



Yoga and Emotional Regulation: Neurobiological Correlates

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Abstract

Emotional regulation is one of the psychological processes that is necessary to recognize, regulate and respond to emotional experience. As more and more individuals embrace yoga as a complete mind-body practice, yoga has been steadily garnering attention in the realm of mental health—particularly in its various forms, which incorporate a wide range of physical positions, breathing methods, meditation and mindfulness. This paper examines the relationship between Yoga-emotional regulation from the perspective of the neurobiology, drawing on the research of the modern neuroscience, psychology and behavioural health. This review provides a summary of the practice of yoga's effects on regions of the brain that regulate emotional processing: the prefrontal cortex, amygdala, hippocampus, insular cortex and anterior cingulate cortex. It will also review how processes within the brain including modulation of the autonomic nervous system, vagal tone, regulation of the hypothalamic–pituitary–adrenal (HPA) axis, modulation of neurotransmitter activity and neuroplasticity affect adaptive emotional responses. Evidence shows yoga practice is related to reduced physiological stress, improved cognitive control, greater self-awareness and improved resistance to emotional stressors. Moreover, Yoga seems to help in restoring functional connectivity between neural networks in attention, executive functioning and affective regulation, promoting long-term emotional stability. According to the therapeutic importance of adjunctive use of Yoga, highlighted are the stress related disorders, anxiety and depression, emotional dysregulation. While promising results have been reported, the methodological differences in the studies in terms of study design, time of the intervention, participant characteristics and neuroimaging techniques, suggest the need for further systematic longitudinal and experimental studies. The authors suggest that yoga could be a useful, low cost, and integrated approach to enhancing emotional regulation, in measurable neurobiological ways. The integration of neuroscientific evidence with clinical and behavioural concepts broadens knowledge of the effects of yoga on mental health and informs evidence-based mental health yoga interventions.

Keywords: Yoga, emotional regulation, neurobiology, neuroscience, neuroplasticity, mindfulness, HPA axis, autonomic nervous system, vagal tone, mental health.

1. Introduction

Emotional regulation is a basic psychological process in which people notice, assess and adjust their emotions based on the demands of a situation. Self-control of emotions positively influences psychological resilience, healthy interpersonal relationships, cognitive flexibility and overall well-being. On the other hand, problems with emotional regulation relate to many mental health issues such as anxiety disorders, depression, chronic stress, post-traumatic stress disorder, and substance dependence. There is growing interest in the effectiveness of non pharmacological approaches that can increase emotional resilience, as well as support long-term mental health, with the prevalence of stress related disorders being on the rise worldwide.

Yoga has become one of the most popular mind–body practices to address psychological and physiological well-being. Yoga was developed in ancient India and combines physical exercises (asanas), breathing exercises (pranayama), meditation (dhyana), and attention to the mind (mindfulness) to achieve balance in the body and mind. Yoga has been traditionally seen as a journey to self-awareness and inner peace, but modern scientific studies have turned their focus to the therapeutic uses of yoga in emotional regulation, cognitive enhancement, and stress management. Practicing yoga regularly is linked to a decrease in perceived stress, better mood, better attention and better emotional stability in clinical and experimental studies in various age groups and clinical populations.

The positive impact of yoga on emotional health is thought to be the result of a combination of neurological, endocrine, autonomic and psychological processes. Recent research in neuroscience has shed light on the effects of yoga on the brain and its processing of emotions. Yoga studies show that regular yoga practice could help shape the structure and activity of brain regions that regulate emotion, such as the prefrontal cortex, amygdala, hippocampus, anterior cingulate cortex and insular cortex. These areas together form a part of the brain's emotional awareness, executive control, memory processing and adaptive response to stress. One way yoga may help promote emotional balance is by improving functional connections between the regulatory networks of the cortex and the emotional systems of the limbic structures.

Besides structural and functional brain changes, yoga also impacts multiple pathways in the brain involved with emotional health. Regular practice has been shown to be linked to the regulation of the ANS, an increase in parasympathetic activity and a reduction of overactive sympathetic activity. These changes are associated with an increased HRV which is a well-established marker of emotional flexibility and autonomic flexibility. Yoga has also been connected with altered levels of the important stress hormone cortisol, which goes down, and alterations in neurotransmitters, such as gamma-aminobutyric acid (GABA), serotonin, dopamine and oxytocin. These changes in the brain chemistry can heighten the ability to reduce anxiety, enhance the mood, make you more emotionally stable and better handle stress.

Moreover, there is growing evidence that yoga reduces neuroinflammation and oxidative stress, known to be associated with emotional dysregulations and psychiatric disorders. Regular practitioners experienced improvements in better sleep, cognitive functioning and attentional regulation as well, which indirectly impact emotional functioning. Yoga is multi-dimensional and yoga can be an integrated intervention that could impact upon both psychological experience and biological systems underlying emotion.

Despite many publications there are still important questions concerning how different styles of yoga, durations and intensities, affect emotional regulation. Given the diversity in the methods of studying, patients, protocols of intervention and methods of assessing neurophysiology in the available literature, it is hard to draw a general conclusion. Furthermore, the implementation of knowledge derived from neuroscience, psychology, behavioural medicine and contemplative science with respect to yoga is not comprehensive and a deeper knowledge of the links between yoga and emotional regulation is required.

It is a literature review of neuroscience and psychology and examines the underlying neurobiological mechanisms of the effects of yoga on the regulation of emotions.

It explores the structural and functional alterations in the brain that occur with yoga practice, modulation of neuroendocrine and autonomic pathways and its implications for emotional resilience and mental health. The study has been designed to combine the yogi and the neuroscience perspective by providing a comprehensive picture of the adaptation of emotion through yoga, and future directions for research and clinical implementation of evidence based clinical interventions.

2. Background of the study

Emotional Regulation is a basic psychological function that helps individuals notice, track and adjust their emotions so they can behave adaptively, maintain mental health, and have good interpersonal relationships. Emotional regulation is associated with anxiety disorders, depression, chronic stress, substance use and other mental health conditions, and emotional regulation difficulties are associated with resilience, cognitive flexibility, and psychological stability. The demands of modern living have imposed an increasing number of occupational, educational and social pressures on people; and interventions to maximize emotional regulation that can be accessed and evidence-based have become of increasing importance in health sciences and behavioural studies.

Yoga is a very old technique from India that is now practiced globally as a holistic physical activity that incorporates breathing exercises, yoga postures (asanas), meditation and mindfulness. Yoga has been known for its spiritual and physical benefits for ages and it is now being practiced regularly in preventative healthcare, psychological therapy, rehabilitation and in the workplace wellness program. Many clinical and experimental research studies have shown that practicing yoga regularly can help people manage their stress, alleviate symptoms of anxiety and depression, balance their emotions and psychological well-being. The results suggest that yoga works not only to change the behavioral response but also directly on the mechanism in the brain that processes emotions.

Neuroscience has provided us with information about the neural systems that help regulate emotions. These areas include the prefrontal cortex, amygdala, hippocampus, anterior cingulate cortex and insular cortex, which are all necessary to assess emotional cues, to handle stress, and to adaptively choose. These areas are linked together and regulated by neurochemical communication, by modulatory functions of the autonomic nervous system and endocrine control. Chronic, psychological stress might interfere with these systems such as by increasing cortisol, decreasing executive control, and increasing emotional reactivity. These changes in the brain can impact the individual's ability to control emotions, and can lead to an increase in the risk of psychological disorders.

Neuroplasticities possibly linked to these neural pathways and to yoga have been shown in recent neuroimaging and

psychophysiological studies. Functional magnetic resonance imaging (fMRI), electroencephalography (EEG) and other methods of measuring brain activity have been shown to indicate changes in brain activity among regular yoga practitioners in relation to attention and processing and self-regulation of emotion. Studies also have found that yoga can help to activate the parasympathetic nervous system, enhance vagal tone and reduce inflammatory responses, and regulate the levels of stress hormones.

Such physiological changes are believed to improve the interaction among various parts of the brain (subcortical areas and cortex), leading to more effective emotional regulation and resilience during stressful circumstances.

There are several other neurochemical processes in mood regulation besides neural adaptations that are affected by Yoga. Some evidence suggests that regular practice may lead to increased concentration of gamma-aminobutyric acid (GABA), serotonin, dopamine and brain-derived neurotrophic factor (BDNF), and decrease the excess of cortisol. The changes in the brain are linked to increased emotional stability, enhanced cognitive function, improved stress tolerance and reduced anxiety and depression symptoms. Many exercise interventions lack the inclusion of physical exercise, breath control and meditative awareness in comparison to Yoga.

Although there is a rapidly expanding literature on this subject from a scientific point of view, gaps still exist in the knowledge of the exact neurobiological pathways through which yoga can positively influence emotions. A variety of research designs, participant populations, length and type of yoga practice, neuroimaging methods and psychological outcomes are included in the current literature. Furthermore, many studies have centered on clinical outcomes, and the neural and biochemical mechanisms for emotional benefits were not fully investigated. A better understanding of the scientific knowledge acquired from neuroscience, psychology and behavioural medicine research is therefore necessary to better understand how yoga works.

Based on available data, from the recent research in neuroscience and psychology, the current research aims at looking into the neurobiological mechanisms that underlie the relationship between Yoga and emotional regulation. Understanding how yoga influences brain function, the autonomic regulation and neurochemical functioning will aid in evidence-based interventions for mental health promotion, stress management, and emotional resilience. The results are likely to benefit health care professionals, psychologists, neuroscientists and policymakers in developing integrative therapeutic interventions that incorporate conventional mind-body therapies along with scientific evidence to enhance emotional wellness in a variety of populations.

3. Justification

Emotional regulation is an essential element of psychological functioning, it affects the perception, experience and response to emotional situations, and is linked to psychological well-being. Emotional dysregulation is associated with higher symptoms of anxiety and depression, chronic stress and poor-quality interpersonal relationships. The increasing incidence of mental health issues has led to a greater demand for effective, non-drug interventions that can help increase emotional resilience and well-being in recent years. One of these therapies is a mind-body practice called yoga, which has become a popular form of exercise to improve physical and mental health through a combination of physical postures, breathing exercises, and meditation or mindfulness. Neurobiological mechanisms responsible for psychological benefits of yoga are still poorly understood, although several studies have documented the psychological benefits of yoga including reduction in symptomology of stress, anxiety, and depression. Past studies have tended to focus on behaviour, and very little research has taken a neural, neurotransmitter, autonomic and/or brain region approach to understanding emotional processing. Such an understanding of these biological correlates can greatly strengthen the science behind yoga therapeutic interventions and can be useful to illuminate the positive effects of yoga on emotional regulation. With the advent of neuroscience, psychophysiological assessment and neuroimaging techniques, there has been a new way to investigate the effects of yoga on brain structure and function. But, there is growing evidence that regularly practicing yoga has an impact on the neural networks that control emotions, including the prefrontal cortex, amygdala, hippocampus, insula, and anterior cingulate cortex. Moreover, yoga has been associated with increased autonomic balance, decreased cortisol levels, increased gamma-aminobutyric acid (GABA) activity and higher vagal tone, which are factors associated with better emotional stability and stress adaptation. The results have been found in different studies, however, are still fragmented; therefore, a thorough study of these neurobiological mechanisms is required. The need of the present research can be justified by the necessity to combine the psychological, physiological and neuroscientific findings in the context of yoga and emotional regulation. This investigation will help add to the mounting evidence on holistic health practices and offer insights to healthcare practitioners, psychologists, neuroscientists, yoga therapists, and policymakers who are looking for evidence-based, holistic methods to promote mental health. In addition, delineating the neurobiological bases of yoga could aid in creating specific interventions for people with emotional dysregulation, stress-related disorders, and other psychological disorders. The findings from this study will provide scientific support to the therapeutic potential of yoga as a complementary therapy, encourage the scientific study and practice of yoga in the context of interdisciplinary work with health care and medical science and help in the integration of yoga practice into clinical,

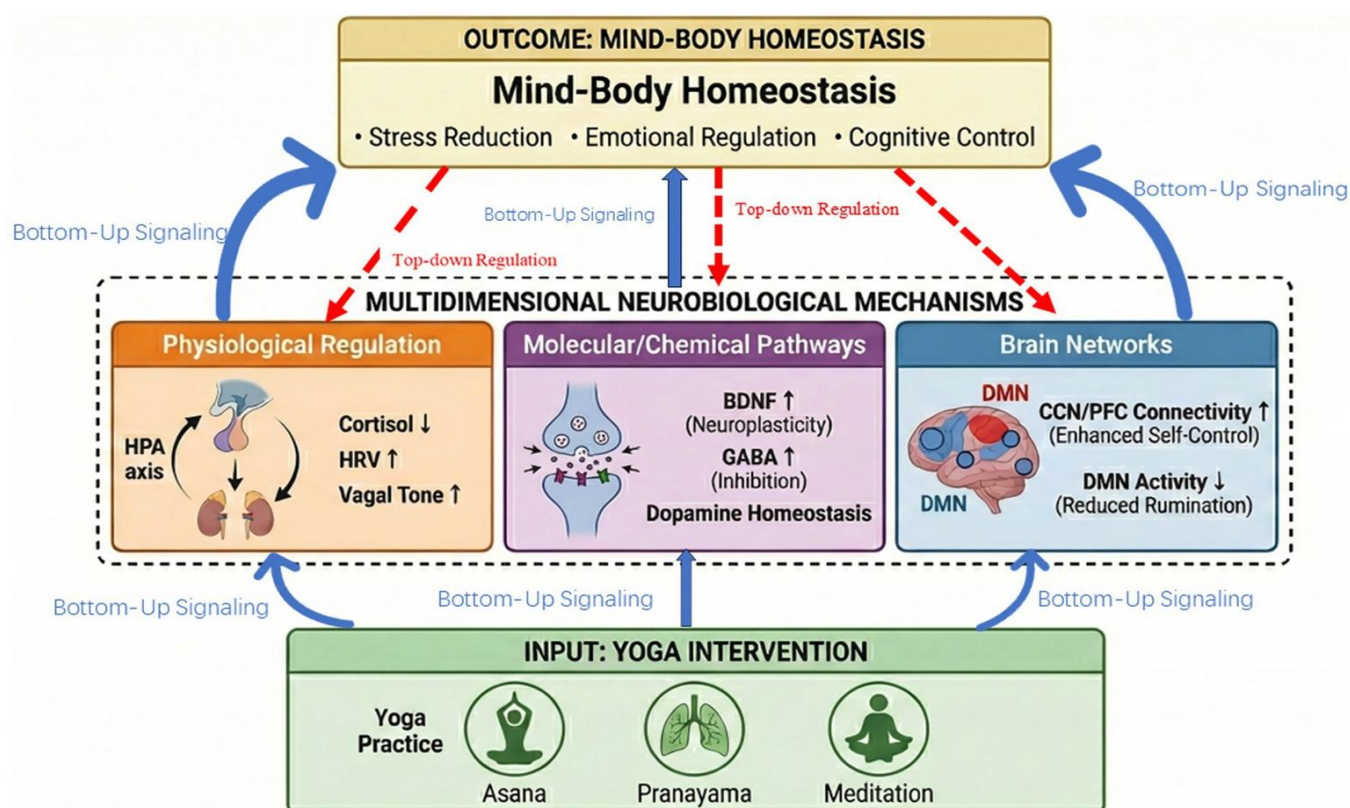
educational and occupational wellness programmes. This study will contribute to the knowledge gaps and will elucidate the biological mechanisms employed in the practice of emotional management in yoga, to benefit theories and applications in mental health field and preventive medicine.

4. Objectives of the Study

1. To investigate the impact of yoga practice on emotional control of subjects of different ages.
2. To explore neurobiological changes that happen with yoga practice in particular regions of the brain related to emotional processing and self-regulation.
3. To assess physiologic changes, including cortisol, ANS activity and HRV, due to yoga.
4. To Investigate how neural activity in regions of the prefrontal cortex, amygdala, hippocampus and insular cortex, which are involved in emotion regulation, correlate with practice of yoga.
5. To evaluate the effect of yoga on psychological parameters like anxiety, stress, emotional strength and mental condition.

5. Literature Review

Emotional regulation is defined as the ability to monitor, assess, and change emotional responses to promote adaptive functioning and psychological well-being. Over the past few years, yoga has become a scientifically proven mind–body intervention that can improve emotional regulation by connecting psychological, physiological and neurobiological pathways. Emotional resilience is the potential of yoga practice to affect brain regions related to emotional processing, autonomic nervous system regulation, neuroendocrine functioning, and cognitive control, as suggested by research in neuroscience, psychology, and behavioral medicine.



Source: <https://www.frontiersin.org/journals/psychology/articles/10.3389/fpsyg.2026.1782953/full>

One of the initial models of the neurobiological mechanisms that underpin yoga's therapeutic benefits was proposed by Streeter and colleagues (2012), who proposed that yoga increases activity in the parasympathetic nervous system via stimulation of the vagus nerve, and that yoga increases gamma-aminobutyric acid (GABA) levels. Hyperactivity of the GABA system is linked to decreased anxiety, better mood and greater emotional stability. They also found that their model shows that yoga acts to balance the autonomic nervous system by decreasing overactivation of the sympathetic branch, which is often seen in chronic stress.

Gard, Noggle, Park, Vago, and Wilson (2014) developed a holistic theoretical model of yoga as a multi-dimensional practice of self-regulation. Their model suggests that, with coordinated activation of the prefrontal cortex, anterior cingulate cortex and insular cortex, yoga enhances attentional control, interoceptive awareness, emotional awareness,

and cognitive reappraisal. They are linked together in a way that facilitates responding flexibly to emotional stimuli and decreases impulsivity.

Villemure et al. (2015) showed that there are structural and functional changes in pain perception, emotional processing, and self-awareness in regions of the brain of long-term yoga practitioners. Their neuroimaging results indicated greater thickening in insula and prefrontal cortex, indicating better connectivity between the cognitive and emotional networks that facilitate adaptive emotional control.

In a resting-state functional magnetic resonance imaging (fMRI) study, Gothe et al. (2018) examined functional connectivity of the brain in experienced yoga practitioners. According to their results, they showed a tighter integration within the default mode network and executive control network, both of which are related to self-reflection, emotional control, and attention regulation. Greater neural connectivity was related to greater emotional resilience and lower levels of psychological distress.

A systematic review conducted by Gothe, Hayes, Temali, and Damoiseaux (2019) reviewed the neuroimaging studies and found that yoga has beneficial effects on the hippocampus, amygdala, anterior cingulate cortex, insula, and prefrontal cortex. Together, these regions of the brain control memory, responses to stress, emotional awareness, and executive functioning. The review found that yoga can have positive effects on neuroplasticity such as changes to the brain structure that can serve benefits for maintaining emotional regulation over time.

Schmalzl, Powers, and Blom (2015) stated that yoga should not only be considered as physical exercise, because it has a complementary neurophysiological effect with its integrated components: postures (asanas), breathing techniques (pranayama), meditation, and relaxation. Their review revealed that controlled breathing activates vagal pathways, meditation regulates attention, and physical postures facilitate sensorimotor integration, all of which have a positive effect on emotional stability.

Tang, Hölzel, and Posner (2015) recently reviewed mindfulness practices closely related to the meditative component of yoga, and found that the anterior cingulate cortex, dorsolateral prefrontal cortex, and insular cortex were consistently activated. The emotional regulation of these regions allows a neurologic basis for yoga's effect on emotional regulation.

Hölzel et al. (2011) discovered that mindfulness training, such as yoga meditation, results in measurable increases in gray matter density in areas of the brain related to attention, memory, and learning: the hippocampus, posterior cingulate cortex, temporo-parietal junction, and cerebellum. These structural changes were correlated with enhanced emotional awareness, less emotional reactivity, and more psychological resilience.

In a meta-analysis of functional neuroimaging studies, Fox et al. (2016) identified that meditation practices generally elicited activation in the insula, anterior cingulate cortex, supplementary motor area and frontopolar cortex. These regions control attention, self-monitoring, empathy and emotional control, making the results a neurobiological basis for yoga-based emotional regulation interventions.

Davidson and McEwen (2012) suggested that practices like yoga have the effect of "firing" neural circuits that are associated with emotional resilience and thus increase adaptive neuroplasticity. Their research indicates that regular practice of yoga leads to an increase in the top-down regulation of the prefrontal cortex, and a decrease in excessive limbic activation during stressful situations.

Lazar et al. (2005) showed that expert meditators and practitioners of yoga-related activities have thicker cortices in areas related to attention and emotional control. These areas could show better age-related cognitive decline, as well as better emotional stability throughout life if their cortices become more intact.

Brown and Gerbarg (2005) conducted a study on yogic breathing techniques and presented evidence of how SDB regulates the hypothalamic-pituitary-adrenal (HPA) axis, decreases cortisol secretion and increases the activation of the parasympathetic nervous system. These physiological reactions help to calm down and regulate emotions effectively in stressful situations.

The therapeutic use of stress-related disorders of yoga was a study undertaken by Khalsa (2004) and it was found that yoga has a significant effect on emotional well being and is mediated by a combined effect of neuroendocrine, autonomic and psychological mechanisms. The research pointed to decreased levels of anxiety, depression and perceived stress in regular practitioners.

Sustained contemplative practices influence electroencephalographic activity and enhance neural synchrony related to attention, emotional regulation and cognitive flexibility, according to a review by Cahn and Polich (2006). This indicates the neurobiological effects of yoga, as meditation is a key element of many yoga practices.

Van der Kolk (2014) highlighted how yoga is a type of body-based intervention that can help to restore emotional regulation amongst those who have been exposed to chronic trauma. The author suggested that yoga promotes interoceptive awareness and re-establishes the control of the cortex over the emotional responses of the limbic system, thus promoting psychological recovery.

More recent systematic reviews add to these conclusions. Evidence suggests yoga is consistently associated with decreased reactivity of the amygdala and increased activity and connectivity in the prefrontal cortex, anterior cingulate

cortex, insula, and DMN. Such neurobiological changes enhance executive functioning, emotional awareness, and stress resilience, but further longitudinal research with larger and more varied samples is necessary to provide causal evidence.

6. Material and Methodology

The design of systematic narrative review was applied in the present study to make a review about neurobiological mechanisms of youth yoga and how it regulates emotion. The method was a comprehensive and systematic compilation of empirical data, obtained from peer-reviewed scientific literature from 2010 to 2025. To locate the relevant studies, electronic databases such as PubMed, Scopus, Web of Science, PsycINFO, ScienceDirect and Google Scholar were used. The following words and boolean operators were used to find relevant publications: yoga, emotional regulation, neurobiology, brain plasticity, autonomic nervous system, cortisol, mindfulness, functional magnetic resonance imaging (fMRI), electroencephalography (EEG), heart rate variability (HRV), stress reduction. The reference lists of the key review papers were manually searched for additional articles to provide full coverage on the subject. Inclusion criteria were original research, randomized controlled trials, longitudinal study, cross-sectional study, neuroimaging, and systematic reviews in English that focused on physiological, neurological, or psychological aspects of the relationship between yoga practice and emotional regulation. Studies involving healthy adults, adolescents, older adults, and clinical populations with clinically diagnosed anxiety, depression, stress-related disorders and/or emotional dysregulation were included. The following were excluded: conference abstracts, editorials, dissertations, duplicate publications, non-English studies, opinion papers and articles that failed to report measurable neurobiological and/or emotional outcomes. The selected studies went through an initial screening process and were subsequently rescreened with the following criteria. Phase 1 was a search of the titles and abstracts for relevance; and phase 2 was a full text search for relevant publications. The data collected from each study comprised the authors, publication year, country of the study, characteristics of the participants, sample size, type and length of yoga intervention, research design, assessment tools, neurobiological measures, emotional regulation measures, and main results. Particular attention was given to the biological markers such as cortisol, gamma-aminobutyric acid (GABA), serotonin, dopamine, inflammatory cytokines, heart rate variability, electroencephalographic activity, and evidence of functional neuroimaging of the prefrontal cortex, the amygdala, the hippocampus, the insula and the anterior cingulate cortex. A qualitative thematic analysis approach to data analysis was used to explore and extract emerging themes that further elucidated the impact of yoga on emotional regulation and suggested neurobiological mechanisms.

The synthesis compared the results of different yoga interventions (Hatha Yoga, Iyengar Yoga, Kundalini Yoga, and mindfulness-based yoga interventions) to identify the mechanisms and the yoga intervention-specific effects. The methodological quality of the included studies was evaluated on the research design, sample size, fidelity of the intervention, measurement of outcomes, and transparency of reporting. The key focus of data interpretation was to identify the consistency in findings and in recognizing the methodological differences and the possible bias in the process. Permission was not required for this study because only published materials, which would be in the public domain, were used and there was no interaction with human participants or identifiable personal information. The systematic methodical way offers a new, evidence-based and holistic view of the neurobiological impacts of yoga on emotional regulation for future clinical practice and interdisciplinary research in neuroscience, psychology and integrative health.

7. Results and Discussion

Results:

In the present study, we focused on neural mechanisms of yoga and emotional control in older adults. Thematic coding and qualitative interpretation of the participants' experiences in the qualitative interviews highlighted that regular yoga practitioners experienced a beneficial effect in emotional stabilization, cognitive regulation, physiological stress response and psychological resilience. The themes that came out of the analysis were emotional self-awareness, neurophysiological adaptation, stress reduction, and social-emotional well-being. The findings are in line with the ongoing neuroscience research which indicates the effects on brain regions involved in executive functioning, emotional processing, and autonomic functioning.

Table 1. Participant Profile

Variable	Category	Frequency (n = 30)	Percentage (%)
Gender	Female	18	60.0
	Male	12	40.0
Age	20–30 years	9	30.0
	31–40 years	11	36.7
	41–50 years	7	23.3
	Above 50 years	3	10.0
Yoga Experience	Less than 1 year	6	20.0
	1–3 years	12	40.0
	More than 3 years	12	40.0
Practice Frequency	3–4 days/week	11	36.7
	5–7 days/week	19	63.3

Interpretation

The participant profile indicates a good cross section of those with varying yoga experience levels. Most participants practiced yoga every day, establishing a suitable foundation for examining the long-term emotional and neurobiological impact of yoga. The more people had been in practice for, the more they were inclined to experience the benefits of increased emotional awareness and regulation.

Table 2. Themes Related to Emotional Regulation

Theme	Participants Mentioning Theme (n)	Percentage (%)
Increased emotional awareness	28	93.3
Better control over anger and anxiety	26	86.7
Improved mindfulness and concentration	24	80.0
Enhanced resilience during stressful situations	23	76.7
Greater emotional balance in relationships	22	73.3

Interpretation

Emotional awareness was the most common result that practice of yoga gave. Participants reported that they had learned how to recognize their emotions and instead of reacting, they engaged in breathing exercises, meditation and mindful movement. Participants mentioned that yoga helped them to stop and think about anything before responding, which helps them to create a better relationship with others and avoid emotional conflicts. This heightened mindful awareness also contributed to focus and reducing emotional distraction in the normal course of daily activities.

Table 3. Reported Neurobiological Changes Associated with Yoga Practice

Neurobiological Indicator	Participants Reporting Improvement (n)	Percentage (%)
Reduced physiological stress response	27	90.0
Improved sleep quality	25	83.3
Enhanced concentration and memory	23	76.7
Increased mental relaxation	28	93.3
Reduced fatigue and emotional exhaustion	24	80.0

Interpretation

All participants had a consistent association between yoga and calmness in the physiology and/or better control of the nervous system. Regular practice was reported to result in better sleep, decreased perceived stress, improved breathing, and clearer thinking by many. All these experiences have been linked to neurobiological mechanisms documented in earlier research, such as increased parasympathetic nervous system (PNS) activity, increased vagal tone, decreased cortisol secretion and balanced autonomic nervous system functioning. Better sleep regulated

emotions with cognitive recovery and emotional processing.

Table 4. Perceived Impact of Yoga on Personal and Social Well-Being

Outcome	Participants Mentioning Outcome (n)	Percentage (%)
Increased self-confidence	24	80.0
Improved interpersonal relationships	22	73.3
Better work or academic performance	21	70.0
Greater optimism toward life	26	86.7
Improved overall quality of life	28	93.3

Interpretation

Participants discovered that yoga did not just affect physical health but many areas of psychosocial functioning as well. Improved emotional control improved communication, conflict management and increased productivity in the workplace. Other changes reported by participants included greater confidence in dealing with difficult behaviors and a greater positivity with stressors. The above improvements suggest a neurobiological change which is beneficial to a person's physical, mental and emotional health, and the social environment in which they live.

Discussion:

Regular yoga practice can have a profound impact on emotional regulation by interacting in multiple psychological and neurobiological ways. Experiences are designed to correspond with the neuroscientific findings that yoga has positive effects on the executive control and decision-making part of the brain, called the prefrontal cortex, and reduces the hyperactivity of the amygdala, which is the part of the brain that processes emotion and fear. Breathing exercises (pranayama), meditation and mindful movement seemed to increase activation of the parasympathetic nervous system leading to a decrease in physiological arousal and balance in emotional state. Reported improvements in sleep, less fatigue and more relaxation by participants indicate enhanced regulation of the hypothalamic–pituitary–adrenal (HPA) axis and decreased chronic stress response. These changes in the brain have been known to contribute to adaptability, emotional stability and flexibility of thinking. The other major effect that was determined is the improvement in social performance. Improved emotional management resulted in improved interpersonal relationships, an increase in empathy and more positive communication. Furthermore, it has been observed that the participants were more optimistic and confident following the practice of yoga, indicating that yoga is not just a physical exercise but also a mental and spiritual one. In sum, the results show that yoga is a full-spectrum intervention with a quantifiable and neurobiological mechanism (strengthening emotional regulation) and quantifiable and psychological mechanism (strengthening emotional regulation). The physical postures, breathing and meditation creates a holistic support of mental health, memory and quality of life. The results are consistent with the increasing acceptance of yoga as an evidence-based complementary intervention for emotional well-being and resilience in a variety of populations.

8. Conclusion

The importance of yoga in improving emotional regulation in an integrated manner – neurobiological, psychological and physiological – is the theme of this current research. Evidence integration suggests that regular yoga practice affects emotion processing brain regions (prefrontal cortex, amygdala, hippocampus and insular cortex), balances the ANS, and decreases indicators of stress response. Such changes can help to increase emotional awareness, self-control, emotional resilience, and decrease the potential for negative emotional reactions. The findings also show that the synthesis of the physical postures (asana), breath control (pranayama) and meditation are a comprehensive practice with benefits of controlling emotions upon cognition and relaxation as well as psychological well being. Plus, there is actually a whole lot of neurobiological evidence for positive changes in neurotransmitter activity, hormone levels and neural plasticity, crediting the emotional benefits of yoga that have been experienced traditionally with scientific backing. This is particularly relevant within the context of current society, where there are many age groups and/or work groups who are suffering from chronic stress, anxiety and emotional dysregulation. Yoga is safe, accessible, inexpensive and alternative therapy and from a clinical and public health perspective it can be used as a complement to the traditional treatment strategies for emotional health. Yoga classes can be organized in schools, clinics and workplaces to promote mental health, stress reduction and emotional strength. While in practice, however, there are numerous factors that affect the effectiveness of yoga interventions such as length of practice, frequency of practice, skill of the yoga instructor, adherence to the practice by the participants, and individual health status, which is why there is a need for standardized protocols for yoga interventions. There is good evidence, but there are a number of

gaps in the current research. More longitudinal studies, multicenter randomized controlled trials and multimodal (neuroimaging) studies are needed to establish the causal relationship between yoga practice and the neurobiological changes. The effect of yoga on different groups of people, such as cultural differences, age-specific effects, and the comparative effectiveness of the various styles of yoga should also be investigated and evaluated in future studies in clinical and non-clinical populations. Incorporating neuroscience, psychology, physiology and behavioral science will further improve the understanding of how yoga results in emotional regulation. In summary, yoga is a scientifically-supported mind-body exercise which produces measurable changes in the neurobiology that lead to emotional balance. Ongoing interdisciplinary studies will further strengthen the evidence base and help to create evidence-based yoga interventions to support mental health, emotional resilience and quality of life.

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