

## THE MECHANISM OF STRESS-REDUCTION BENEFITS OF YOGA FOR BUSINESS STUDENTS

**ANAND N. ASTHANA**

Professor, CENTRUM Católica Graduate Business School (CCGBS), Lima, Perú; Pontificia Universidad Católica Del Perú (PUCP), Lima, Perú. Email: aasthana@pucp.pe

### Abstract

Stress levels of business students are higher than those of other students in higher education. This often results in burnouts. Some studies have found that stress of business students can be reduced through yoga. However, the mechanism through which yoga acts remains unexplored. This study finds that the pranayama (regulated breathing) component of yoga has a significant role in stress reduction of business students. Yoga brings down stress levels both directly and indirectly through improved respiratory efficiency. The effect of yoga through respiratory efficiency is estimated to be 60% of the total effect, while 40% effect comes directly from yoga.

**Keywords:** Business Education, Yoga, Mindfulness, Breathing, Stress.

### INTRODUCTION

Stress may be defined as a non-specific physiological reaction to external and internal demands where individuals feel pressure and threats in their environments [1]. It is often described as the perception of people lacking resources to cope with the current or future course of consequences [2]. Stress levels among business students are likely to be higher than other students in higher education due to a combination of factors related to the nature of business education and the demands of the business world [3]. There are several reasons why business students might experience higher stress levels:

1. **Competitive Environment:** Business programs often attract ambitious and competitive individuals who are driven to succeed. The competition can create a sense of pressure and stress as students strive to outperform their peers and meet high expectations.
2. **Heavy Workload:** Business programs typically require students to cover a wide range of subjects such as accounting, finance, marketing, management, and economics. The workload can be demanding, and students may have to balance multiple projects, assignments, and exams simultaneously.
3. **Real-World Application:** Business education often emphasizes practical application and real-world scenarios. Students may feel pressured to not only understand theoretical concepts but also apply them effectively to solve complex business problems.
4. **Internships and Networking:** Business students are encouraged to participate in internships, co-op programs, and networking events to gain practical experience and build professional connections. While these opportunities can be valuable, they can also add stress as students manage their academic commitments and professional development alongside managing social interactions.

5. **Job Market Pressure:** Business students may feel heightened stress as they approach graduation due to the competitive nature of the job market. The expectation to secure well-paying jobs and start successful careers immediately after graduation can be anxiety-inducing.
6. **Group Projects:** Business programs often involve group projects, which can be challenging to coordinate due to differing schedules, work habits, and personalities among team members. Conflicts within groups can contribute to increased stress levels.
7. **Constant Change and Innovation:** The business world is dynamic, with constant changes in technology, markets, and strategies. Students may feel the need to keep up with these rapid changes, leading to stress about staying relevant and competitive.
8. **Pressure for High Grades:** Many business students aspire to achieve high grades in hopes of enhancing their resumes and job prospects. This pressure to excel academically can contribute to stress, particularly during exam periods.
9. **Long-Term Goals and Expectations:** Business students may have high career aspirations and long-term goals, which can lead to stress about meeting their own and others' expectations.

Business schools are growing more concerned about their students' stress levels leading to high rates of burnout [4].

The surge of interest in managing stress began in the late seventies, largely motivated by Karl Albrecht's contention that stress is a management problem rather than a medical problem [5]. He contended that most stress is self-inflicted. According to Albrecht, because their field was established on elitism, psychiatrists had little to offer in the way of stress relief. Albrecht also uncovered evidence of covert collaboration between the regulatory authorities and the pharmaceutical business to influence doctors to prescribe mood-stabilizing drugs, so stalling the advancement and widespread use of non-chemical stress-reduction techniques. One such method that has gained popularity during the last few decades is yoga [6].

## 2. WHAT IS YOGA?

Yoga is a long-standing tradition with a history going back thousands of years. The two sources that are studied most by modern scholars in this field are the ancient Indian book Bhagawad Gita and the Yoga Sutras [6]. Gita, believed to have been composed in the second half of the first millennium BC, has been translated from Sanskrit to several languages during the last four centuries and has been a popular text among commentators from various philosophical traditions over centuries [7]. Of late it has attracted the interest of management scholars as well [8]. The Yoga Sutras were compiled by the sage Patanjali sometime between the second century BCE and the sixth century CE [9]. They are a collection of 195 aphorisms that were so exceptional and thorough for their time that they are frequently referred to as the "classical yoga" [10]. The Yoga Sutra lists the eight limbs of yoga in Table 1.

**Table 1: Eightfold Path of Yoga Sutra**

	<b>Limb</b>	<b>Approximate English equivalent</b>	<b>Description</b>
1	Yama	Selfless values	Non-violence, truthfulness, non-stealing, continence and greedlessness.
2	Niyama	Self-discipline	Cleanliness, contentment, austerity, self-study and resignation.
3	Asana	Postures	Body positions that open energy channels and develop physical stability for meditation and other advanced practices.
4	Pranayama	Breathing practices	Cardiovascular control to enhance the flow of vital energy through retraining the respiratory organs.
5	Pratyahara	Withdrawal of senses	Withdrawal of sensory inputs, coming from our five senses into our physical being.
6	Dharna	Concentration	Creation of one-pointedness of the mind.
7	Dhyana	Meditation	Uninterrupted flow of concentration.
8	Samadhi	Merger of individual consciousness with universal consciousness	Highly esoteric practice that cannot be taught. Not practiced in the West.

In the West, only the third and the fourth limbs (asanas and pranayama) are popular [11]. Numerous scientific studies have explored the effects of yoga on stress reduction [12-15]. Some studies suggest that while chronic stress can lead to disturbance in cortisol levels, yoga may help restore balance [16]. Yoga practices activate the parasympathetic nervous system, which promotes relaxation and counters the “fight or flight” response of the sympathetic nervous system. Yoga encourages a holistic approach to well-being, emphasizing the connection between the mind and body [17]. This integrated approach can lead to a greater sense of self-awareness and overall stress reduction.

### **3, MEDIATION BY RESPIRATORY EFFICIENCY**

In the West, some gymnasiums have yoga classes with only asanas. However, the practice of asanas without other components of yoga is just acrobatics [18]. Pranayama, an integral aspect of yoga, is a breathing technique that focuses on controlling the breath to enhance physical and mental well-being [19]. The practice involves consciously regulating the breath through various techniques, leading to a sense of calm and relaxation. Pranayama, as a part of yoga, is deeply rooted in ancient Indian philosophy [20]. It has gained popularity worldwide as a powerful tool for reducing stress and promoting overall wellness [21].

The practice involves deliberate inhalation, exhalation, and retention of breath in specific patterns aimed at manipulating the breath to influence “the sympathetic and parasympathetic components of the autonomic nervous system” [22].

Some of the common practices of pranayama are:

1. **Breath Awareness (Anapanasati):** Pranayama begins with cultivating awareness of the natural breath. This involves paying attention to the rhythm, depth, and quality of the breath without trying to alter it. This initial step helps create a foundation for more advanced techniques.
2. **Dirgha Pranayama (Three-Part Breath):** This technique involves breathing deeply into three parts of the lungs – the lower, middle, and upper parts – to maximize lung capacity and oxygen intake. It encourages full and efficient breathing, promoting relaxation and increased energy.
3. **Ujjayi (Victorious Breath):** Ujjayi involves breathing through the nose while gently constricting the glottis. This creates a gentle, ocean-like sound and helps focus the mind. Ujjayi breathing is often used during asana (physical posture) practice to maintain concentration and build internal heat.
4. **Nadi Shodhana (Alternate Nostril Breathing):** This technique involves breathing through one nostril while closing off the other, alternately. Nadi Shodhana is believed to balance the energy channels (nadis) in the body, leading to a sense of equilibrium and improved mental clarity.
5. **Bhastrika (Bellows Breath):** Bhastrika involves rapid and forceful inhalations and exhalations through the nose. It is an energising technique that increases oxygen intake and metabolic rate.
6. **Kapalabhati (Skull Shining Breath):** Kapalabhati involves forceful exhalations and passive inhalations through the nose. It is meant to cleanse the respiratory system, energize the body, and clear the mind. It also helps in strengthening the abdominal muscles and the diaphragm.
7. **Sheetali (Cooling Breath):** Sheetali involves inhaling through a rolled tongue or pursed lips to create a cooling sensation in the body. It is particularly useful for reducing excess heat and calming the mind.
8. **Bhramari (Bee Breath):** Bhramari involves making a humming sound while exhaling, often likened to the buzz of a bee. This technique stimulates the vagus nerve and activates the parasympathetic system, which helps to calm the mind and promotes relaxation.
9. **Surya Bhedana and Chandra Bhedana:** Surya Bhedana involves inhaling through the right nostril, believed to stimulate energy and heat in the body. Chandra Bhedana involves inhaling through the left nostril, thought to have a cooling and calming effect.
10. **Bhavana (Visualization Breath):** This technique involves combining breath awareness with visualization of energy flow within the body. Practitioners imagine prana (vital energy) circulating through specific energy channels, enhancing concentration and mindfulness.

The parasympathetic nerve system, which is in charge of the "rest and digest" response, is stimulated by the controlled breathing technique. The reduction of stress levels in business students through pranayama can be attributed to several factors. Firstly, the rhythmic and focused breathing patterns promote a sense of mindfulness, redirecting the mind away from worries and anxieties. As individuals concentrate on their breath, they naturally shift their attention away from stressors, leading to a quieter and more tranquil mental space. Additionally, pranayama encourages deep and controlled breathing, which increases oxygen intake, improves lung capacity, and enhances blood circulation [23]. This physiological response aids in calming the body and mind, reducing the tension associated with stress [24].

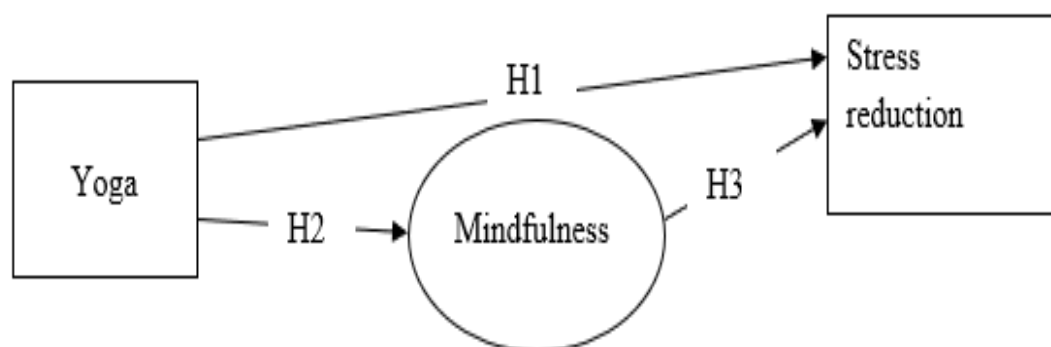
Based on the discussion above, the three hypotheses are proposed:

H1 Yoga will be negatively related to stress levels.

H2 Yoga will be positively related to good breathing practices.

H3 Good breathing practices will mediate the relation between yoga and stress levels.

Figure 1 illustrates these hypotheses.



**Figure 1: Mediation model of Effectiveness of Yoga**

#### 4. MATERIALS AND METHODS

##### *Sample*

A non-medical Randomised Controlled Trial on business students was used to assess the effect of yoga in enhancing good breathing practices and the stress levels. All students in the MBA programmes in the business schools in city were invited to join a yoga programme. More than four hundred students registered. Out of these applicants, 310 turned up for the programme. In view of capacity constraints, only half of the students were asked to join the programme, while the remaining were placed on the waiting list for the next session and served as the control group. The CONSORT "flow chart" is displayed as Figure 2. Table 2 shows the demographic information for the participants in detail.



CONSORT 2010 Flow Diagram

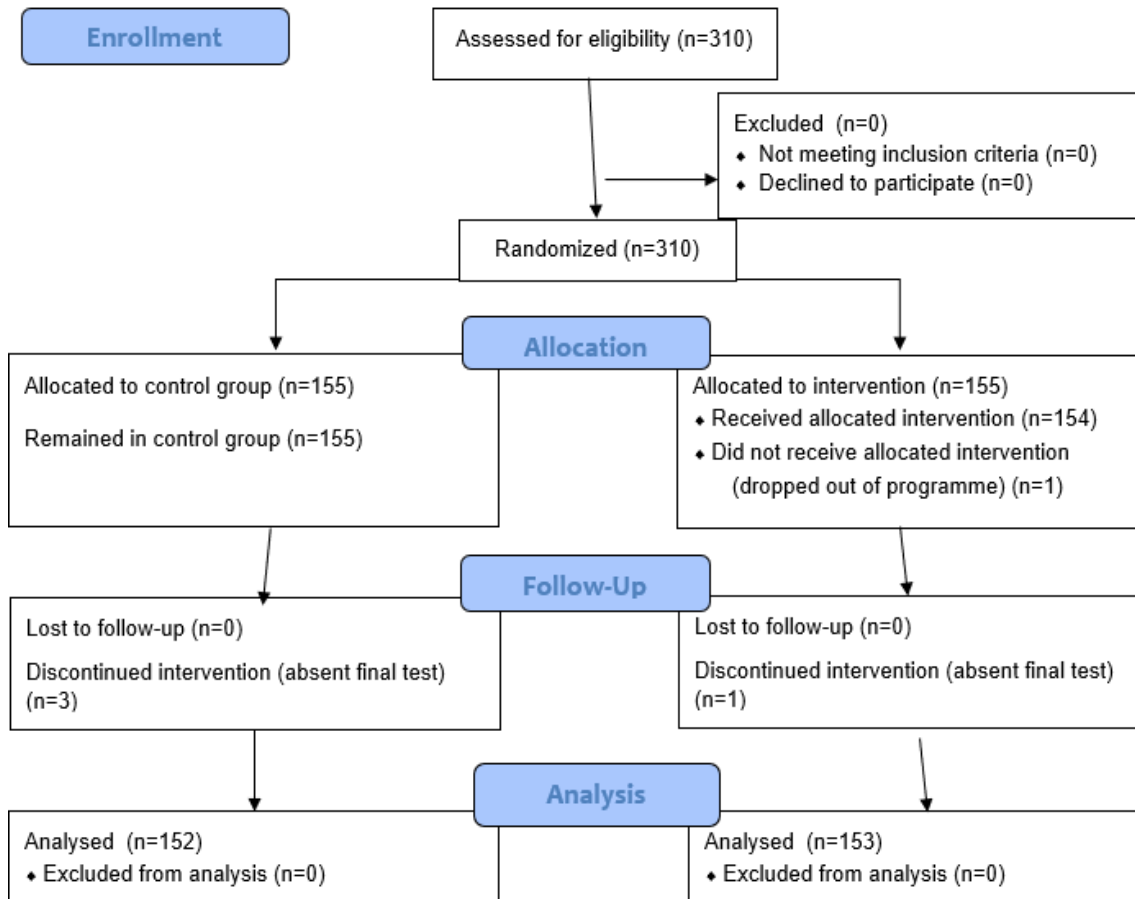


Figure 2: Parallel randomised trial of two groups

Table 2: Baseline characteristics and scores

Demographics	Control group	Intervention group	Difference	p value
Gender: Female, %	39.3	36.9	2.4 ( $\chi^2=0.241$ )	.582
Marital status: Married, %	75.3	73.2	2.1 ( $\chi^2=0.191$ )	.671
Age in years, mean (sd)	35.3(6.6)	34.6(6.5)	0.7 (t=1.58)	.112
Work experience in months, mean (sd)	58.6(13.1)	57.4(12.8)	1.2 (t=1.52)	.131
N	150	149		

### Measurements

*Yoga:* An hour of yoga instruction was conducted each day of the week. The programme consisted of five minutes of preparation, thirty-five minutes of physical postures (asanas), and twenty minutes of breathing exercises (pranayama). Participants were instructed to complete a shorter practice at home and submit their reports next day, if they could not spare one hour on a specific day. Hours per day served as the measurement's base unit. There were 20 weeks in the programme.

*Stress:* A 10-item “Perceived Stress Scale”, a popular psychometric tool for measuring the stress was adopted [25-27]. This scale includes questions that use a 5-point answer scale (1 being “nearly never” to 5 being “very often”) to inquire about feelings and thoughts from the previous month. The sample's Cronbach alpha value was 0.79.

*Respiratory efficiency:* There is no agreed definition of respiratory efficiency. However, it is generally acknowledged that respiration involves two basic processes: internal and external [28]. The physical process of exchanging respiratory gases (oxygen and carbon dioxide) between an organism and its environment is known as external respiration or breathing. Internal respiration, also known as cellular or tissue respiration, is an internal chemical oxidation of food that produces free energy, carbon dioxide and water vapour. This study is concerned with breathing practices, for which the most common measures are “forced vital capacity”, “forced expiratory volume in first second”, “maximum expiratory pressure”, “maximum inspiratory pressure”, “peak expiratory flow rate”, “expiratory reserve volume” etc. Prior investigations show that correlation among most measures is high [29]. Peak expiratory flow rate was chosen for the study as a sign of good breathing practice.

## 5. RESULTS AND DISCUSSION

Table 2 reveals the features of the intervention and control groups are not significantly different from one another. Table 3 displays the efficacy of the yoga in the difference-in-differences format. The yoga group showed significant improvements in stress levels and respiratory efficiency during this time frame, however the control group did not experience any appreciable changes.

**Table 3: Scores at baseline and follow-up.**

		Control group	Intervention group	Difference
Good breathing score	Initial	6.26 (0.78)	6.26 (0.77)	0.00
	Final	6.26 (0.79)	6.52 (0.84)	0.27***
	Change	-0.01	0.26***	0.25***
Stress level	Initial	2.82 (0.51)	2.81 (0.50)	-0.01
	Final	2.83 (0.52)	2.61 (0.50)	-0.22***
	Change	0.01	-0.20***	-0.21***

\*\*\*Significant 1% level.

Table 4 shows the mean standard deviations and correlations statistics. Cronbach alphas (reliabilities) are on the diagonal in parentheses. As expected, the relationships are significant

and positive. Yoga is associated with respiratory efficiency and the latter is negatively linked to stress levels.

**Table 4: Means, standard deviations, correlations and reliabilities.**

		M	SD	1	2	
1	Yoga	4.19	0.85	(0.90)		
2	Good breathing	6.52	0.84	0.40***	(0.92)	
3	Stress level	2.61	0.50	-0.44**	-0.30*	(0.89)

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$

Next, it was examined whether respiratory efficiency (as enhanced by yoga) plays a mediating function or is only a side benefit. Path analysis was employed to determine this, which, grounded on a closed arrangement of nested relations between variables, uses structured linear equations to statistically characterise their relationships. Consequently, path analysis adds a few extra restrictions that define the allowed pattern of variable interactions. The relationship structure between variables is shown in a path diagram. (Figure 1). Straight arrows connect variables, demonstrating the causal links' orientations. Because it is assumed that a variable cannot be both a cause and an effect of another variable, straight arrows point in one way; thus, the model is "recursive" and does not have feedback loops. For this regression PROCESS macro [30] has been used. Respiratory efficiency, in this case, is not a moderating variable but a mediating one. The difference "between the two types of variables is that mediation is an attempt to establish *mechanism* by which one variable may be affecting another, whereas moderation is looking for differences in the relationship between group assignment and outcomes based on *pre-existing* variables" [31]. The regression results are reported in Table 5. It should be noted that unstandardised coefficients are presented. BCLB stands for the "lower limit of the bootstrapped confidence interval" of 95%. And the upper limit of this interval is referred to as BCUB. Partial mediation is observed.

**Table 5: Regression results**

	Good breathing score			Stress level		
	<i>b</i>	SE	<i>t</i>	<i>b</i>	SE	<i>t</i>
Constant	2.16	0.30	7.02***	3.08	0.96	3.21***
Yoga				0.40	0.18	2.22**
Good breathing score				1.02	0.32	3.19**
Indirect effect				-0.36	0.17	2.12**
(Confidence Interval)				(BCLB=-0.70, BCUB=-0.02)		
Direct effect				-0.24	0.11	2.18**
(Confidence Interval)				(BCLB=-0.46, BCUB=-0.02)		
Total effect				-0.60	0.19	3.11**
(Confidence Interval)				(BCLB=0.25, BCUB=0.47)		
R <sup>2</sup>		0.22			0.30	

\*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$



According to hypothesis 1, yoga relates to lowering of stress levels. Yoga has a significant and beneficial overall negative influence on stress levels, supporting the hypothesis. Yoga was expected to relate to good breathing in Hypothesis 2. Yoga showed a significant and favourable effect on good breathing score, validating hypothesis 2. The indirect effect of yoga (through good breathing practices) on stress level is significant. Stress levels are significantly reduced directly also by yoga. Yoga, therefore, affects stress levels both directly and indirectly through improved respiratory efficiency. The effect of yoga through respiratory efficiency is estimated to be 60% of the total effect while 40% effect comes directly from yoga.

This research has taken a secular approach and removed spirituality from yoga. This practice is in accordance with the mainstream Western academic tradition. Nonetheless, many academics view such a strategy as Eurocentric and prejudiced [32]. They contend that in order to fully benefit from Eastern contemplative techniques, they ought to be connected to their roots because of their belief that the world is currently in a “post-secular” period [33]. Religious mores go beyond the narrow practical concepts and indifference to these traditions could negate the benefits as a denaturalised practice separated from its background is not useful. Religious traditions provide deep analyses of attention that go beyond the constrained and down-to-earth concepts presently favoured by educators [34]. Future studies might address these issues.

## 6. CONCLUSION

Throughout the past few decades, study of yoga has grown significantly. A lot of empirical research has demonstrated positive therapeutic effects of yoga on a variety of health issues [35]. The growing interest is remarkable as it signifies the meeting of two spheres of human knowledge, i.e., Western practical science and Eastern meditative practices that had rarely communicated with each other earlier [36]. This research advances our understanding in three different ways. First, the mechanism through which yoga operates on stress level of business students has not received much attention. Second, it establishes the mediating effect of respiratory efficiency in the impact of yoga on stress levels of business students. Third, it quantifies the direct impact of yoga on stress level of business students as also its indirect effect through good breathing practice.

### Acknowledgement

The author is thankful to members of PUCP Management Education Research Centre for helpful suggestions. Excellent research support from Omayoga Ltd. is acknowledged.

### References

- 1) Myers, D. G. (2004) *Exploring Psychology. 6th ed.* Duffield, Derbyshire, England: Worth Publishers.
- 2) Akram, H., Bhutto, M. H., & Chughtai, M. S. (2022). An analysis of business students' stressors and their coping strategies in the post-pandemic era. *Decision, 49(2)*, 239-252.
- 3) Law, D. W., & Patil, V. H. (2015). An exploratory study of the effects of exhaustion and social support on business students' persistence. *Academy of Educational Leadership Journal, 19(3)*:187–193.

- 4) Klussman, K., Lindeman, M. I. H., Nichols, A. L., & Langer, J. (2021). Fostering stress resilience among business students: The role of stress mindset and self-connection. *Psychological Reports, 124*(4), 1462–1480.
- 5) Albrecht, K. (1979). *Stress and the manager*. Englewood Cliffs, NJ: Prentice-Hall.
- 6) Asthana, A., & Asthana, A. N. (2012). Yogic science for human resource management in business. *World Applied Sciences Journal, 19*(1), 120-130
- 7) Goldberg, E. (2016), *The path of modern yoga: the history of an embodied spiritual practice*. New York: Simon and Schuster.
- 8) Turci R. (2021). The Yoga of the Bhagavad Gita: Spirituality, meditation, and the rise of a new scientific paradigm. In: Telles, S. and Gupta R. K. (eds.) *Handbook of Research on Evidence-Based Perspectives on the Psychophysiology of Yoga and Its Applications* (pp. 85-102), Hershey PA: IGI Global.
- 9) Iyengar, B. K. S. (1993). *Light on the yoga sutras of Patanjali*. Detroit, MI: Aquarian.
- 10) Asthana, A. N. (2023). Prosocial behavior of MBA students: The role of yoga and mindfulness. *Journal of Education for Business, 1-9*.
- 11) Shearer, A. (2020). *The story of Yoga: From ancient India to the modern West*. London: Hurst & Company.
- 12) Veckalne, R. (2023). From Stress Reduction to Resilience Building: The Role of Yoga in Promoting Mental Health and Well-Being. *International Journal on Integrated Education, 6*(3), 110-114.
- 13) Gura, S. T. (2002). Yoga for stress reduction and injury prevention at work. *Work, 19*(1), 3-7.
- 14) Dubey, P., Sarva, M., & Singh, P. P. (2016). The application of yoga on effective mind body and stress reduction among students. *Man in India, 96*(4), 1163-1179.
- 15) Brems, C. (2015). A yoga stress reduction intervention for university faculty, staff, and graduate students. *International Journal of Yoga Therapy, 25*(1), 61-77.
- 16) Maheshkumar, K., Dilara, K., Ravishankar, P., Julius, A., Padmavathi, R., Poonguzhali, S., & Venugopal, V. (2022). Effect of six months pranayama training on stress-induced salivary cortisol response among adolescents-Randomized controlled study. *Explore, 18*(4), 463-466.
- 17) Asthana, A. N. (2022). Contribution of Yoga to Business Ethics Education. *Journal of Business Ethics Education, 19*, 93-108.
- 18) Iyengar, B. K. S. (1964). *Light on yoga: The definitive guide to yoga practice*. London: Allen & Unwin.
- 19) Asthana, A. N. (2023). Reskilling business executives in transition economies: can yoga help?. *International Journal of Business and Emerging Markets, 15*(3), 267-286.
- 20) Vivekananda, S. (1896), *Rāja Yoga*. London: Longmans, Green and Co.
- 21) Iyengar, B. K. S. (1981). *Light on pranayama: the yogic art of breathing*. Chestnut Ridge, PA: Crossroad.
- 22) Jahan, I., Begum, M., Akhter, S., Islam, M. Z., Jahan, N., & Haque, M. (2020). Effects of alternate nostril breathing exercise on respiratory functions in healthy young adults leading stressful lifestyle. *Journal of Population Therapeutics and Clinical Pharmacology, 27*(1), e104-e114.
- 23) Hepburn, S. J., & McMahan, M. (2017). Pranayama meditation (yoga breathing) for stress relief: Is it beneficial for teachers?. *Australian Journal of Teacher Education, 42*(9), 142-159.
- 24) Bhimani, N. T., Kulkarni, N. B., Kowale, A., & Salvi, S. (2011). Effect of pranayama on stress and cardiovascular autonomic tone and reactivity. *National Journal of Integrated Research in Medicine, 2*, 48-54.

- 25) Cohen, S., Kamarck, T., & Mermelstein, R. (1994). Perceived stress scale. *Measuring stress: A guide for health and social scientists*, 10(2), 1-2.
- 26) Reis, R. S., Hino, A. A., & Añez, C. R. (2010). Perceived stress scale. *Journal of Health Psychology*, 15(1), 107-114.
- 27) Roberti, J. W., Harrington, L. N., & Storch, E. A. (2006). Further psychometric support for the 10-item version of the perceived stress scale. *Journal of College Counseling*, 9(2), 135-147.
- 28) Hlastala, M. P., & Berger, A. J. (2001). *Physiology of respiration*. Oxford, England: Oxford University Press.
- 29) Webster, L. R., & Karan, S. (2020). The physiology and maintenance of respiration: a narrative review. *Pain Therapy*, 9, 467-486.
- 30) Hayes, A. F. (2022). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach (3rd Edition)*. New York: Guilford.
- 31) Shapiro, S. L., Carlson, L. E., Astin, J. A., Freedman, B. (2006) Mechanisms of mindfulness. *Journal of Clinical Psychology*, 62(3): 373–386.
- 32) Ergas, O. (2019). A contemplative turn in education: charting a curricular-pedagogical countermovement. *Pedagogy, Culture & Society*, 27(2), 251-270.
- 33) Lewin, D. (2017). *Educational Philosophy for a Post-Secular Age*. New York: Routledge.
- 34) Gearon, L. (2017). Secularisation and the Securitisation of the Sacred a Response to Lewin’s Framing of the Gearon–Jackson Debate. *British Journal of Educational Studies*, 65(4), 469-480.
- 35) Cramer, H., Lauche, R., & Dobos, G. (2014). Characteristics of randomized controlled trials of yoga: A bibliometric analysis. *Alternative Medicine*, 14, 1-20.
- 36) Cope, S. (2006). *The Wisdom of Yoga*. New York: Bantam.