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EDITED BY  
Gaylene Denford-Wood,  
Auckland University of Technology,  
New Zealand

REVIEWED BY  
Michaéla C. Schippers,  
Erasmus University Rotterdam,  
Netherlands  
Ramajayam Govindaraj,  
National Institute of Mental Health  
and Neurosciences, India

\*CORRESPONDENCE  
Tracy F. H. Chang  
tracy.chang@rutgers.edu

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# "Inner Engineering" for success—A complementary approach to positive education

Tracy F. H. Chang<sup>1\*</sup>, Sheetal Pundir<sup>2</sup>, Akila Rayapuraju<sup>1,3</sup> and Pradeep Purandare<sup>4</sup>

<sup>1</sup>Rutgers, The State University of New Jersey, New Brunswick, NJ, United States, <sup>2</sup>Faculty of Medicine and Health Sciences, McGill University, Montreal, QC, Canada, <sup>3</sup>Sadhguru Center for a Conscious Planet, Beth Israel Deaconess Medical Center, Harvard Medical School Teaching Hospital, Boston, MA, United States, <sup>4</sup>Amalgamated Life Insurance Company, White Plains, NY, United States

The movement of positive education is growing globally. Positive education aims to balance academic skills with skills of wellbeing. This study introduces the "Inner Engineering" methodology and evaluates its impact on promoting wellbeing and flourishing for college students. Based on the science of yoga, the Inner Engineering methodology comprehensively addresses four major dimensions of human experiences—physiological, cognitive, affective, and energetic experiences and offers methods and processes to optimize wellbeing in all of these dimensions. The study design involves a quasi-experimental one-group with pre- and post-course tests. Participants of the study ( $n = 92$  students) completed both the pre- and post-course surveys. The pair-wise  $t$ -test results showed significant improvement in wellbeing (mindfulness, joy, vitality, sleep quality, and health) and flourishing in the academic setting (academic psychological capital, academic engagement, and meaningful studies) and in life (meaningful life) among students who successfully completed the course. These findings suggest that the academic curriculum may be balanced by integrating the yogic sciences of wellbeing which address a more complete spectrum of human experiences as a whole person. This, in turn, has a further effect on flourishing academically and in life. Future studies may involve a larger sample size with a comparison group or a randomized control and a longitudinal follow-up.

## KEYWORDS

yoga, wellbeing, higher education, flourishing, engagement, mindfulness, positive education, psychological capital

## Introduction

The positive education movement is growing rapidly and globally (Seligman and Alder, 2018). The movement is inspired by the launch of positive psychology as a new field of study about two decades ago. Seligman and Csikszentmihalyi (2000) introduced positive psychology as "a science of positive subjective experience, positive individual

traits, and positive institutions that promises to improve quality of life and prevent the pathologies that arise when life is barren and meaningless” (p. 5). Positive psychology shifts the focus of traditional research from mental disorders and pathologies to wellbeing and flourishing. Drawing on this principle, positive education broadens the scope of education to include both traditional academic skills and skills of happiness and wellbeing (Noddings, 2005; Seligman et al., 2009). Positive education aims to integrate the skills for wellbeing into formal curriculum to help students be well, flourish, and live a happy, engaged, meaningful, and accomplished life (Noddings, 2005; Seligman et al., 2009). As a new field of study, its conceptual and theoretical clarity needs to be refined and a rigorous empirical evidence should be established (Kristjánsson, 2012).

Positive education starts with K-12 education and extends to higher education globally (Harward, 2016; Houghton and Anderson, 2017). Wellbeing is important both as a foundational outcome on its own and as a predictor of critical educational outcomes, yet it has been declining in higher education (Putwain, 2019). Lucas and Rogers (2016) presented a case study of “wellbeing university,” which is “a place at which students, faculty, and staff learn what it means to have lives well-lived and how to respond well to a full range of emotions and challenges” (p. 191). In a “wellbeing university,” the metric of student success includes both academic and wellbeing competencies because students learn best when they are “in a state of physical, psychological, emotional, intellectual, social and spiritual wellbeing” (Harward, 2016, p. 251). Oades et al. (2011) identified five key environments for a “positive university” and one key element is embedding wellbeing in the formal learning environments (e.g., classroom, curriculum, and academic engagement). This embedment involves both curriculum content and process (Houghton and Anderson, 2017). Identifying evidence-based strategies is essential to realize the promise of education for integrated wellbeing (Harward, 2016; Houghton and Anderson, 2017; Henning, 2018).

Various frameworks and interventions of positive education have been developed (Seligman and Alder, 2018; Waters and Loton, 2019). The Whole Child Initiative for student success is based on five tenets: Healthy, Safe, Engaged, Supported, and Challenged (Slade and Griffith, 2013). The PROSPER framework includes Positivity, Relationships, Outcomes, Strengths, Purpose, Engagement, and Resilience (McGrath, 2015). The multi-dimensional PERMA-H model consists of Positive Emotion, Engagement, Relationship, Meaning, Accomplishment, and Health (Lai et al., 2018). Using methods of meta-analysis and action-research, Waters and Loton (2019) developed the SEARCH (Strength, Emotional Management, Attention/Awareness, Relationships, Coping, Habits/Goals) framework.

The western approach toward positive psychology and positive education interventions thus far focuses more on cognitive strategies, followed by emotional and social strategies, and less on the bodily and energetic strategies. One of the

cognitive strategies involves “life crafting,” which is defined as “a process in which people actively reflect on their present and future life, set goals for important areas of life—social, career, and leisure time—and, if required, make concrete plans and undertake actions to change these areas in a way that is more congruent with their values and wishes” (Schippers and Ziegler, 2019). “Life crafting” techniques, such as reflecting on values and best-self, writing about ideal future and plans, and setting and attaining goals, assist young people’s search for meaning and purpose in life (Schippers and Ziegler, 2019; de Jong et al., 2020). Schippers et al. (2020) found that writing about goals and plans was related to a 22% increase in academic performance among university students. Coulombe et al. (2021) proposed “Personal Project Analysis” to support youth wellbeing in a person-centered, social ecological manner. Positive Psychology Interventions (PPIs) employ techniques such as gratitude, savoring, and acts of kindness to promote emotional wellbeing (Moskowitz et al., 2021). Furthermore, multi-component positive psychology Interventions (MPPIs) tend to be more effective and practical than single-component interventions in enhancing wellbeing in real life situations (Carr et al., 2020).

Others have pointed out the importance of the bodily and energetic strategies. Research suggests that body movement facilitates learning (Barnacle, 2009; Beilock, 2015; Gallagher and Lindgren, 2015). The body stores memory of experiences (Michelson, 1998; Gallagher and Lindgren, 2015) and psychological wellbeing (Hanley et al., 2017). Rigg (2018) examined the role of somatic learning in critical reflection—through direct experience of bodily sensations, unconscious thoughts and emotion could be recognized. Dem Nguyen and Larson (2015) noted that the body has the “ability to feel knowledge, internalize it, and commit it to memory” (p. 332). Recognizing the importance of energy, Spreitzer and Grant (2012) developed the “energy audit” exercise to help students assess their energy levels and manage energy. Schippers and Hogenes (2011) contended that human energy is key to work performance and proposed “energy management” through a personal energy plan that includes reflection on long-term goals and plans as well as physical fitness plan. However, these strategies remain primarily at the cognitive and psychological levels and lack a formal protocol intervention on the somatic and energetic levels.

While enthusiastically welcoming the birth of positive psychology, Walsh (2001) pointed out that sophisticated systems and effective techniques toward wellbeing, such as yoga and meditation, have been well established for millennia in Asia. Positive psychologists could draw from this “theoretical and practical gold mine.” Four decades ago, Kabat-Zinn (1982) drew from this “gold mine” and developed the Mindfulness-Based Stress Reduction (MBSR) program in a medical school environment. MBSR curriculum includes various forms of mindfulness-based meditation (body scan, awareness of breath, loving-kindness meditation, etc.), mindful movement (modified

Hatha Yoga), and small group discussions (Kabat-Zinn, 2013). In recent years, research on MBSR has grown exponentially and spurred many modified programs applied in many settings, including higher education (Barbezat and Bush, 2013; Gunnlaugson et al., 2014). MBSR and its adapted forms have been incorporated into formal curriculum for medical, counseling, and college students (Schure et al., 2008; Canby et al., 2015; Aherne et al., 2016). However, these studies focused more on reducing negative outcomes (e.g., stress, depression, and anxiety) and less on promoting positive outcomes (e.g., wellbeing and flourishing).

Among eastern yogic sciences, a family of programs called “Inner Engineering” (Sadhguru, 2016) is less well-known to educators and researchers. While MBSR includes mindfulness-based meditations and modified Hatha Yoga, the “Inner Engineering” methodology preserves the original form of classical Hatha Yoga and the multi-dimensionality of classical yoga. Yoga shares much commonality with positive psychology (Levine, 2010; Hendriks et al., 2017). However, modern research on yoga has focused more on alleviating physical and mental pathologies rather than promoting optimal wellbeing and functioning (Hendriks et al., 2017; Domingues, 2018). Hendriks et al. (2017) found that only a small fraction (5%) of the current research of yoga focuses on positive outcomes and call for more research of yoga focusing on positive outcomes.

The purpose of the present study is to introduce the Inner Engineering methodology into the higher educational curriculum and evaluate its effectiveness in fostering student wellbeing and flourishing in the academic setting and in life. The Inner Engineering approach focuses on four major dimensions that one can experience and work with—the physiological, cognitive, emotional, and energetic experiences (Sadhguru, 2016). It consists of methods and processes that are designed to optimize the functioning of the physiological, cognitive, emotional, and energetic systems and unify these systems so that they work as a harmonious whole within a person (Sadhguru, 2016). This yogic approach encompasses an inclusive spectrum of experiences of a whole person. Recent randomized control studies showed that the Inner Engineering Online (IEO) program reduced stress for technology professionals (Upadhyay et al., 2022) and online Upa Yoga intervention reduced stress and increased wellbeing for college students during the COVID-19 pandemic (Chang et al., 2022b). This study aims to evaluate the impact of a new one-credit college course employing the IE approach toward student wellbeing and flourishing in the academic context and in life.

## Course design

The “Inner Engineering’ for Success” seminar was created as a new one-credit college course open to all students at a major research university in the northeast of United States.

The course was designed to introduce students to the concepts and methods of “Inner Engineering.” It aimed to enhance their self-knowledge and self-mastery in optimizing and unifying the functioning of their physiological, cognitive, emotional, and energetic systems for inner wellbeing and flourishing in college and in life. The course considered wellbeing and flourishing as the markers of complete success. Table 1 outlines the course components and learning objectives.

TABLE 1 Course components and learning objectives.

“Inner Engineering” Sadhguru (2016) book	Learning objectives
<b>Core perspectives:</b>	
“When I lost my sense”	• Describe the author’s life story
“The way out is in”	• Describe the source of perceptions and experiences
“Design your destiny”	• Define human agency
“No boundary, no burden”	• Explain what the author means by “limitless responsibility”
	• Experiment with Inner Engineering (IE) tools
“. . . And now yoga”	• Describe what yoga really is, its depth, and multi-dimensionality
<b>Practical tools:</b>	
“Body”	• Describe the yogic physiology of the body, the yogic approach to physical health and the importance of asanas (postures), the yogic approach to food
	• Experiment with IE tools related to the body (e.g., pay attention to bodily experiences, experience the connection between the body and nature, from restlessness to restfulness)
“Mind”	• Describe the yogic psychology of the mind (intellect, emotion, and identity) and the importance of awareness
	• Experiment with IE tools of how to work with thoughts and emotions (e.g., awareness, love, compassion)
“Energy”	• Describe the yogic energy physiology of a human being and the yogic approach to the mechanics of life
	• Experiment with IE tools of how to enhance energy and exuberance
“Joy”	• Experience joy as one’s own nature
<b>Upa yoga<sup>a</sup></b>	Demonstrate to do each practice correctly
Directional movement of the arms	• Activates energy nodules in joints and exercise muscles, bringing ease to the whole system
Neck practices	• Keep the neck region in good condition
Yoga namaskar	• Strengthen the muscles along the spine
Nadi shuddhi	• Balance the breath and mental structure
Nada yoga	• Generate sound vibrations that bring joy
Shambhavi mudra	• Involve a process of meditation
Namaskar profess	• Foster love from within

<sup>a</sup><https://isha.sadhguru.org/yoga/yoga-for-beginners-yoga-videos/>.

The course material consisted of two major components—a book and a system of Upa Yoga (see [Table 1](#)). The first component involved, prior to attending classes, (1) reading the book titled “*Inner Engineering*” ([Sadhguru, 2016](#)), (2) experimenting with the “Inner Engineering” tools through experiential activities, and (3) submitting a journal reflecting on their experiences and learning. During in-person class sessions, students learned and practiced a system of Upa Yoga and discussed what they have learned and experienced from the book, experiential activities, and yoga practices in small groups.

The book consists of into two sections—core perspectives and practical tools (see [Table 1](#)). The author systematically introduced core perspectives and offered practical tools (known as “sadhana”) of “Inner Engineering” for readers to experiment with. Yoga literally means “union” ([Sadhguru, 2016](#)). Classical yoga, in its original form, was intended for the purpose of realizing one’s true nature, heightening consciousness, and experiencing universal oneness through self-transformation ([Sadhguru, 2016](#); [Hendriks et al., 2017](#)). The ancient science of yoga offers four paths through which one can realize and experience this union—*Jñāna* (the path of the intellect; the mind), *Bhakti* (the path of devotion; emotion), *Karma* (the path of action; body), and *Kriya* (the path of heightening life energies) ([Sadhguru, 2016, 2017](#); [Pandey and Navare, 2018](#)). Drawing on these yogic methods, the Inner Engineering methodology focuses on enhancing self-knowledge and self-mastery over four major areas of human experiences that one can work with—body, mind, emotion, and energy. When these four systems function at their best and harmoniously, one can experience a sense of complete wellbeing and perform at their highest possibilities ([Sadhguru, 2016](#)).

The eastern philosophy of education is consistent with the western principle of positive education. [Krishnamurti \(1953\)](#) argued that “The function of an educator is to help students have a good academic brain and a good human being... A good human being is whole, not fragmented, saying one thing and doing another, thinking one thing and acting in a totally different way” (p. 35). We hypothesize that the Inner Engineering methodology equips students with self-knowledge and self-mastery skills to foster this wholeness within one’s interiority, which, in turn, facilitates flourishing academically and in life.

The second component involves learning and practicing a system of simple “Upa Yoga” practices that are made freely available online.<sup>1</sup> If one learns or practices yoga improperly, yoga may lead to adverse effects ([Feuerstein, 1972](#); [Cramer et al., 2019](#)). The MBSR curriculum contains modified forms of Hatha Yoga, also known as “mindful movement.” This mild form of yoga along with high standards of teacher qualifications and screening out participants who may not benefit from the

program due to their physical and psychological conditions significantly reduce the risk for adverse effects of participating in MBSR programs ([Hirshberg et al., 2020](#)).

To safeguard student wellbeing, only “Upa Yoga” is introduced to students by a qualified MBSR teacher and trained facilitator of Isha Upa Yoga. “Upa Yoga” means “pre” or “sub” yoga, which consists of simple preparatory practices for absolute beginners and does not involve the spiritual dimension of yoga. It can be taught via video instruction with minimal risk of injury. This system of Upa Yoga includes directional movements of the arms, neck practices, Yoga Namaskar, Nadi Shuddhi, Nada Yoga, Shambhavi Mudra, and the Namaskar process. Students learn and practice Upa Yoga during each class session and are encouraged to practice daily on their own.

## Theoretical framework

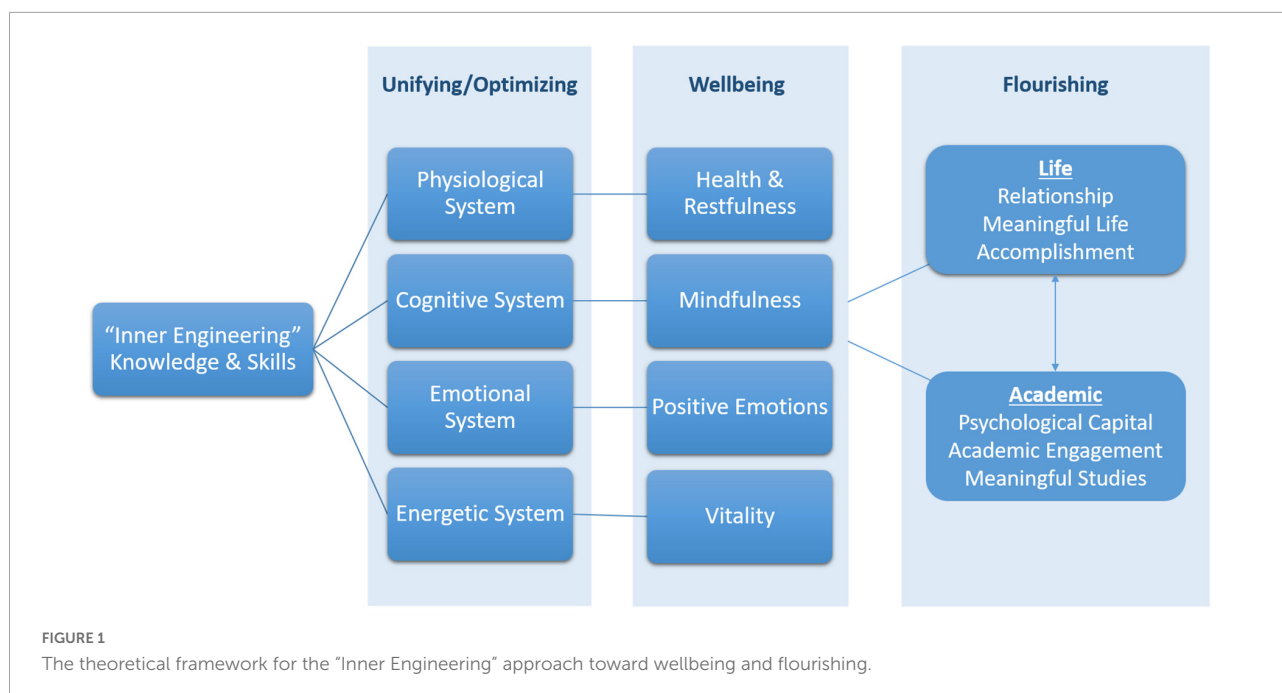
[Figure 1](#) presents the theoretical model of an “Inner Engineering” approach to student wellbeing and flourishing. We theorize that the course equips students with Inner Engineering competencies—self-knowledge of how their physiological, cognitive, emotional, and energetic systems work and self-mastery skills of how to work with these systems so that they function at an optimal level and in a unifying way. We hypothesize that when these systems are functionally well, they create wellbeing in the body (restfulness and health), mind (mindfulness), emotion (joy), and energy (vitality), respectively. The yogic science conceptualizes wellbeing as “pleasantness” manifested in the body, mind, emotion, and energy ([Sadhguru, 2016](#)). When these four dimensions of experiences are in harmony, one experiences a sense of wholeness within. Furthermore, the harmonious interaction between these systems may generate a synergetic effect that facilitates flourishing in the academic setting (psychological capital, academic engagement, and meaningful studies) and in life (supportive relationships and a sense of accomplishment).

## Wellbeing

### Physiological dimension

The book chapter on “Body” introduces the yogic physiology of the body, the yogic approach to physical health and food, and the significance of physical postures (“asanas”) and yogic diet for health. The chapter also offers experiential activities that train students to pay attention to bodily experiences and the connection between body, food, and nature. Students experimented with what food soothes rather than agitates the body and what food yields rather than depletes energy.

<sup>1</sup> <https://isha.sadhguru.org/yoga/yoga-for-beginners-yoga-videos/>



According to the Online Etymology Dictionary, the word “disease” originated from “*des*” (“without, away”) and “*aise*” (“ease”). Literally, “disease” means lack of ease. Practicing the system of Upa Yoga “brings the whole human system to ease” (see text footnote 1) which further assists the body’s transition from restlessness to restfulness (health). [Hunt et al. \(2018\)](#) found that yoga and its combination with mindfulness meditation enable students to be more adaptive in meeting a stressful challenge compared to mindfulness meditation alone.

### Cognitive dimension

The chapter on “Mind” introduces the yogic psychology of the mind in terms of its multi-dimensionality—the intellect, memory, identity, “*Chita*” ([Sadhguru, 2016](#)), and the importance of awareness. Mindfulness refers to the awareness of the moment to moment experiences (body and mental) without judgment. It has a positive effect on health and wellbeing through the process of “de-coupling” and cognitive reappraisal ([Kabat-Zinn, 1982](#)). The chapter also discusses the connection between mind and body—the yogic science includes both thought and emotion as part of the “mental body.” This is consistent with the psychosomatic approach to medicine ([DiMartini and Ackerman, 2015](#)).

Practicing the system of Upa Yoga further supports the cultivation of awareness and mindfulness. Studies suggested that Hatha Yoga shows promise for improving executive function ([Luu and Hall, 2016](#)). Furthermore, Upa Yoga includes a simple *pranayama* known as *Nadi Shuddhi*. It is a form of alternate nostril breathing that modulates autonomic nervous system function, improves attention and awareness, and relieves emotional exhaustion, anxiety, and depression

([Brown et al., 2013](#)). It also produces positive neurocognitive, psychophysiological, and biochemical outcomes ([Herrero et al., 2018](#); [Saoji et al., 2019](#)). Respiratory psychophysiology studies show that changes in breathing behaviors induce changes in physiology, emotions, and cognition ([Ley, 1999](#)). Recent neurophysiological studies show that the rhythm of breathing creates electrical activity in the brain that enhances emotional judgment, memory recall ([Zelano et al., 2016](#)), and “volition control and awareness of breathing engage distinct but overlapping brain circuits” ([Herrero et al., 2018](#), p. 145).

### Emotional dimension

According to the yogic sciences, the “mental body” includes both thought and emotion ([Sadhguru, 2016](#)). The chapter on “Mind” explores the connection between thought and emotion and the nature and source of positive emotions, such as love and joy and offers perspectives and methods (“*sadhana*”) in cultivating these emotions. Practicing yoga of sound and Namaskar process may further foster these positive emotions.

Yoga-based interventions conducted via in-person group classes have shown positive effects on college students’ psychological wellbeing ([Hendriks et al., 2017](#)). Studies find that yoga of sound can increase physiological relaxation, and mental alertness from 5 min of daily regular practice ([Shobitha and Agarwal, 2013](#)). Healing by sound has shown a significant improvement in the markers of wellbeing and a decrease in physical pain ([Goldsby et al., 2017](#)). Studies indicate that listening to the “AUM” sound generates emotional empathy ([Kalyani et al., 2011](#)) and chanting these three sounds brings physiological relaxation and mental alertness ([Shobitha and Agarwal, 2013](#)).

## Energetic dimension

Another essential element of wellbeing is vitality or how energetic and exuberant one is. Vitality is “the state of feeling alive and alert to having energy available to the Self” (Ryan and Frederick, 1997) and is affected by somatic and psychological factors (Ryan and Deci, 2001). Acknowledging the eastern perspectives on vitality, Ryan and Frederick (1997) discussed the Chinese concept of *chi*, “a vital force or energy that is the source of life” (p. 532), and the Japanese concept of *Ki*, energy one can draw to enhance physical, mental, and spiritual health. Another eastern perspective of energy is “*prana*,” the life force or vital energy that enables life. “*Pranayama*” refers to the yogic practices that gain control over this vital energy (Feuerstein, 1972; Sadhguru, 2016). The chapter on “Energy” explores the mechanics of life and another “layer” of the body—the energy body. “The yogic system offers us a comprehensive and elaborate view of the anatomy of the human energy body” (Sadhguru, 2016, p. 226). The chapter also offers methods and experiential activities that promote vitality and exuberance, leading to physical and psychological health. The system of Upa Yoga further assists in energy activation through physical movement and exercise of the joints and muscles. *Nadi Shuddhi* also assists the balance of breath, energy, and mental structure (see text footnote 1).

## Flourishing

We hypothesize that once these four systems are optimized and harmonized, it produces a synergistic effect on students’ flourishing in the academic setting and in life. Academic flourishing includes academic psychological capital (self-efficacy, hope, optimism, and resilience), academic engagement (vigor, dedication, and absorption), and meaningfulness of studies. These academic indicators of flourishing contribute to the positive education literature because they have been less studied within the established flourishing frameworks.

Psychological capital (PsyCap) refers to an individual’s positive psychological resources—self-efficacy, hope, resiliency, and optimism (Luthans et al., 2012). Adapted to the academic setting, academic psychological capital refers to students’ positive psychological resources associated with their academic studies (e.g., confidence in presenting ideas in group work, ability to find ways regarding school work, positive outlook regarding school, capability of being independent in school work) (Babinchak, 2012; Luthans et al., 2012; Jafri, 2013; You, 2016). Carmona-Halty M. A. et al. (2019) found that students who experience a higher frequency of positive emotions are more likely to perform better academically through academic psychological capital and academic engagement. Other studies found that academic psychological capital is positively associated with academic performance, academic adjustment, and engagement (Luthans et al., 2014; You, 2016; Carmona-Halty M. A. et al., 2019).

The concept of academic engagement is extended from the concept of work engagement in the work setting—“a positive, fulfilling, work related state of mind characterized by vigor, dedication, and absorption” (Carmona-Halty M. A. et al., 2019). From a psychological perspective, the activities students perform can be considered as “work” (Carmona-Halty M. A. et al., 2019). When applied to the academic setting, vigor refers to “high levels of energy and mental resilience while studying, the willingness to invest effort in studying, and persistence even when encountering difficulties.” Dedication refers to “being strongly involved in one’s studies and experiencing a sense of significance, enthusiasm, inspiration, pride, and challenge.” Absorption refers to “being fully concentrated and happily engrossed in what one is studying, where time passes quickly and one finds it difficult to detaching him/herself from studying” (Carmona-Halty M. A. et al., 2019). Ouweneel et al. (2011) found that positive emotion, personal resources, and academic engagement are reciprocally related. Furthermore, academic engagement is related to wellbeing and academic performance (Carmona-Halty M. A. et al., 2019).

The concept of meaningful studies is expanded from the concept of meaningful work (Azila-Gbettor et al., 2022). Meaningful work is one’s perception of the extent to which work is significant to one’s life and purpose. When applied to the academic setting, meaningfulness of study refers to the extent to which students consider their studies to be worthwhile and make their lives meaningful (Azila-Gbettor et al., 2022). Psychological meaningfulness is related to happiness, personal growth, wellbeing, and caring relationships (Azila-Gbettor et al., 2022).

Flourishing in life includes positive emotion, engagement, supportive relationship, meaningful life, and a sense of accomplishment (Seligman, 2011). Our study considers positive emotion as a marker of wellbeing and applies engagement and meaningfulness to the academic setting. We consider flourishing in life in three dimensions—supportive relationship, meaningful life, and a sense of accomplishment. Positive social relationship has been identified as an important factor for physical and psychological health and other positive outcomes (Butler and Kern, 2016). Meaningful life refers to “having direction in life, connecting to something larger than oneself, feeling that one’s life is valuable and worthwhile, and that there is a purpose to what one does” (p. 3) (Butler and Kern, 2016). Meaningfulness of life is related to physical health and higher life satisfaction (Butler and Kern, 2016). Accomplishment involves “a sense of working toward and reaching goals, mastery, and efficacy to complete tasks.”

## Early evidence on the “Inner Engineering” methods

Although research on the Inner Engineering methodology is in its infancy, early evidence thus far warrants further

exploration and examination of the methodology. For example, a pilot study of the course was conducted based on a sample of first-year college students. Results from the pilot study showed that the IE course had a positive effect on first-year students' wellbeing and flourishing (Chang and Rayapuraju, 2021). The current study aims to establish additional evidence among college students from all disciplines beyond first-year students. Furthermore, using a randomized control study, Chang et al. (2022b) found that two Upa Yoga practices (Yoga Namaskar and *Nadi Shuddhi*) reduced stress and enhanced wellbeing among college students during the COVID-19 pandemic.

Other studies have examined the effect of other IE methods on professionals. Rangasamy et al. (2019) found that a beginner's meditation called Isha Kriya meditation may improve mood among health professionals. Another beginner's practice called Simha Kriya showed feasibility and acceptance among healthcare workers during the COVID-19 pandemic (Narayanan et al., 2021) and may reduce COVID-19 related stress (Rain et al., 2021). A randomized control study showed that the IEO program, including the system of Upa Yoga, reduced stress among technology professionals (Upadhyay et al., 2022). Other studies found that IEO increased employee wellbeing and positive organizational behavior (psychological capital, work engagement, and meaningful work) (Chang, 2020, 2021; Chang et al., 2022c) and promoted the development of positive self-leadership (Chang et al., 2022a). Baelen and Chang (Forthcoming) argued that yoga can serve as tools for developing conscious leadership. More advanced "Inner Engineering" practices also showed changes in the biochemistry and neuro functioning that enhanced wellbeing and the feeling of bliss (Sadhasivam et al., 2020, 2021).

## The effect of yoga and meditation on college students

Yoga and meditation have a potential positive effect on youth education, including cognition, academic performance, psychosomatic, social, and physiological measures (Chung, 2018). Seppälä et al. (2020) found that the SKY Campus Happiness Program (Sudarshan Kriya Pranayama) improved most outcomes (e.g., depression, stress, mental health, mindfulness, positive affect, and social connectedness) relative to Emotional Intelligence and MBSR training. Greeson et al. (2014) showed that the Koru program may reduce stress and sleep problems and increase mindfulness and self-compassion. These programs are designed as campus programs. Integrating the knowledge and skills of wellbeing into the formal curriculum is an important way to institutionalize positive education in higher education. This study evaluates the effect of a credit-course based on

the Inner Engineering methodology on student wellbeing and flourishing.

## Materials and methods

### Design

Our study relies on a one-group field quasi-experimental design with pre-test (T0) and post-test (T1). The study was approved by the Institutional Review Board at the lead author's institution. Students enrolled in the course were introduced to the study and were invited to participate in the study on a voluntary basis. The pre-test and post-test surveys were administered online using Qualtrics. Each survey took about 10–15 min to complete. After completing online informed consent, students took the pre-test of the outcomes at the end of the first class (T0). The post-test of the outcomes (T1) was taken at the end of the last class in Week 8. The 8-week length of the course is comparable to the 8-week length of a MBSR course. However, the class meeting time is shorter (80 min) compared to that of MBSR (2.5 h).

### Intervention

The course is offered as a new 1-credit course open to all students across academic disciplines in the Fall semester of 2018 at a major research university in the Northeast region of the U.S. The course met in-person for 80 min once a week for 8 weeks in the second half of the semester (October–December). The course was offered again in two sections in the first half (February to April) of the Spring semester of 2019. The class size was limited to 35 students per section.

The course components and their associated learning objectives are outlined in [Table 1](#). Students were required to read assigned sections of the book titled "Inner Engineering" each week prior to attending class. In addition, students chose an Inner Engineering (IE) tool (known as "sadhana") offered in each chapter and experimented with using the tool as a homework assignment. Every week, students wrote and submitted a journal entry describing a core perspective presented in the book and their experience and learning from experimenting with one practical IE tool of their choice.

Students learned the series of seven Upa Yoga practices via video instruction in class. Each video instruction was about 12–15 min. One to two new practices were learned per class. After it was learned, each practice took about 4–5 min. The entire sequence took 30–35 min. Students were encouraged to practice daily outside of the class. After practice, students engaged in small group discussions. They described aspects of the book chapter that resonated with them and their inner experiences and shared their learning from experimenting with the IE tools.

## Recruitment

Students were recruited to enroll in the course through a course flyer. The flyer was posted on physical bulletin boards on campus and social media. The flyer was also emailed to academic advisors, who were requested to inform their students of the new course offering. The course flyer indicated that enrolled students would have an opportunity to participate in a research study evaluating the effectiveness of the course.

## Participants

A total of 105 students were enrolled in the 3 courses over two semesters and 92 students completed the pre (T0) and post (T1) course surveys. The participation rate was 87.6%. The sociodemographic and other characteristics of participants are shown in [Table 2](#). Twenty-six percent of the students were white, 46% were Asian, and 28% were other races; 37% were male and 63% were female. In the month before starting this course, 70% of students did not engage in yoga, 59% did not engage in meditation, and 20% did not engage in quiet time. This means that overall, most students were novices in yoga and meditation.

## Measures

The outcomes were measured by validated scales with satisfactory reliability (Cronbach's alpha > 0.8). Each scale was measured both in the pre-test and in the post-test. The number of items, range of score, coding scheme, range of score, and the reliability indicator Cronbach's  $\alpha$  for each scale are described in detail below.

### Wellbeing

*Mindfulness* was measured by the Mindful Attention Awareness Scale (MAAS) (5-Item) ([Brown and Ryan, 2003](#); [Osman et al., 2016](#)). [Osman et al. \(2016\)](#) found that the 5-Item is as reliable as the original MAAS. An example item of the 5-item scale was: "It seems I am 'running on automatic,' without much awareness of what I'm doing." The response was coded on a 6-point scale from 1 (Almost Always) to 6 (Almost Never). The score ranged from 5 to 30 and the Cronbach's alpha was 0.89 (pre) and 0.88 (post).

*Joy* was measured by the Joy Subscale of the Dispositional Positive Emotion Scales (6-Item) ([Shioata et al., 2006](#)). An example item of the scale was "I often feel bursts of joy." The response was coded on a 7-point Likert scale from 1 (Strongly Disagree) to 7 (Strongly Agree). The score ranged from 6 to 42 and the Cronbach's alpha was 0.89 (pre) and 0.88 (post).

*Vitality* was measured by the Subjective Vitality Scale (6-Item) ([Ryan and Frederick, 1997](#); [Bostic et al., 2000](#)). [Bostic et al. \(2000\)](#) found that the 6-item scale is a better scale with a

Cronbach's alpha of 0.84. An example item of the scale was: "I feel alive and vital." The response was coded on a 7-point scale from 1 (Not True at All) to 7 (Very True). The score ranged from 6 to 42 and the Cronbach's alpha was 0.89 (pre) and 0.88 (post).

*Body Restfulness* was assessed by the restorative quality of sleep. It is measured by a single item—Question 6 from the Pittsburgh Sleep Quality Index ([Buysse et al., 1989](#)). The question was "During the last month, how would you rate your quality of sleep overall?" The response was coded from 1 (very bad) to 4 (very good). The score ranged from 1 to 4 and Cronbach's alpha was 0.89 (pre) and 0.89 (post).

*Health* was measured by 2 questions adapted from "PERMA-Profiler Measure" ([Butler and Kern, 2016](#)). One question was "In general, how would you say your health is?"

TABLE 2 Sociodemographic characteristics of participants at baseline (N = 92).

Characteristics	N	%
<b>Gender</b>		
Male	34	37
Female	58	63
<b>Race</b>		
White	26	28
Black/African American	6	7
Asian	46	50
Native Hawaiian or Pacific Islander	1	1
Other	13	14
<b>Year in school</b>		
1st Year	19	21
2nd Year	29	32
3rd Year	19	21
4th Year	23	25
5th and more year	2	2
<b>Engagement in yoga in the last month</b>		
Not at all	65	70
A few days	24	26
Half of the days	1	1
Most of the days	2	2
Everyday	0	0
<b>Engagement in meditation in the last month</b>		
Not at all	54	59
A few days	27	29
Half of the days	3	3
Most of the days	6	7
Everyday	2	2
<b>Engagement in quiet time in the last month</b>		
Not at all	18	20
A few days	49	53
Half of the days	13	14
Most of the days	6	7
Everyday	6	7



The response was coded from terrible (1) to excellent (10). The score ranged from 2 to 20 and the Cronbach's alpha is 0.89 (pre) and 0.88 (post).

## Flourishing

*Academic Psychological Capital* was measured at four dimensions (self-efficacy, hope, optimism, and resilience) by a 24-item scale developed by Luthans et al. (2012). The Cronbach's alpha in the preliminary study with college students was 0.90. The wording of several questions (5, 8, 10, 11, 12, 16, 17, 18, 21, 23, 24) was modified to capture additional areas of academia (academic goals, assignments, school). Other questions were adopted from other versions of the same 24-item academic psychological capital scales—Question 1 (You, 2016); Questions 2, 3, and 20 (Babinchak, 2012); and Questions 6 and 13 (Jafri, 2013). Questions 19 and 22 were modified to reflect general psychological capital. An example item was: "I feel confident in presenting my ideas during group discussions." The response was coded on a 6-point scale from 1 (Strongly Disagree) to 6 (Strongly Agree). The score ranged from 12 to 84 and Cronbach's alpha was 0.88 (pre) and 0.87 (post).

*Academic Engagement* was measured by the Utrecht Work Engagement Scale—Student Form (UWES-SF, 9-Item). The 9-item short form was found to have the same acceptable level of structural validity (Çapri et al., 2017) as the 17-item long form (Schaufeli et al., 2002). The Cronbach's alpha for the 9-item scale was 0.88 (Çapri et al., 2017). Example items of the scale were: "When I study, I feel like I am bursting with energy" (Vigor); "My studies inspire me" (Dedication); "When I am studying, I forget everything else around me" (Absorption). The response was coded on a 7-point scale from 0 (Never) to 6 (Always). The scale score ranged from 9 to 54 and the Cronbach's alpha is 0.88 (pre) and 0.87 (post).

*Meaningful Studies* was measured by 3-item adapted from "PERMA-Profiler Measure" (Butler and Kern, 2016). An example item was "My studies help me understand my life's purpose." Each item was coded on a 10-point scale from 1 (not at all) to 10 (completely). The score ranged from 3 to 30 and the Cronbach's alpha is 0.89 (pre) and 0.88 (post).

*Relationship* was measured by 3-item on a 10-point scale from 1 (not at all) to 10 (completely) (Butler and Kern, 2016). A sample question was: "How satisfied are you with your personal relationships?" The score ranged from 3 to 30 and the Cronbach's alpha was 0.89 (pre) and 0.88 (post).

*Meaning of life in general* was measured by 3-item on a 10-point scale from 1 (not at all) to 10 (completely) (Butler and Kern, 2016). A sample question was: "To what extent do you lead a purposeful and meaningful life?" The score ranged from 3 to 30 and the Cronbach's alpha was 0.88 (pre) and 0.87 (post).

*Accomplishment* was a 2-item measure with responses coded on a 10-point scale from 1 (never) to 10 (always) (Butler and Kern, 2016). An example question is "How much of the time do you feel you are making progress toward accomplishing your

goals?" The score ranged from 5 to 30 and Cronbach's alpha was 0.91 pre-course and 0.92 post-course.

## Data analysis

The data from three courses was pooled into one dataset. We examined the data across three courses ( $n = 32, 32,$  and  $28$ ) prior to pooling the data together. We did not find significant systemic differences in sociodemographic characteristics and outcomes at baseline (T0) and the  $t$ -test results. The data was analyzed using R statistic software. The pairwise  $t$ -tests were conducted to determine if there is a significant difference in the scale score between pre (T0) and post (T1) test. The significance level was set at  $p < 0.05$ . Cohen's  $d$  was calculated to estimate effect sizes of IE course on the outcomes.  $d = 0.2$  is considered a "small" effect size,  $0.5$  represents a "medium" effect size and  $0.8$  a "large" effect size (Lakens, 2013).

## Results

Table 3 presents the mean, median, standard deviation, mean difference with significance test level, 95% confidence interval, and Cohen's  $d$ . Students scored significantly higher on all wellbeing measures—mindfulness, joy, vitality, self-rated health, and quality of sleep in the post-test (T1) compared to the pre-test (T0). Mindfulness was significantly higher at the end of the course ( $M = 18.69, SD = 5.01$ ) compared to that at the beginning of the course ( $M = 16.06, SD = 4.80$ ), [ $t(61) = -3.68, p < 0.001$ ]. Similarly, joy was significantly higher at the end of the course ( $M = 29.73, SD = 6.60$ ) compared to that at the beginning of the course ( $M = 26.76, SD = 5.82$ ), [ $t(61) = -3.97, p < 0.001$ ]. Vitality was significantly higher at the end of the course ( $M = 28.92, SD = 6.37$ ) compared to that at the beginning of the course ( $M = 25.18, SD = 5.72$ ), [ $t(61) = -4.64, p < 0.001$ ]. Sleep quality was significantly higher at the end of the course ( $M = 2.84, SD = 0.66$ ) compared to that at the beginning of the course ( $M = 2.66, SD = 0.66$ ), [ $t(61) = -2.50, p = 0.015$ ]. Health was significantly higher at the end of the course ( $M = 14.98, SD = 3.50$ ) compared to that at the beginning of the course ( $M = 13.44, SD = 3.35$ ), [ $t(61) = -5.33, p < 0.001$ ]. The effect size was moderate for mindfulness ( $d = 0.47$ ), joy ( $d = 0.50$ ), vitality ( $d = 0.59$ ), and sleep quality ( $d = 0.70$ ) but small for self-rated health ( $d = 0.32$ ).

Markers of academic flourishing were also increased at the end of the course. Students' academic psychological capital, academic engagement, and meaningful studies were significantly greater at the end of the course compared to those at the beginning of the course. Psychological Capital was significantly higher at the end of the course ( $M = 41.16, SD = 15.07$ ) compared to that at the beginning of the course ( $M = 37.40, SD = 41.46$ ), [ $t(61) = -4.80,$

TABLE 3 Results of *t*-test between pre (T0) and post (T1) measures (*N* = 92).

Outcome	Pre (T0)		Post (T1)		Mean <sub>T0</sub> -mean <sub>T1</sub>	95%CI		Cohen's <i>d</i>
	Mean	SD	Mean	SD		Lower limit	Upper limit	
<b>Wellbeing</b>								
Mindfulness	16.06	4.80	18.69	5.01	-2.63***	-4.06	-1.20	0.47
Joy	26.76	5.82	29.73	6.60	-2.97***	-4.46	-1.47	0.50
Vitality	25.18	5.72	28.92	6.37	-3.74***	-5.35	-2.13	0.59
Sleep quality	2.60	0.66	2.84	0.58	-0.24*	-0.44	-0.05	0.32
Health	13.44	3.35	14.98	3.50	-1.55***	-2.13	-0.97	0.68
<b>Flourishing</b>								
Relationship	20.74	6.29	21.87	4.88	-1.13	-2.82	0.57	0.17
Meaningful life	19.58	5.69	22.24	5.22	-2.66***	-3.88	-1.44	0.55
Accomplishment	19.74	5.53	20.00	4.97	-0.26	-1.83	1.31	0.04
<b>Academic flourishing</b>								
Academic PsyCap	37.40	13.40	41.16	15.07	-3.76**	-6.33	-1.18	0.37
Self-efficacy	11.40	3.57	12.90	3.21	-1.50***	-2.22	-0.78	0.53
Hope	6.40	4.97	7.50	6.14	-1.10***	-1.79	-0.41	0.40
Resilience	14.50	4.01	16.41	3.72	-1.90**	-3.27	-0.52	0.45
Optimism	9.31	2.82	10.44	2.51	-1.13**	-1.95	-0.31	0.35
Academic engagement	21.56	8.97	25.52	10.11	-3.95***	-5.46	-2.44	0.67
Vigor	9.76	2.94	11.89	3.27	-2.13***	-3.02	-1.24	0.61
Dedication	9.39	3.38	10.68	3.23	-1.29***	-2.00	-0.58	0.46
Absorption	10.71	4.48	13.07	4.18	-2.36**	-4.33	-0.39	0.69
Meaningful studies	4.60	...	5.26	...	-0.66*	-1.34	0.14	0.25

\**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001 (two-tail tests).

*p* < 0.001]. Similarly, academic engagement was significantly higher at the end of the course (*M* = 25.52, *SD* = 10.11) compared to that at the beginning of the course (*M* = 21.56, *SD* = 8.97), [*t*(61) = -5.24, *p* < 0.001]. Meaningfulness of studies was also significantly higher at the end of the course (*M* = 5.26, *SD* = ) compared to that at the beginning of the course (*M* = 4.60, *SD* = ), [*t*(61) = -1.97, *p* = 0.027].

The effect size was moderate for academic psychological capital (*d* = 0.37) and academic engagement (*d* = 0.61) and small for learning (*d* = 0.19) and meaningfulness of studies (*d* = 0.25). The mean score of academic psychological capital increased by 10%, from 37.40 to 41.16 and the mean score of academic engagement score increased by 18%, from 21.56 to 25.52.

Additional measures of flourishing such as meaningful life was also improved at the end of the course (*M* = 22.24, *SD* = 5.22) compared to that at the beginning of the course (*M* = 19.58, *SD* = 5.69), [*t*(61) = -4.36, *p* < 0.001]. The effect size was moderate for meaningful life (*d* = 0.55). However, there was no significant change in accomplishment between post-test (*M* = 20.00, *SD* = 4.97) and pre-test (*M* = 19.74, *SD* = 5.53), [*t*(61) = -0.33, *p* = 0.743]. Relationship also did not change significantly between post-test (*M* = 21.87, *SD* = 4.88) and pre-test (*M* = 20.74, *SD* = 6.29), [*t*(61) = -1.33, *p* = 0.187].

## Discussion

The study introduced a novel 1-credit 8-week college course based on yogic sciences of “*Inner Engineering*” and conducted a study evaluating its impact on the markers of wellbeing and flourishing on college students. Our findings suggested that students experienced improved wellbeing (mindfulness, joy, vitality, sleep quality, health), flourishing (meaningful life), and academic flourishing (academic psychological capital, academic engagement, and meaningful studies) upon completion of the course. However, there was no evidence of improvement in relationship and accomplishment. In terms of effect size, most markers of wellbeing (mindfulness, joy, vitality, and health) showed a medium effect size. Meaningful life and academic engagement showed similar results. The effect size for sleep quality, academic psychological capital, and meaningful studies was small. These results were comparable to the findings from the study of a similar course offered to first-year college students (Chang and Rayapuraju, 2021). These results provided support for our Theoretical Framework (Figure 1). Both the book and Upa Yoga practices combined produced positive effects on all markers of wellbeing and most markers of flourishing.

These findings contributed to the field of positive education in several ways. First, we introduced the Inner Engineering (IE)

methodology, little known to western educators and researchers, and established evidence for its potential as a college course for wellbeing and flourishing. Although research on MBSR and adapted programs have grown exponentially in recent years, fewer studies focused on the outcomes of university courses based on the MBSR approach. Among these studies, they primarily focused more on reducing negative outcomes (e.g., stress, anxiety, and depression) (Schure et al., 2008; Canby et al., 2015; Aherne et al., 2016) and little on positive outcomes (e.g., wellbeing and flourishing).

Our study presents a significant step toward incorporating the wealth of yogic sciences of wellbeing as an evidence-based and complementary approach to positive education. This intervention considers students as a whole person by comprehensively addressing four dimensions of human experiences—physiological, cognitive, affective, and energetic experiences. The study blended the strengths from both worlds—effective methods from the east and measurement instruments from the west. Our findings pointed out the potential of the yogic sciences to develop students more holistically and to humanize higher education by cultivating skills of wellbeing in a complete spectrum of human experiences (Oades et al., 2011; Devis-Rozental and Farquharson, 2020).

However, we did not find a significant increase in relationship and accomplishment upon completion of the course. In western societies, solitude is often associated with loneliness. However, spending time alone may enhance positive affect, especially for those who have preference for solitude (Toyoshima and Sato, 2019). Intentional solitude allows one to turn inward, which creates opportunities to be more aware, curious of one's physical, cognitive, and emotional processes, and to be less judgmental of oneself and others (Leavitt et al., 2021). University students, who reported lower social belonging but prefer autonomous solitude, tend to experience greater self-esteem and greater sense of relatedness to others and lower loneliness (Nguyen et al., 2019). The yogic approach to wellbeing focuses on self-reliance—one is capable of generating desirable inner experiences regardless of social conditions (Sadhguru, 2016). Alternatively, it is plausible that the impact on the social aspect of flourishing, such as social relationship and accomplishment, may take longer time to take effect.

The effect size we found in academic psychological capital and academic engagement were larger than a few previous studies (King et al., 2015). For example, in our study students experienced a 10% increase in academic psychological capital while students experienced a 3% increase in the study of Luthans et al. (2014) using a micro psychological capital intervention (2 h) among undergraduate business students. The effect size of academic engagement ( $d = 0.67$ ) found in our study was slightly larger than that of King et al. (2015) ( $d = 0.48$ ) using a positive emotion intervention.

This study comes with several limitations. First, the effect of the course may be exaggerated without a comparison group or

a randomized control group. There could be a maturation effect (Jhangiani et al., 2019), where students may learn and grow over time naturally without partaking in a course. Also, the study did not include a post-course follow-up. The long-term effect of the course is unknown. It is desirable for future research to use a comparison group or a Randomized Control Trial (RCT) design as well as a post-course follow-up.

Second, from a western or U.S. perspective, Asian students were over-represented among students who enrolled in the course, which may reduce the generalizability of the results to the western or U.S. college population. The course was offered in a university that has a diverse student body and a high rate of Asian population in the local community. It is plausible that Asian students were more interested in learning yoga and meditation and therefore enrolled in the course. On the other hand, from a global perspective, Asian population constitutes 60% of the world population. A course employing the eastern yogic approach may have a global appeal.

Third, this course was conducted in-person before the COVID-19 global pandemic. College students experienced unprecedented disruptions in their lives during the COVID-19 pandemic. Stress, depression, anxiety, and disengagement were prevalent among college students (Freyhofer et al., 2021; Fruehwirth et al., 2021). The in-person format of the course not only limited its scalability but also its feasibility during the COVID pandemic. de Jong et al. (2020) argue that “life crafting” could offer a way to help people cope with the COVID-19 pandemic situation and help them renew their sense of meaning in life. Similarly, based on our findings, the *Inner Engineering for Success* course has the potential to help students handle the disruptions associated with the COVID-19 pandemic in a more resilient way. Chang et al. (2022b) found that two of the Upa Yoga practices, Yoga Namaskar and Nadi Shuddhi, reduced stress and increased wellbeing among college students during the COVID-19 pandemic. At the end of the 12-week study, students experienced a significant increase in wellbeing and positive affect and reduction in stress, anxiety, depression, and negative affect.

## Conclusion

This study presented a way of embedding yogic sciences of wellbeing in the higher education curriculum and evaluated its effectiveness. The present intervention added diversity to the existing interventions of positive education in higher education and provided a way of institutionalizing wellbeing and flourishing. This study was the first to examine the effect of a course based on the Inner Engineering methodology integrated in the university curriculum. The findings revealed that the Inner Engineering methodology shows promise as a positive education intervention for student wellbeing and flourishing. Although the findings are preliminary due to methodological

limitations, these findings provide compelling evidence for incorporating the Inner Engineering methodology in university curriculums and encourage future studies on its effectiveness.

Future studies may examine the effect of the course during challenging situations or during the COVID pandemic if the pandemic persists for a long period of time. The COVID-19 pandemic exposed the necessity and usefulness of online learning technology. Dekker et al. (2020) explored how “life crafting” strategy may be incorporated with artificial intelligence such as mental health care chatbots and a conversation agent. Gilmour (2021) explored how wellbeing may be embedded in blended and online learning. Recent randomized control studies showed that online format (IEO) is effective in reducing stress for employees (Upadhyay et al., 2022) and online Upa Yoga intervention, reduced stress and increased wellbeing for college students during the COVID-19 pandemic (Chang et al., 2022b). Future studies may investigate whether an online format of the “Inner Engineering” for Success course would be feasible and equally effective.

## Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

## Ethics statement

The studies involving human participants were reviewed and approved by the Rutgers Institutional Review Board. The

patients/participants provided their written informed consent to participate in this study.

## Author contributions

TC contributed to conceptualization, study design, data collection and data analysis, literature review, and manuscript writing. SP and AR contributed to literature review and manuscript writing. PP contributed to data analysis. All authors contributed to the article and approved the submitted version.

## Conflict of interest

Author PP was employed by Amalgamated Life Insurance Company.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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