Uluslararası Turizm, Ekonomi ve İşletme Bilimleri Dergisi
International Journal of Tourism, Economic and Business Sciences
E-ISSN: 2602-4411, 9(1): 01-11, 2025, www.ijtebs.org

A STUDY ON THE LUNG CAPACITY, COGNITIVE AND AFFECTIVE AWARENESS AND STRESS LEVELS OF UNIVERSITY STUDENTS WHO DO BREATHING EXERCISES

[1]Pınar AKPINAR[1] [2]
Bandırma Onyedi Eylül University
School of Foreign Languages
Orcid ID: 0000-0002-3245-6315

Yağmur AKKOYUNLU[2]
Bandırma Onyedi Eylül University
Faculty of Sports Science
Orcid ID: 0000-0002-5184-1331

Sorumlu Yazar: Pınar Akpınar
E-mail: pakpinar@bandirma.edu.tr

Geliş Tarihi: 10.01.2025
Kabul Tarihi:10.06.2025

Abstract
The aim of this study is to investigate the lung capacity, cognitive and affective mindfulness, and stress levels of university students who practice breathing exercises. For this purpose, 36 students enrolled at Bandırma Onyedi Eylül University participated in the study on a voluntary basis. The experimental group was selected from students outside the Department of Physical Education and Sports, while the control group was selected from students within the Department of Physical Education and Sports. As a result of the ANOVA test, cognitive and affective awareness showed improvement in the experimental group. Measurements related to perceived stress did not show a significant difference between the groups. However, when examining the time and group interaction, a significant reduction in stress was observed in the experimental group. The FVC value related to lung capacity showed a significant effect in the time and group interaction, but the difference between the groups was not statistically significant. In terms of FEV1, the experimental group showed a significant improvement compared to the control group. This result indicates a substantial effect for the experimental group at the end of 8 weeks, and the time and group interaction was also quite strong. The FEV1/FVC ratio showed a significant improvement in the time and group interaction. The findings of the study suggest that breathing exercises lead to improvements in cognitive and affective awareness, perceived stress, and respiratory functions. The experimental group achieved better results compared to the control group. Breathing exercises can be an effective method in rehabilitation processes and may also provide improvements in both mental and physical health.

Keywords: Breath, Affective Mindfulness, Cognitive Mindfulness, Stress, Lung Capacity

NEFES EGZERSİZLERİ YAPAN ÜNİVERSİTE ÖĞRENCİLERİNİN AKCİĞER KAPASİTESİ, BİLİŞSEL VE DUYGUSAL FARKINDALIK VE STRES DÜZEYLERİ ÜZERİNE BİR ARAŞTIRMA

Özet
Bu çalışmanın amacı, nefes egzersizleri yapan üniversite öğrencilerinin akciğer kapasitesi, bilişsel ve duygusal bilinçli farkındalık ve stres düzeylerini incelemektir. Bu amaçla; bu çalışmada gönüllülük esasıyla Bandırma Onyedi Üniversitesi'nde öğrenim gören 36 adet öğrenci random yer almıştır. Deney Grubu Beden Eğitimi ve Spor Anabilim Dalı dışından, Kontrol Grubu ise Beden Eğitimi ve Spor Anabilim Dalı içinden seçilmiştir. Anova testi sonucunda, bilişsel ve duygusal farkındalık, deney grubunda iyileşme göstermiştir. Algılanan stresle ilgili ölçümler, gruplar arasında belirgin bir fark göstermemiştir. Ancak, zaman ve grup etkileşimi incelendiğinde, deney grubunda stresin önemli ölçüde azaldığı gözlemlenmiştir . Akciğer kapasitesiyle ilgili FVC değeri, zaman ve grup etkileşiminde büyük bir etki göstermiştir, ancak gruplar arasındaki fark anlamlı değildir. FEV1 değerinde deneysel grup, kontrol grubuna kıyasla belirgin bir iyileşme göstermiştir. Bu sonuç, 8 hafta sonunda deneysel grup için büyük bir etki göstermektedir ve zaman ve grup etkileşimi de oldukça güçlüdür. FEV1/FVC oranında zaman ve grup etkileşimi önemli bir iyileşme göstermiştir. Çalışmanın bulguları, nefes egzersizlerinin bilişsel ve duygusal farkındalık, algılanan stres ve solunum fonksiyonları üzerinde iyileşmeler sağladığını göstermektedir. Deney grubu, kontrol grubuna kıyasla daha iyi sonuçlar elde etmiştir. Nefes egzersizleri, rehabilitasyon süreçlerinde etkili bir yöntem olarak kullanılabileceği gibi zihinsel ve fiziksel sağlık üzerinde iyileşmeler sağlayabilir.

Anahtar Sözcükler: Nefes, Duygusal Farkındalık , Bilişsel Farkındalık, Stres , Akciğer Kapasitesi

[1] Instructor, Bandırma Onyedi Eylül University School of Foreign Languages, Bandırma, Turkiye. ORCID: 0000-0002-3245-6315, pakpinar@bandirma.edu.tr
[2] Professor, Bandırma Onyedi Eylül University Faculty of Sports Science ,Bandırma, Turkiye. ORCID: 0000-0002-5184-1331, yakkoyunlu@bandirma.edu.tr

1. INTRODUCTION

In today’s fast-paced world, stress has become an integral part of people's lives. Factors such as long working hours, financial pressures, personal responsibilities, and the constant advancement of technology have been sources of stress for many individuals. This situation can lead to negative effects on both physical and mental health. However, breathing exercises may have positive effects on stress reduction, increase lung capacity, and enhance individuals' cognitive and affective awareness.

A review of the literature reveals a lack of studies that simultaneously examine breathing exercises, stress reduction, lung capacity, and cognitive and affective awareness as interrelated variables. In this regard, the current study can be considered as a novel contribution to the field. Furthermore, the data generated from this study will serve as one of the pioneering works in the existing literature.

Clinical studies utilizing modern research methods have demonstrated how mind-body techniques improve psychophysiological conditions in mental and physical disorders associated with stress. Voluntary respiratory techniques, such as synchronized breathing, have been found to significantly alleviate anxiety and stress when combined with focus of attention, inner awareness (perception of bodily sensations), visualization, and meditation (Gerbarg & Brown, 2021). Voluntary breathing practices enhance attention and cognitive functions, while also alleviating stress symptoms by restoring autonomic balance (Gerbarg et al., 2017).

The main objective of this study is to investigate the relationships between lung capacity, cognitive and affective awareness, and stress levels in university students practicing breathing exercises. An experimental model, a widely used scientific research method, has been employed in the study, and a thorough literature review was conducted using various databases to select relevant studies on breathing exercises. The findings of the study indicate that breathing practices enhance cognitive and affective awareness, have a significant effect on stress reduction, and improve lung capacity. The results of this study also offer insights into how breathing exercises can improve individuals' mental and physical health, particularly in terms of stress management and overall quality of life, providing recommendations for further research.

1.1. BREATH

Breathing is our primary activity that ensures our survival and health for a quality life. The World Health Organization (WHO) defines breathing as filling the lungs completely with air (oxygen) and using the diaphragm during the inhalation-exhalation process. Breathing consists of two phases, referred to as internal air circulation, which are inhalation and exhalation. An average person breathes around 3,600 times per hour, which amounts to approximately 86,400 breaths in a single day. Proper and conscious breathing significantly influences the aging process and overall well-being. Breathing, unlike reflexive respiration, is behavioral. A behavioral type of breathing, which can be termed voluntary breathing, can be exemplified by activities such as playing the flute or singing. The main difference between the two types of breathing is that voluntary breathing requires focus, whereas automatic breathing requires no conscious attention (Örün, 2019).

Correct breathing lowers blood pressure, accelerates blood circulation, facilitates digestion, regulates heart rate, eases stress management, and stabilizes sleep. Incorrect breathing is often associated with the onset of physical and mental health problems. There are certain standards for breathing correctly, such as using the diaphragm, reducing the number of breaths per minute to below eight, breathing exclusively through the nose, and utilizing lung capacity during inhalation and exhalation. When breathing through the mouth, mucus secretions may form in the bronchi and nasal area. Engaging in breathing practices throughout the day helps to support proper breathing techniques (Kartal, 2007). Breathing practices aid individuals in understanding their essence, recognizing how the universal order functions, and fostering empathy, which helps them uncover their full potential. Breathing techniques should be utilized in stress management, as the direct connection between breathing and the physiological arousal system has been shown to yield immediate effects. Breathing exercises have been practiced for thousands of years in Eastern cultures to improve health (Büyükaslan, 2023). Breathing physically regulates various bodily functions, such as electrolyte balance, hemoglobin chemistry, blood flow, and kidney function, directly influencing body chemistry. Mentally, breathing plays a role in emotions, focus, motivation, perception, memory, and other

behaviors, all of which adhere to the same learning principles. However, very few people are aware of these broader benefits (Önal, 2023).

1.2. MINDFULNESS

The concept of mindfulness originated approximately 2,500 years ago in the Pali language. The term "Sati," meaning mindfulness, refers to the pure attention directed toward present experiences in this language (Özen, 2017). Mindfulness is defined as the ability to remain present in the moment by focusing attention with a non-judgmental and accepting attitude, and directing attention to the present experience (Atalay et al., 2017). According to many clinicians, mindfulness serves as a healing mechanism focused on the underlying causes of a patient's suffering, making it an active and effective part of psychotherapy. The clinical significance of mindfulness practices in addressing psychological challenges such as anxiety, depression, chronic pain, insomnia, and OCD has been well-established (Pollak et al., 2019). Dr. Jon Kabat-Zinn, the person who introduced the term "mindfulness" to the world, believes that it is wonderful that this subject is now widely discussed globally. Kabat-Zinn emphasizes that mindfulness, which is an ancient practice with thousands of years of history, is a way of being. It has been proven that mindfulness practices have a significant impact on people's happiness, health, and well-being (Williams & Pennman, 2011).

In the concept of mindfulness, rather than suppressing or controlling emotionally impactful situations, it is necessary to perceive and regulate our feelings. The phenomenon of mindfulness is also used in the sense of "remembering," but this remembrance is not about recalling events; it is about remembering to be aware. Unpleasant experiences are not attempted to be changed but are attended to and viewed in their entirety (Aktepe & Talan, 2020). In other words, mindfulness does not mean avoiding pain. Pain is like an angry bull: when confined to a small space, it becomes wild and tries to escape, but when placed in an open area, it calms down (Germer, 2020). Mindfulness allows the individual to be present with their attention in the here and now and helps them break free from the automatic "pilot mode" of life. The term "automatic pilot" refers to a mental state where a person acts without being consciously aware of their thoughts and feelings in the present moment (Zümbül, 2021). Mindfulness cannot be fully expressed in words; it must be experienced to be understood.

1.2.1. Affective Mindfulness

Affective mindfulness can be defined as the ability to recognize and identify one's own and others' emotions. Individuals with high emotional awareness are generally more successful than those with lower emotional awareness in situations such as decision-making and problem-solving. Additionally, individuals with lower emotional awareness tend to experience more negative emotions, have lower self-esteem, and are more socially anxious (Kurt et al., 2015). It is often stated that individuals with low levels of emotional awareness face clinical issues. These problems include depression, post-traumatic stress disorder, substance addiction, emotional eating, schizophrenia, and alexithymia (Tatar et al., 2017). People with emotional awareness can work on reinforcing their positive aspects while managing and controlling the negative aspects that disturb them. Individuals who are aware of their emotions are able to build healthier relationships in daily life, leading to a happier and more productive life. Such individuals become more aware of the psychological needs they require to make their lives more meaningful and can be more successful in their interpersonal relationships (Gençoğlu & Yılmaz, 2013). The stages of emotional awareness include: recognizing emotions, taking responsibility for them, distinguishing between emotion and thought, considering emotions when making decisions, understanding and considering others' emotions, and being able to transform emotions into energy. By applying these stages, we can become happier and more successful (Özen, 2017).

1.2.2.Cognitive Mindfulness

Mindfulness also supports better cognitive functioning and flexibility. A study has shown that participating in mindfulness training leads to increases in working memory and sustained attention. Some researchers suggest that mindfulness is a form of "mental training" that includes self-regulation of attention and cognitive inhibition, which refers to the ability to control involuntary thoughts, emotions, or behaviors. Therefore, mindfulness can encourage better executive functions and prevent cognitive errors that contribute to aggressive behaviors (Borders, Earleywine, Jajodia, 2010).

Grossman and colleagues summarize the fundamentals of the mindfulness approach as follows: People are often not fully aware of their present experiences and tend to operate in "automatic pilot" mode. Another important aspect is that we can develop the ability to sustain attention on mental

content, and this development requires gradual, progressive, and regular practice. Moreover, the immediate awareness of experience will provide a more vivid sense of life as the experience becomes more active and alive, with active participation in mindfulness without unconscious reactivity. The continuous, non-judgmental observation of mental content will make perceptions more realistic, and by more accurately perceiving one's mental reactions to both internal and external stimuli, a greater sense of control is gained (Crane, 2004).

1.3. STRESS

Stress, a concept derived from the Latin word "estrictia," which has been used to describe hardship, sorrow, disaster, and calamity, has been recognized since the 17th century. It is a phenomenon we encounter at every stage of life, both personally and organizationally in the context of work and life (Sardarov, 2012). Stress is not a spontaneous occurrence; it requires the person to be affected by changes in their environment. For stress to occur, certain biochemical changes must take place in the affected individual's body, activating the body's systems (Güçlü, 2001). Stress is a physiological state resulting from the activation of the sympathetic nervous system, often leading to a fight-or-flight response. This response has a significant impact on our physiology, causing muscle tension, increased resistance to blood circulation, higher blood pressure to pump blood to the tensed muscles, increased heart rate, dilation of bronchioles, and increased oxygen delivery to the cells. Additionally, the liver releases extra sugar into the bloodstream (Rosenberg, 2020).

1.3.1.Effect of Breathing Practices on Stress Reduction

In Western culture, breathing techniques have been developed independent of religious or spiritual beliefs and are primarily used for therapeutic purposes today (e.g., biofeedback, progressive relaxation, autogenic training). These breathing techniques are often referred to as slow breathing and are based on slowing the rate of breath. Slow breathing is associated with relaxation and feeling good, whereas rapid breathing is often linked with anxiety and stress (Zaccaro et al., 2018).

The autonomic nervous system is responsible for regulating internal bodily states, such as blood pressure, heart rate, and digestion. In the fight-or-flight response, the sympathetic branch is activated. During this response, the brain and nervous system are sequentially triggered, leading to the release of catecholamines and cortisol, stress hormones that prepare the body for quick action. This heightened arousal increases sensory perception to process information quickly—pupils dilate to take in more light, hearing sharpens, and body hairs stand up to increase sensitivity to the environment. We become alert and focused. Blood pressure and heart rate rise, and more blood and energy are sent to the limbs, preparing the body for either fight or flight. Meanwhile, digestion is halted by the parasympathetic branch. The parasympathetic branch's role is to slow down and calm the body. While the sympathetic branch stimulates the heart under stress, the parasympathetic branch slows it down as the body recovers. The vagus nerve plays a crucial role in managing stress. High vagal tone is associated with calmness, rapid stress recovery, and positive emotions, whereas low vagal tone is linked to stress and anxiety. Slowing down the breath increases vagal tone (Kabat-Zinn, 2021; Zautra, 2010).

1.3.2.Diaphragmatic Breathing

Diaphragmatic (abdominal) breathing involves deep breathing in which the lungs expand towards the diaphragm rather than the abdomen or ribs. Diaphragmatic breathing techniques focus on inhaling deeply through the nose and expanding the abdomen, often involving counting breaths to slow the pace of breathing. This technique helps reduce the respiratory rate by establishing an inhalation-exhalation rhythm. Deep breathing increases blood circulation, lowers heart rate and blood pressure, enhances vagal activity, and reduces sympathetic responses. Diaphragmatic breathing does not require any equipment or a special environment, making it easy to learn and cost-effective. It is also a self-applicable practice when a person identifies a stress trigger, providing an easily accessible means of managing stress. Diaphragmatic breathing has been shown to be beneficial for both physical and mental health.

Breathing exercises are a mind-body practice used for their positive effects in disease treatment and symptom management. They should be applied regularly for stress management, psychophysiological condition control, organ function improvement, and relaxation. Proper breathing is the first step in promoting relaxation, as it helps keep the autonomic nervous system from being dominated by the sympathetic branch and encourages parasympathetic activity. During correct and deep breathing, blood vessels expand, allowing oxygen to reach the body's extremities, thus breaking

the chain of stress, including anxiety. A study examining the effects of breathing exercises on hormones and enzyme levels revealed a significant reduction in cortisol levels and suggested that breathing exercises can be used to reduce stress factors as a relaxation technique (Özkan, 2024). The voluntary modulation of breathing rate provides a channel to shape autonomic activity, leading to beneficial effects on cardiovascular and psychological health (Critchley et al., 2015).

1.4. Lung Capacity

Lung capacity can be explained with the following terms (Vagas & Akgül, 2012).

Inspiratory Capacity: It is the sum of the inspiratory reserve volume and tidal volume.

Functional Residual Capacity: It is the sum of the residual volume and expiratory volume. This refers to the air remaining in the lungs after tidal volume is exhaled.

Vital Capacity (VC) or Forced Vital Capacity (FVC): It is the sum of the expiratory reserve volume, inspiratory reserve volume, and tidal volume. It represents the maximum volume of air that can be exhaled after a forceful inhalation.

Total Lung Capacity: This refers to the total amount of air in the lungs after maximum inhalation. It is the sum of the inspiratory reserve volume, expiratory reserve volume, tidal volume, and residual volume.

Forced Expiratory Volume in 1 second (FEV1): It refers to the volume of air exhaled in the first second during a forceful and maximal exhalation

Lung capacity refers to the amount of air inhaled into or exhaled from the lungs and is measured in liters (L). The total volume of air voluntarily moved from full inspiration to maximum expiration in a single breath is called *vital capacity (VC)*, or more specifically *forced vital capacity (FVC)*. FVC typically ranges from 4-5L in healthy young males and 3-4L in young females. Forced Vital Capacity (FVC) is defined as the total volume of air exhaled after a maximal inhalation to maximum exhalation, or the total volume of air expelled into a spirometer during the exhalation phase (Abushakra & Faezipour, 2012).

2.METHOD

2.1.Participants

In this study, 36 students voluntarily participated from Bandırma Onyedi Eylül University. The experimental group was selected from outside the Department of Physical Education and Sports, while the control group was selected from within the same department in a random way.

2.2.Procedure

The breathing exercises were administered three days per week, each session lasting one hour, over the course of eight weeks. Prior to and following the intervention, participants' perceived stress levels, as well as their cognitive and affective awareness, were assessed using standardized scales, while lung capacity was measured via spirometry. An experimental model was employed in the study.

2.3.Measures

Various tools were employed for data collection, including a Personal Information Inventory, the Cognitive and Affective Awareness Scale, the Perceived Stress Scale, and a Spirometer.

Personal Information Inventory: This form gathered basic information such as name, surname, gender, and whether the participant had any existing health conditions.

Cognitive and Emotional Awareness Scale: To assess cognitive and emotional awareness, various self-report tools are used. The Cognitive and Emotional Awareness Scale (CAMS-R), consisting of 10 items, was evaluated for its psychometric properties in two separate studies conducted on non-clinical Turkish samples. In the first study, the psychometric properties of CAMS-R were evaluated using a sample of 265 undergraduate students. The second study extended the evaluation to a sample of 88 white-collar public employees. The results of both studies indicated that the Turkish version of CAMS-R exhibited acceptable internal consistency and demonstrated concurrent and convergent validity. The Cronbach’s Alpha was calculated in order to examine the internal consistency of the Turkish CAMS-R. The Cronbach’s Alpha value found for the questionnaire was .73 which indicated that the CAMS-R Turkish version possessed an acceptable level of internal consistency . The results showed that the Turkish version of CAMS-R demonstrated accepted levels of internal consistency. The Cronbach’s Alpha value calculated for Turkish CAMS-R was comparable to values reported by Feldman et al. (2007). Statistically significant relationships were found between the Turkish CAMS-R and variables such as depression, well-being, anxiety, and perceived stress. These

findings suggest that CAMS-R maintains its psychometric properties in a non-Western culture and is a valid tool for measuring awareness in the Turkish population (Catak, P., 2012).

Perceived Stress Scale: Developed by Cohen, Kamarck, & Mermelstein in 1983, the Perceived Stress Scale has a Cronbach Alpha value of 0.86 in its reliability study. It was adapted to Turkish by Bilge, Öğce, Genç, and Oran (2007), showing a Cronbach Alpha value of 0.81 in its reliability study. The scale is a 5-point Likert-type scale (0: never, 4: very often), where three items are reverse-coded (items 4, 5, and 6), and the remaining five items are straight. The total score ranges from 0 to 32. It includes two subscales: perceived stress (items 1, 2, 3, 7, 8) and perceived coping (items 4, 5, 6). The scale is evaluated based on the total score as well as subscale scores. A higher total score indicates higher perceived stress, and higher scores on the coping subscale indicate more negative responses to stress (Bilge, A., et al., 2009).

Spirometer: Before starting the breathing exercises, students were gathered, and measurements were taken using a spirometer. Measurements were taken as pre-tests and post-tests for the experimental group before and after breathing exercises, while the control group did not engage in any exercise.

2.4..DataAnalysis

Data collected through the Personal Information Inventory, Perceived Stress Scale, Cognitive and Emotional Awareness Scale, and Spirometer were analyzed using the SPSS 24.0 (Statistical Package for the Social Sciences) software. Data were processed and analyzed with the consideration of dependent and independent variables. Statistical results were accepted at a 95% confidence level and a significance threshold of $p < 0.05$.

3. FINDINGS

Table 3.1: Results of the Cognitive and Affective Awareness Scale

	Groups	Mean	Std. Deviation	N	
PRETEST	Experiment	2,8333	,46273	18	F= 5.71
	Control	2,9444	,30141	18	P= 0,023
	Total	2,8889	,38898	36	Partial Eta Squared= 0,144
POSTTEST	Experiment	3,0500	,27062	18	
	Control	3,0333	,29704	18	
	Total	3,0417	,28018	36	

A Repeated Measures ANOVA was conducted to compare the scores of the Cognitive and Affective Awareness Scale administered at multiple time points. The analysis revealed the following results:

At the conclusion of the 8-week period, $F = 5.71$, $p = 0.023$, and Partial Eta Squared = 0.144, indicating a large effect size.The Time × Group interaction was examined, yielding $F = 0.99$, $p = 0.325$, and Partial Eta Squared = 0.029, which suggests a small effect size.When examining the inter-group differences, the analysis showed $F = 0.251$, $p = 0.619$, and Partial Eta Squared = 0.07, indicating a medium effect size.At the end of the 8-week intervention, the experimental group demonstrated significantly higher scores on the cognitive and emotional awareness scale compared to the control group ($F = 5.71$, $p = 0.023$).

	Groups	Mean	Std. Deviation	N	
PRETEST	Experiment	3,3819	,40328	18	F=0.05

	Control	2,9583	,40220	18	P= 0,81 Partial Eta Squared= 0,002
	Total	3,1701	,45134	36	
POSTTEST	Experiment	3,0903	,33707	18	
	Control	3,2083	,44557	18	
	Total	3,1493	,39395	36	

Table 3.2. Perceived Stress Scale Results

A Repeated Measures ANOVA was employed to compare the scores on the Perceived Stress Scale. The results of the analysis indicated the following:

At the conclusion of the 8-week period, the results showed F = 0.05, p = 0.81, and Partial Eta Squared = 0.002, suggesting a negligible effect size.The Time × Group interaction was examined, revealing F = 9.80, p = 0.004, and Partial Eta Squared = 0.224, indicating a large effect size. In terms of inter-group differences, the analysis yielded F = 2.288, p = 0.140, and Partial Eta Squared = 0.06, which corresponds to a medium effect size. The analysis of perceived stress did not reveal a significant difference between the groups (F = 0.05, p = 0.81, Partial Eta Squared = 0.002). However, the Time × Group interaction yielded significant findings (F = 9.80, p = 0.004, Partial Eta Squared = 0.224), indicating a large effect. This suggests that, over the course of the 8-week intervention, the experimental group, who participated in breathing exercises, experienced a significant reduction in perceived stress levels.

Table 3.3 FVC (Forced Vital Capacity) Results

	Groups	**Mean**	**Std. Deviation**	**N**	
FVC (pre)	Experiment	4,0194	1,04698	18	F=3.70 P= 0,06 Partial Eta Squared = 0,09
	Control	4,3917	,95738	18	
	Total	4,2056	1,00660	36	
FVC (post)	Experiment	4,6506	,88146	18	
	Control	4,4683	1,01836	18	
	Total	4,5594	,94320	36	

A Repeated Measures ANOVA was conducted to assess the changes in FVC (Forced Vital Capacity) over time. The results of the analysis were as follows:

At the conclusion of the 8-week intervention, the FVC values approached statistical significance (F = 3.70, p = 0.06, Partial Eta Squared = 0.09), indicating a medium effect size.The Time × Group interaction yielded significant findings (F = 6.02, p = 0.019, Partial Eta Squared = 0.150), suggesting a large effect size. These findings imply that the breathing exercises contributed to a notable increase in respiratory capacity over the 8-week period. When examining the inter-group differences, no statistically significant differences were observed (F = 0.68, p = 0.414, Partial Eta Squared = 0.020), indicating a small effect size.

Table 3.4. FEV1 (Forced Expiratory Volume 1) Results

	Groups	**Mean**	**Std. Deviation**	**N**	
FEV1 (pre)	experiment	2,8039	,84777	18	F=12,41 P= 0,01 Partial Eta Squared =0,267
	control	3,6156	1,12027	18	
	Total	3,2097	1,06211	36	
FEV1 (post)	experiment	3,8511	,63000	18	
	control	3,6011	1,08521	18	
	Total	3,7261	,88367	36	

A Repeated Measures ANOVA was conducted to evaluate the differences in FEV1 (Forced Expiratory Volume in 1 second) values across repeated measures. The analysis yielded the following results:

At the conclusion of the 8-week intervention, a statistically significant difference in FEV1 values was observed (F = 12.41, p = 0.01, Partial Eta Squared = 0.267), indicating a large effect size. The Time × Group interaction similarly revealed a significant difference (F = 13.11, p = 0.001, Partial Eta Squared = 0.278), with a large effect size, further suggesting a pronounced impact of the intervention over time. Upon examining the inter-group differences, no significant differences were observed (F = 1.02, p = 0.31, Partial Eta Squared = 0.029), indicating a small effect size. The results demonstrated that the experimental group exhibited a marked improvement in FEV1 compared to the control group (F = 12.41, p = 0.01), signifying a substantial effect at the 8-week assessment. Furthermore, the Time × Group interaction revealed a robust effect (F = 13.11, p = 0.001), reinforcing the conclusion that breathing exercises had a significant positive influence on pulmonary function.

Table 3.5 FEV1/ FVC Results

	Groups	Mean	Std. Deviation	N	
FEV1/FVC (pre)	Experiment	71,856	17,9814	18	F= 3,70
	Control	81,528	14,7869	18	P=0,06
	Total	76,692	16,9501	36	Partial Eta Squared =0,098
FEV1/FVC (post)	Experiment	83,656	8,4304	18	
	Control	80,100	11,9064	18	
	Total	81,878	10,3261	36	

A Repeated Measures ANOVA was performed to assess changes in the FEV1/FVC ratio over time. The results of the analysis are summarized as follows:

At the conclusion of the 8-week intervention, a noticeable improvement in the FEV1/FVC ratio was observed, although the differences did not attain statistical significance (F = 3.70, p = 0.063, Partial Eta Squared = 0.098), indicating a moderate effect size. The analysis of the Time × Group interaction revealed a statistically significant relationship (F = 6.02, p = 0.019, Partial Eta Squared = 0.150), indicating a large effect size. Examination of the inter-group differences yielded no statistically significant findings (F = 0.68, p = 0.414, Partial Eta Squared = 0.020), suggesting a small effect size.

While a significant improvement in the FEV1/FVC ratio was observed over time, the effect size for the between-group differences was relatively small (F = 3.70, p = 0.06). However, the Time × Group interaction revealed a significant and substantial improvement (F = 6.02, p = 0.019), suggesting that the intervention had a meaningful impact on the FEV1/FVC ratio, particularly when considering the temporal dimension.

4.CONCLUSIONS AND RECOMMENDATIONS

This study investigated the effects of regular breathing exercises on lung capacity, cognitive and emotional awareness, and stress levels in university students.

Physical Effects: The findings of the study suggest that students engaging in regular breathing exercises exhibited a modest yet statistically significant improvement in their lung capacity. These results substantiate the potential of breathing exercises in enhancing respiratory function.

Cognitive and Affective Awareness: The implementation of breathing exercises resulted in a significant increase in cognitive awareness, indicating that such practices can facilitate the enhancement of attention and concentration skills. Furthermore, a marked improvement in affective awareness was observed, suggesting that the exercises contributed to strengthening self-awareness and emotional regulation capabilities.

Stress Levels: While no statistically significant differences were observed between the groups, the experimental group exhibited substantial changes over time, with these alterations yielding a considerable effect size. This indicates that breathing exercises may have a positive impact on stress levels, with this effect appearing to intensify over time.

The students who practiced breathing exercises showed improvements in their physical and mental health. In this context, it can be said that the study is consistent with the breathing, body, and

mind research conducted by Gerbarg and Brown, and it is likely to shed light on future studies (Gerbarg and Brown, 2021).

The finding that breathing exercises increase cognitive and emotional awareness highlights the effect of mindfulness-based approaches on breath awareness as one of the key mechanisms. This data aligns with the results of Kabat-Zinn's (1990) Mindfulness-Based Stress Reduction (MBSR) program, which facilitates individuals' ability to connect with themselves. An increase in emotional awareness may enable students to cope more effectively with stress, enhance their emotional regulation capacities, and improve their attention. However, it can be said that these increases should be interpreted cautiously due to variability among students.

In a study by Lee et al. (2023), it was observed that deep and slow breathing significantly improved newly learned cognitive skills and cognitive functions. Moreover, both short-term and long-term effects of deep and slow breathing were confirmed in the experimental groups. These findings suggest that simple breath control techniques may be effective in improving the retention of newly learned cognitive skills and may guide studies investigating cognitive skill acquisition and recall factors.

According to the results of Zaccaro et al.'s study, evidence was found that slow breathing techniques increase psychophysiological flexibility, enhancing parasympathetic activity, central nervous system activities related to emotional control, and connections to psychological well-being in healthy individuals. Specifically, they found reliable relationships between HRV power induced by slow breathing at 6 breaths per minute and positive psychological/behavioral effects, indicated by an increase in EEG alpha waves and a decrease in EEG theta power (Zaccaro et al., 2018).

In a study conducted by Demir V. and A. (2018) with university students, interventions aimed at increasing mindfulness were applied, such as breathing exercises, body awareness, and exercises focusing on emotions related to the present moment. The results from pre-test and post-test showed a significant decrease in the students' average scores on the Perceived Stress Scale.

In a randomized controlled study by Kim K. et al. (2019), 45 elderly women participated, and when breathing practices were added to exercise with an elastic band, the experimental group showed a significant increase in forced vital capacity (FVC), forced expiratory volume in 1 second (FEV1), and FEV1. In another study conducted in South Korea, 30 smokers aged 65 and older participated in breathing exercises three times a week for 6 weeks. As a result, after four weeks, significant improvements were observed in forced vital capacity (FVC), FEV1/FVC ratio, peak expiratory flow (PEF), and rectus abdominis muscle activity (Hyun-Ju et al., 2016).

In terms of generalizability, it is recommended that future studies expand the sample size and duration of the intervention. It is hypothesized that continued practice of breathing exercises could significantly contribute to both cognitive and emotional awareness, particularly in the domain of emotional regulation. Such benefits are likely to positively influence individuals' performance in daily or professional contexts, whether academic or non-academic. External stress factors may also moderate the results. Based on the observed reduction in stress levels, it can be inferred that individuals engaging in breathing exercises may experience long-term improvements in mental health and productivity. Overall, these findings suggest that breathing exercises may provide valuable contributions to existing rehabilitation programs within healthcare.

It should be considered that breathing exercises may offer substantial benefits for students' academic performance and overall well-being on university campuses. Consequently, integrating these exercises into academic curricula or university-related activities should be considered as part of a holistic approach to student health. To facilitate the adoption of breathing exercises as a regular practice, the establishment of support groups or the organization of regular workshops aimed at university students is recommended. These initiatives could encourage students to make breathing exercises a habitual part of their daily routines.While this study primarily focused on the short-term effects, future research should seek to evaluate the long-term impact of breathing exercises. Longitudinal studies would provide a deeper understanding of the sustained benefits and any lasting effects of such interventions. Future investigations should explore the effects of breathing exercises across various demographic groups, including different age cohorts, genders, and cultural contexts. This would enhance the understanding of the generalizability and effectiveness of such interventions in diverse populations. It is advisable to leverage mobile applications and social media platforms to disseminate breathing exercises, thereby broadening access to a larger student demographic and

ensuring the sustainability of these interventions over time. In light of the study's findings, it is recommended that future research expand both the population and sample size, incorporating additional variables to enhance the depth and scope of the investigation.

As with all studies, certain limitations should be acknowledged. The sample in this study was limited to a small group of students from Bandırma Onyedi Eylül University, which restricts the generalizability of the findings to this specific institution or to university students more broadly. Moving forward, it would be beneficial for future research to incorporate data from a variety of sources to strengthen the robustness and generalizability of the findings.

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