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*Review Article*

# Exploring 4-7-8 Breathing for Stress Relief and Improved Quality of Life in Chronic and Degenerative Diseases: A Scoping Review

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**Abstract:** Chronic and degenerative diseases have a profound effect on patients' overall well-being, often accompanied by psychological distress such as anxiety and chronic stress. While pharmacological treatments are commonly used, they may have limitations, including accessibility issues and side effects, which have prompted interest in non-pharmacological interventions. This scoping review aims to systematically map and synthesize the empirical evidence on the physiological and psychological effects of the 4-7-8 breathing technique, a structured slow-breathing method that involves inhaling for 4 seconds, holding the breath for 7 seconds, and exhaling for 8 seconds. The review adhered to PRISMA-ScR guidelines and included 15 studies published between 2013 and 2024. These studies examined diverse populations and employed various methodological approaches. The findings were categorized into five major themes: (1) the 4-7-8 technique's effectiveness in reducing stress and anxiety, (2) improvements in cardiovascular markers such as heart rate variability and blood pressure, (3) its adaptability in both clinical and community-based multimodal interventions, (4) its preventive benefits for healthy individuals, and (5) its impact on parasympathetic activity via vagal pathways, enhancing autonomic regulation and emotional stability. The technique is supported by both theoretical and empirical evidence, positioning it as an accessible, low-cost psychoregulatory intervention. The results suggest that the 4-7-8 breathing technique could play a key role in holistic nursing care, health education, and public health promotion strategies, offering a simple yet effective approach to managing stress, improving mental health, and enhancing cardiovascular health. Future studies could explore long-term benefits and its integration into more diverse health interventions.

**Keywords:** 4-7-8 breathing, chronic illness, quality of life, slow breathing, stress reduction

## 1. Introduction

The global burden of chronic and degenerative diseases is increasing every year, triggering serious impacts on the quality of life of sufferers. Chronic and degenerative diseases such as hypertension, diabetes mellitus, coronary heart disease, and chronic obstructive pulmonary disease (COPD) have become a major cause of morbidity and reduced quality of life worldwide (Pandekar & Thangavelu, 2019). Physiological instability, physical activity limitations, and psychological disorders such as anxiety and chronic stress are major challenges in the long-term care of these diseases. Poorly managed psychological conditions not only worsen the perception of illness but can also disrupt autonomic nervous system regulation, impede healing, and increase the risk of complications (Aktaş & İlgin, 2023).

Along with the limitations of pharmacological therapies that can cause side effects and limited patient access to health services, non-pharmacological approaches have become

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an alternative in patient care (Marchant, 2025). One of them is the 4-7-8 breathing technique, which is a slow and controlled breathing technique that is physiologically known to activate the parasympathetic nervous system, reduce sympathetic activity, and stabilize cardiovascular function and stress response (Vierra et al., 2022). The 4-7-8 breathing technique-which consists of a pattern of inhaling for 4 seconds, holding the breath for 7 seconds, and exhaling for 8 seconds-is one of the simple relaxation techniques that has gained widespread attention due to its ease of implementation and potential benefits (Zahra et al., 2023).

The technique was first introduced by Dr. Andrew Weil as an adaptation of pranayama in yoga, and has been widely applied in psychotherapy practice and stress management training (Naugle, 2024). Several studies have explored the effectiveness of this technique in various populations. Pandekar and Thangavelu (2019) reported that the use of the 4-7-8 technique in COPD patients was able to significantly reduce anxiety and depression, and improve breathing capacity, as measured using the Modified Medical Research Council dyspnea scale and the Hospital Anxiety and Depression Scale (HADS) (Willi, 2023). The study by Aktaş and İlgin (2023) on post-bariatric patients also showed that this technique was effective in reducing anxiety and improving overall quality of life scores. Physiologically, according to Vierra et al. (2022) explained that this technique can increase heart rate variability and decrease systolic blood pressure in young adults, even after sleep deprivation conditions, which indicates the activation of the parasympathetic nervous system, all of which indicate the body's relaxation response to stress.

The study by Marchant (2025) did show that rhythmic breathing at a rate of 6 breaths per minute resulted in a greater increase in heart rate than 4-7-8, but there was no significant difference in blood pressure or mood, indicating that the 4-7-8 technique remains relevant, and practical due to its ease of application. The 4-7-8 technique targets neurophysiological pathways directly related to emotion regulation and autonomic function. This activity stimulates the vagus nerve and increases baroreceptor sensitivity, which in turn decreases sympathetic activity and increases a sense of calm (Willi, 2023). This review article aims to present a systematic review of empirical evidence evaluating the impact of the 4-7-8 breathing technique on the quality of life of patients with chronic and degenerative diseases. Special focus is given to physiological (such as blood pressure, heart rate) and psychological (such as anxiety and stress) indicators. The results of this review are expected to provide a scientific foundation for the integration of the 4-7-8 technique as part of evidence-based chronic disease management strategies.

## 2. Proposed Method

This scoping review was prepared based on the PRISMA-ScR guidelines (Tricco et al., 2018) designed to map the available literature, identify research gaps, and systematically synthesize findings without critically evaluating the quality of evidence. This approach was

deemed appropriate to explore the diversity of research designs, contexts, and populations related to the 4-7-8 breathing technique and its variants.

### 2.1. Research Question

This review was directed by the main question: "What are the empirical findings regarding the effectiveness of the 4-7-8 breathing technique in improving psychological and physiological health in various populations?"

### 2.2 Inclusion and Exclusion Criteria

The criteria for articles that the authors wanted were the inclusion criteria: Primary research articles or reviews (literature, systematic, or narrative) published between 2013-2024; addressing the 4-7-8 breathing technique or structured slow breathing of similar duration; published in English or Indonesian; available in full access; reporting quantitative or qualitative results relevant to psychological or physiological indicators. Exclusion criteria: Opinion articles, editorials, conference abstracts without complete data, animal studies, or irrelevant breath interventions (e.g. hyperbolic breath, wim hof, etc.).

### 2.3 Search Strategy and Data Sources

Literature was obtained from two main sources, namely 1) International electronic databases such as PubMed, Scopus, and Wiley Online Library, using the keywords: "4-7-8 breathing", "slow breathing", "breath regulation", "stress", "anxiety", 'HRV', "quality of life". 2) Supporting documents obtained from user-curated files and manually reviewed for content appropriateness.

### 2.4 Study Selection

The selection process was conducted in two stages, namely 1) Title and abstract screening to assess initial relevance based on inclusion criteria. 2) Full text review to ensure study eligibility and availability of synthesizable data. The selection process was conducted independently by two reviewers. Differences of opinion were resolved through discussion to reach consensus as shown in Figure 1.

### 2.5 Data Extraction and Synthesis

Data were extracted using an Excel-based worksheet that included: author name, year of publication, article title, study design, population, methods and measurement tools, and main results as in Table 1. Extraction was performed by one reviewer and verified by a second reviewer to ensure accuracy. Data synthesis was conducted through an inductive thematic analysis approach.

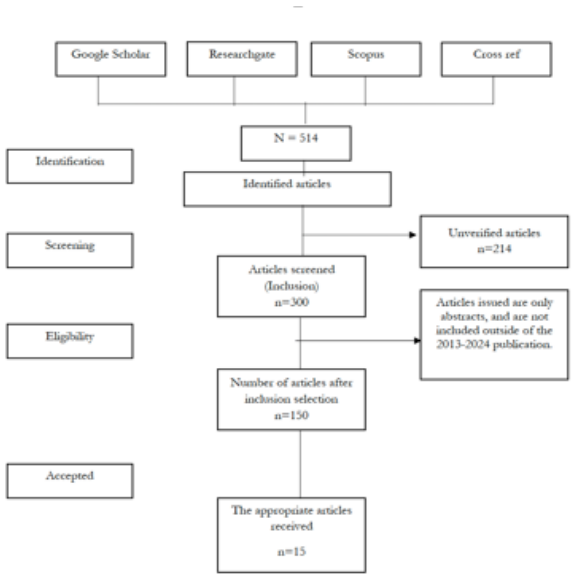


**Figure 1.** PRISMA diagram scoping review

## 4. Results and Discussion

The synthesized results were presented in the form of narratives and thematic tables illustrating the relationship between study design, population, and key outcomes (Table 1). The PRISMA flowchart was used to illustrate the article selection process.

4.1. Scoping Review

**Table 1.** Scoping review of articles

| No | Author and Year | Title | Study Design | Methods and Measurement Tools | Key Findings |
|---|---|---|---|---|---|
| 1 | Diva Azalia Karangan *et al.*, 2024 | The Effect of the Combination of Deep Breath Relaxation 4-7-8 Method and Classical Music on Anxiety Levels in Preoperative Patients Undergoing Spinal Anesthesia | Quasi-experimental | Pretest-posttest with control group | Combination of 4-7-8 breathing and classical music significantly reduced anxiety in preoperative spinal anesthesia patients (p=0.000) |
| 2 | Ryota Kobayashi & Hideyuki Negoro, 2024 | Acute Effects of the 4-4-8 Breathing Technique on Arterial Stiffness in Healthy Young Men | Two-condition crossover experiment | cfPWV, baPWV, HRV measurement | Reduced blood pressure and increased parasympathetic activity after 30-minute intervention |
| 3 | Riska Cahyani Zahra *et al.*, 2023 | Foot Reflexology and 4-7-8 Breathing Exercise as Supporting Therapy... | Evidence-based practice report | Case study of 3 ICU patients | Reduced anxiety and stabilized vital signs in ICU patients |
| 4 | Joshua Marchant, 2025 | Comparing the Effects of Square, 4-7-8... | Randomized experiment | n=84, repeated-measures model, | 6 breaths/min most effective for HRV; 4-7-8 increased $CO_2$ retention |

| No | Author and Year | Title | Study Design | Methods and Measurement Tools | Key Findings |
|---|---|---|---|---|---|
| | | | | SPANE, $CO_2$ monitor | |
| 5 | Taylor Willi, 2023 | Investigation of an Ultra-Brief Breathing Technique... | Randomized controlled trial (RCT) | n=109, STICSA, PANAS, HRV | 4-7-8 breathing reduced cognitive anxiety after 8 weeks |
| 6 | Linda Myerholtz, 2023 | Take a Deep Breath | Professional reflection | Mindful breathing, clinical practice experience | Mindful breathing stimulates the vagus nerve and promotes calmness |
| 7 | Amy Naugle, 2024 | The Use of Diaphragmatic Breathing Techniques to Reduce Stress... | DNP implementation project | Pre-licensure nurses, RSQ survey | 4-7-8 breathing × 3 cycles reduced stress before exams |
| 8 | Pratibha Pandekar & Poovishnu Devi, 2019 | Effect of 4-7-8 Breathing Technique on Anxiety and Depression in COPD Patients | Two-group RCT | n=87, MMRC, HADS | 4-7-8 technique effectively reduced anxiety, depression, and dyspnea |
| 9 | Gülfidan Kurt Aktaş & Vesile İlgin, 2023 | The Effect of Deep Breathing and 4-7-8 Techniques After Bariatric Surgery | Three-group RCT | n=90, STAI, Obesity QoL scale | 4-7-8 breathing reduced anxiety and improved quality of life |
| 10 | Jaruwan Vierra *et al.*, 2022 | Effects of Sleep Deprivation and 4-7-8 Breathing on HRV, BP... | Pre-post experimental study | n=43, HRV, BP, FBG | 4-7-8 breathing improved HRV and reduced blood pressure |
| 11 | Brown R. P. & Gerbarg P. L., 2015 | Sudarshan Kriya Yogic Breathing... | Literature review | Review of deep breathing techniques | 4-7-8 helps manage stress, anxiety, and depression |
| 12 | Telles S. *et al.*, 2013 | Immediate Effect of a Slow Pace Breathing Practice on Anxiety | RCT | n=60, STAI, blood pressure | Slow breathing (similar to 4-7-8) reduced anxiety and blood pressure |
| 13 | Ma X. *et al.*, 2017 | The Effect of Diaphragmatic Breathing on Attention and Stress | Randomized experiment | n=40, HRV, STAI, salivary cortisol | Improved attention and reduced biological and psychological stress |
| 14 | Zaccaro A. *et al.*, 2018 | How Breath-Control Can Change Your Life: A Systematic Review... | Systematic review | 15 studies, HRV, EEG, EMG, stress hormones | Slow breathing enhances parasympathetic function and mental health |
| 15 | Saoji A. A. *et al.*, 2019 | Effects of Yogic Breathing Techniques on HRV and Stress | RCT | n=60 students, HRV, PSS-10 | Rhythmic breathing (similar to 4-7-8) increased HRV and reduced stress |

Based on the results table above, five main themes summarize the contribution of the 4-7-8 technique in psychophysiological interventions. To systematically identify the scope, direction, and consistency of evidence related to the 4-7-8 breathing technique, these include:

Theme 1: Effectiveness of the 4-7-8 Breathing Technique as a Psychophysiological Intervention for Stress and Anxiety Reduction

The 4-7-8 breathing technique has been widely researched as an effective strategy in reducing stress and anxiety. Various studies have shown that this practice is capable of producing positive impacts both psychologically and physiologically. For example, Paul & Garg (2012) found that post-bariatric surgery patients experienced decreased anxiety and improved quality of life after performing the 4-7-8 breathing exercise. Similarly, Pandekar and Thangavelu (2019) reported decreased anxiety and depression in COPD patients after a similar intervention. In a population of nursing students, the 4-7-8 technique helped reduce stress levels ahead of exams (Naugle, 2024). The physiological mechanism involves increased parasympathetic activity through stimulation of the vagus nerve, which elicits a relaxation response (Brown & Gerbarg, 2015; Telles et al., 2013). These findings support the adoption of the 4-7-8 technique as an easy-to-implement psychophysiological intervention for managing stress and anxiety.

Theme 2: Effects of Structured Breathing Techniques on Cardiovascular and Autonomic Physiological Parameters

Structured breathing techniques, including 4-7-8, have been shown to have significant physiological impacts, especially on cardiovascular and autonomic parameters. Kobayashi and Negoro (2024) reported that the 4-4-8 breathing technique acutely decreased arterial stiffness and increased parasympathetic activity. The study by Vierra et al. (2022) showed increased heart rate variability (HRV), decreased blood pressure, and improved endothelial function after breathing intervention. In addition, Ma et al. (2017) found that diaphragmatic breathing improved attention and decreased biological stress, indicated by a decrease in salivary cortisol. These effects confirm that slow breathing, such as 4-7-8, can serve as an effective non-pharmacological intervention in improving cardiovascular health and regulating the autonomic nervous system.

Theme 3: Integration of 4-7-8 Breathing Technique in Multimodal Interventions in Clinical and Community Contexts

The 4-7-8 breathing technique shows great flexibility to be integrated into multimodal intervention approaches, both in clinical and community settings. Sharma & Rush (2014) reported that the combination of the 4-7-8 technique with foot reflexology significantly decreased the anxiety of ICU patients. Similarly, Karangan et al. (2024) showed that the combination of 4-7-8 breathing with classical music provides a synergistic effect in reducing preoperative anxiety. This integrative approach harnesses the power of simple and inexpensive breathing techniques, making it applicable in a variety of community-based mental health intervention programs as well as in healthcare institutions.

Theme 4: Effectiveness of the 4-7-8 Technique in Preventive Contexts and Non-Clinical Populations

Outside of clinical populations, the 4-7-8 technique is also effective as a preventive intervention for healthy populations. Zope & Zope (2013) found that 4-7-8 breathing

exercises improved mood and $CO_2$ tolerance in healthy participants. Willi (2023) reported that the technique was effective in reducing cognitive anxiety in university students over an eight-week intervention period. Ma et al. (2017) also showed that slow breathing improved attention and reduced stress in healthy individuals. The preventive potential of this technique reinforces its relevance in mental health promotion programs and the development of stress resilience in the wider community.

Theme 5: Theoretical Validation and Empirical Consistency of Slow Breathing Techniques as Psychoregulatory Interventions

There is a strong theoretical foundation and consistent empirical evidence supporting the effectiveness of slow breathing techniques, including 4-7-8, as psychoregulatory interventions. Zaccaro et al. (2018), in their systematic review, showed that slow breathing improves sympatho-vagal balance, improves heart rate variability, and decreases stress hormones. Perciavalle et al. (2017) highlighted the role of breathing techniques in the modulation of the autonomic nervous system, with beneficial applications for the management of stress, anxiety, and depression. These findings strengthen the position of the 4-7-8 technique as an effective, evidence-based strategy in improving psychological and physiological well-being (Priasmoro et. al, 2023).

## 5. Conclusions

The 4-7-8 breathing technique has been shown to be effective as a psychophysiological intervention to reduce stress and anxiety through increased parasympathetic activity and modulation of the autonomic nervous system. It has shown a positive impact on cardiovascular parameters, including improved heart rate variability and reduced blood pressure. While the technique can be applied independently, it is also effective when incorporated in multimodal interventions in clinical and community contexts. Its effectiveness is also valid in non-clinical populations as a preventive intervention. Consistent empirical and theoretical evidence supports the 4-7-8 technique as an accessible and evidence-based psychoregulatory strategy.

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## References

Aktaş, G. K., & İlgin, V. (2023). The effect of deep breathing exercise and 4-7-8 breathing techniques applied to patients after bariatric surgery on anxiety and quality of life. *Obesity Surgery, 33*, 920-929. https://doi.org/10.1007/s11695-022-06405-1

Brown, R. P., & Gerbarg, P. L. (2005). Sudarshan Kriya yogic breathing in the treatment of stress, anxiety, and depression: Part II-Clinical applications and guidelines. *Journal of Alternative and Complementary Medicine, 11*(4), 711-717. https://doi.org/10.1089/acm.2005.11.711

Brown, R. P., & Gerbarg, P. L. (2015). Sudarshan Kriya yogic breathing in the treatment of stress, anxiety, and depression: Part I-Neurophysiologic model. *Journal of Alternative and Complementary Medicine, 21*(3), 167-173. https://doi.org/10.1089/acm.2013.0337

Karangan, D. A., Siregar, A., Halim, A., & Simanjuntak, R. (2024). The effect of the combination of deep breath relaxation 4-7-8 method and classical music on anxiety levels preoperative patients with spinal anesthesia. *Jurnal Teknologi Kesehatan, 20*(1). https://doi.org/10.29238/jtk.v20i1.2355

Kobayashi, R., & Negoro, H. (2024). Acute effects of the 4-4-8 breathing technique on arterial stiffness in healthy young men. *Cardiology Journal, 31*(3), 418-426. https://doi.org/10.5603/CJ.96299

Ma, X., et al. (2017). The effect of diaphragmatic breathing on attention, negative affect, and stress in healthy adults. *Frontiers in Psychology, 8*, 874. https://doi.org/10.3389/fpsyg.2017.00874

Ma, X., Yue, Y., Gong, Y., Zhang, H., Duan, H., Shi, W., & Wang, D. (2017). The effect of diaphragmatic breathing on attention, negative affect, and stress in healthy adults. *Frontiers in Psychology, 8*, 874. https://doi.org/10.3389/fpsyg.2017.00874

Marchant, J. (2025). Comparing the effects of square, 4-7-8, and 6 breaths-per-minute breathing conditions on heart rate variability, $CO_2$ levels, and mood. *Thesis, Brigham Young University*. https://doi.org/10.1007/s10484-025-09688-z

Naugle, A. (2024). The use of diaphragmatic breathing techniques to reduce stress in pre-licensure nursing students. *Gardner-Webb University*.

Pandekar, P., & Thangavelu, P. D. (2019). Effect of 4-7-8 breathing technique on anxiety and depression in moderate COPD patients. *International Journal of Health Sciences and Research, 9*(5), 209-214.

Paul, M., & Garg, K. (2012). The effect of deep breathing on stress. *Indian Journal of Physiology and Pharmacology, 56*(2), 183-187.

Perciavalle, V., Di Corrado, D., Blandino, M., Fecarotta, P., Gagliardo, A., & Coco, M. (2017). The role of deep breathing on stress. *Neurological Sciences, 38*(3), 451-458. https://doi.org/10.1007/s10072-016-2790-8

Priasmoro, D. P., & Lestari, R. (2023). Prevalence of a sedentary lifestyle as a predictor of risk of chronic diseases and stress levels in Malang, Indonesia. *Malaysian Journal of Public Health Medicine, 23*(1), 11-16. https://doi.org/10.37268/mjphm/vol.23/no.1/art.1346

Saoji, A. A., Raghavendra, S., & Manjunath, S. (2019). Effects of yogic breathing techniques on heart rate variability and perceived stress in healthcare students: A randomized controlled trial. *Journal of Ayurveda and Integrative Medicine, 10*(3), 201-205. https://doi.org/10.1016/j.jaim.2018.06.008

Sharma, M., & Rush, S. E. (2014). Mindfulness-Based Stress Reduction as a Stress Management Intervention for Healthy Individuals: A Systematic Review. *Journal of Evidence-Based Complementary & Alternative Medicine, 19*(4), 271-286. https://doi.org/10.1177/2156587214543143

Telles, S., Singh, N., & Balkrishna, A. (2013). Immediate effect of a slow pace breathing practice on anxiety. *Indian Journal of Physiology and Pharmacology, 57*(4), 414-420.

Tricco, A. C., et al. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. *Annals of Internal Medicine, 169*(7), 467-473. https://doi.org/10.7326/M18-0850

Vierra, J., Boonla, O., & Prasertsri, P. (2022). Effects of sleep deprivation and 4-7-8 breathing control on heart rate variability, blood pressure, blood glucose, and endothelial function in healthy young adults. *Physiological Reports, 10*. https://doi.org/10.14814/phy2.15389

Willi, T. S. (2023). Investigation of an ultra-brief breathing technique for the treatment of physiological and psychological markers of anxiety. *Dissertation, Simon Fraser University*.

Zaccaro, A., et al. (2018). How breath-control can change your life: A systematic review on psycho-physiological correlates of slow breathing. *Frontiers in Human Neuroscience, 12*, 353. https://doi.org/10.3389/fnhum.2018.00353

Zahra, R. C., Dewi, E., & Marumpy, N. (2023). Foot reflexology and 4-7-8 breathing exercise as supporting therapy to reduce anxiety and maintain vital signs of ICU patients. *Jurnal Berita Ilmu Keperawatan, 16*(2), 320-328. https://doi.org/10.23917/bik.v16i2.1936

Zope, S. A., & Zope, R. A. (2013). Sudarshan Kriya Yoga: Breathing for health. *International Journal of Yoga, 6*(1), 4-10. https://doi.org/10.4103/0973-6131.105935