposition 15: Autonomic nervous system regulation functions as a mediating variable in the relationship between yoga, meditation, breathing techniques, and stress.

Proposition 16: Emotion regulation functions as a mediating variable in the relationship between yoga, meditation, breathing techniques, and anxiety.

Proposition 17: As perceived safety increases, social connectedness and psychological well-being increase.

Proposition 18: Within the framework of Polyvagal Theory, perceived safety is positively associated with psychological resilience.

Proposition 19: Body awareness, interoception, and autonomic nervous system regulation collectively serve as significant predictors of psychological well-being.

Model

This study evaluated the effects of yoga, meditation, and breathing techniques on stress and anxiety through a systematic review of the literature. The findings suggest that these practices may exert multidimensional effects on mental health.

Overall, the reviewed studies indicate that yoga can reduce stress levels, alleviate anxiety symptoms, and support psychological well-being. Similarly, meditation practices appear to enhance attentional control, reduce rumination, and strengthen emotion regulation abilities.

The findings further suggest that mind–body-based practices influence not only psychological symptoms but also neurobiological mechanisms.

Consequently, the effects of yoga, meditation, and breathing techniques extend beyond symptom reduction. These practices appear to support mental health through multiple mechanisms, including body awareness, interoception, autonomic nervous system regulation, and psychological resilience.

The Integrated Neurosomatic Mental Health Model developed in this study provides a comprehensive theoretical framework for explaining these mechanisms.

Future experimental studies designed to test the model may contribute substantially to both theoretical and applied knowledge within the field of mental health.

13.8. Neurobiological Outcomes

The findings derived from the literature indicate that yoga, meditation, and breathing techniques are associated with several neurobiological processes, including:

Regulation of the hypothalamic–pituitary–adrenal (HPA) axis,

Increased heart rate variability,

Increased vagal activation,

Enhanced neuroplasticity.

These findings suggest that mental health should be understood not only through cognitive processes but also through brain–body interactions.

Furthermore, the evidence indicates that yoga, meditation, and breathing techniques may serve as valuable interventions for promoting mental health.

These practices may be particularly useful within:

Stress management programs,

Anxiety interventions,

Psychoeducational programs,

Psychological resilience training,

Workplace well-being initiatives.

However, these interventions should be considered complementary approaches rather than substitutes for clinical treatment.

13.9. Conclusions Regarding Interoception and Neurosomatic Processes

One of the most important findings of this study is the central role of interoception in mental health.

A common effect of yoga, meditation, and breathing techniques is the enhancement of body awareness.

Strong interoceptive awareness may support:

Emotion regulation abilities,

Self-awareness,

Psychological resilience.

were synthesized to develop a new theoretical framework explaining the effects of yoga, meditation, and breathing techniques.

The proposed Integrated Neurosomatic Mental Health Model integrates:

Neurosomatic awareness,

Interoception,

Autonomic nervous system regulation,

Neurocognitive restructuring,

Emotion regulation,

Psychological resilience

within a single conceptual framework.

In this respect, the model integrates previously fragmented mechanisms within the literature and provides a more comprehensive explanation of mental health processes.

13.11. Strengths and Limitations of the Model

The primary strengths of the model include its integration of findings from multiple disciplines and its provision of empirically testable propositions.

However, the model has not yet been experimentally validated. Therefore, future empirical studies are required to examine its validity and applicability.

Testing the model across diverse cultural groups and clinical populations is strongly recommended.

13.12. Explanatory Notes on the Conceptual Model

The model proposed in this study was developed to explain the mechanisms through which yoga, meditation, and breathing techniques influence mental health.

It provides a holistic framework explaining how relationships among body awareness, interoception, nervous system regulation, neuroplasticity, and psychological well-being, the model aims to make a meaningful theoretical contribution to the existing literature.

13.13. Recommendations for Future Research

Based on the findings of this study, the following recommendations are proposed:

Randomized controlled trials with larger sample sizes should be conducted.

The long-term effects of yoga, meditation, and breathing techniques should be investigated.

Greater use of neuroimaging methods is recommended.

Research utilizing biomarkers such as heart rate variability and cortisol should be expanded.

Additional studies examining interoception and body awareness processes are needed.

More research should be conducted with children, older adults, and clinical populations.

The quantity and methodological quality of research conducted in Türkiye should be improved.

14. THEORETICAL AND PRACTICAL CONTRIBUTIONS

14.1. Theoretical Contributions

The most important theoretical contribution of this study is that it proposes a new conceptual framework by integrating the fragmented literature explaining the effects of yoga, meditation, and breathing techniques on mental health.

In the literature, yoga, meditation, and breathing techniques are generally addressed as separate interventions. Some studies focus on mindfulness

limited.

The Integrated Neurosomatic Mental Health Model developed in this study aims to address this gap. The model brings together interoception, autonomic nervous system regulation, neuroplasticity, emotion regulation, and psychological resilience within a single theoretical structure.

Another theoretical contribution of this study is that it explains the relationship between body awareness and mental health on the basis of neurobiological mechanisms. While traditional psychological approaches generally focus on cognitive processes, this study emphasizes the role of body-based processes in mental health. This approach is also consistent with recent developments in somatic psychology and embodied cognition (Khalsa et al., 2018).

The study also integrates Polyvagal Theory (Porges, 2011), the Neurovisceral Integration Model (Thayer & Lane, 2009), the Neuroplasticity Approach (Davidson & McEwen, 2012), and Positive Psychology (Seligman, 2011) within a common framework. This strengthens the interdisciplinary nature of the model.

In addition, the study demonstrates that psychological well-being can be explained not only through cognitive processes but also through bodily awareness and nervous system regulation. Thus, it moves beyond the traditional pathology-oriented perspective on mental health and offers a strengthening and preventive perspective.

14.2. Original Contribution of the Study to the Literature

One of the most important aspects of this study is that it systematically integrates the fragmented literature explaining the effects of yoga, meditation, and breathing techniques on mental health. The original contributions of the study are summarized below:

regulation were evaluated within the same model.

Polyvagal Theory (Porges, 2011), the Neuroplasticity Approach (Davidson & McEwen, 2012), and Positive Psychology (Seligman, 2011) were addressed within an integrated framework.

A new conceptual model explaining the reduction of stress and anxiety was developed.

The Integrated Neurosomatic Mental Health Model was proposed.

In this respect, the study is not merely a review of existing knowledge but also offers a new perspective to the literature.

14.3. Practical Contributions

One of the important contributions of this study is that its findings can be transferred to applied settings. Today, stress and anxiety disorders are among the most common mental health problems worldwide (World Health Organization, 2022). This increases the need for effective, accessible, and low-cost interventions.

The findings indicate that yoga, meditation, and breathing techniques can be used as complementary practices that support mental health. In particular, the integration of mind–body-based practices into psychological counseling and psychotherapy may improve clients' emotion regulation skills.

The integration of mindfulness practices into cognitive behavioral therapy has become increasingly common in recent years (Segal, Williams, & Teasdale, 2018). This study suggests that breathing techniques and body-awareness practices may similarly be beneficial when integrated into psychological interventions.

The findings are also important for educational institutions. Studies conducted with university students indicate that mindfulness and breathing techniques may reduce test anxiety and increase

yoga and mindfulness practices may reduce burnout levels and support psychological well-being (Galante et al., 2021). Therefore, it is recommended that body–mind-based practices be included in employee support programs within healthcare institutions.

From an organizational perspective, breathing techniques and mindfulness practices may contribute to reducing work-related stress, burnout, and performance problems.

14.4. Contribution of the Neurosomatic Approach to the Field of Mental Health

One of the original contributions of this study is that it clarifies the place of the neurosomatic approach within the field of mental health. The neurosomatic approach suggests that psychological processes cannot be explained solely through cognitive mechanisms; rather, the continuous interaction among the body, nervous system, and brain plays an important role in shaping mental health (Khalsa et al., 2018).

The findings of this study support the effects of body awareness, interoception, and autonomic nervous system regulation on stress and anxiety. This indicates that mental health practices should focus not only on thoughts and behaviors but also on bodily processes.

The importance of body-based interventions is becoming increasingly evident, particularly in trauma, chronic stress, and anxiety disorders (Porges, 2011). The findings of this study support this perspective and emphasize the importance of interventions that place body–mind integration at the center.

15. CONCLUSION

In this study, the effects of yoga, meditation, and breathing techniques on mental health were examined through a systematic review method, and the Integrated Neurosomatic Mental Health

psychological well-being.

The reviewed studies demonstrate that yoga, meditation, and breathing techniques strengthen individuals' relationship with their bodies, increase their capacity to perceive bodily signals, and exert regulatory effects on the autonomic nervous system. In particular, findings related to interoception, vagal activation, and neuroplasticity indicate that mental health cannot be explained solely through cognitive processes. This supports the view that reciprocal interaction among the body, mind, and nervous system is one of the fundamental determinants of mental health.

The findings also support the concepts of perceived safety and nervous system regulation proposed by Polyvagal Theory. Increased body awareness and strengthened nervous system regulation may contribute to reduced stress responses, improved emotion regulation skills, and increased psychological resilience. Ultimately, these processes appear to support psychological well-being.

The most important conclusion of this study is that the effects of yoga, meditation, and breathing techniques can be explained not by independent mechanisms but by multidimensional processes that operate in interaction with one another. Accordingly, the Integrated Neurosomatic Mental Health Model developed in this study provides a holistic theoretical framework explaining the relationships among body awareness, interoception, nervous system regulation, psychological resilience, and psychological well-being.

Unlike existing approaches, the proposed model brings together interoception, Polyvagal Theory, neuroplasticity, and positive psychology perspectives within a single structure. Thus, it evaluates mental health not only through the absence of psychopathological symptoms but also

a holistic framework in the Turkish literature. In this respect, the study has the potential to provide a theoretical foundation for future research in the field of mental health in Türkiye.

In conclusion, this study offers a new perspective that places the interaction among the body, mind, and nervous system at the center of understanding mental health. The mental health-supportive effects of yoga, meditation, and breathing techniques are related not only to psychological processes but also to neurophysiological mechanisms. It is recommended that the Integrated Neurosomatic Mental Health Model developed in this study be

Conclusion

In conclusion, the Integrated Neurosomatic Mental Health Model offers a comprehensive and applicable framework for mental health services in Türkiye. By explaining the relationships among body awareness, interoception, nervous system regulation, and psychological well-being, the model contributes not only to treatment-oriented interventions but also to preventive and mental health promotion strategies. As such, it provides an integrative perspective that may support both individual and societal well-being.

Author Contribution

The author is responsible for the conceptual preparation, manuscript content, academic interpretation, and final approval of the submitted work unless otherwise stated.

Funding

No external funding information was provided unless declared separately by the author.

Conflict of Interest

The author declares no conflict of interest unless otherwise stated in the manuscript or correspondence.

Ethics Statement

The author is responsible for ethical compliance, consent, institutional permission, and research integrity where applicable.

Data Availability

Data availability information was not separately provided unless stated by the author.

Correspondence & ORCID

Correspondence details and ORCID information are displayed where supplied by the author.

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