

## CHAPTER 1

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# The (Further) Evolution of Mindfulness Science

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Since the first edition of this handbook was published in 2015, there has been an explosive growth in popular and scientific interest in mindfulness. Mindfulness programs and other training can now be found in day care centers, primary and secondary schools, colleges, corporate headquarters, government bodies, and prisons. Mindfulness has been integrated into health care settings to address various mental and physical health conditions, and insurance reimbursement can be obtained for therapeutic mindfulness programs such as mindfulness-based cognitive therapy. Many businesses have incorporated mindfulness training into corporate wellness programs. There has been a proliferation of online courses and programs, and wellness retreats and workshops focusing on mindfulness, meditation, and well-being have become popular. Before the first edition of this book was published, there were 260 smartphone apps available for download that purported to teach or facilitate mindfulness meditation. Since 2015, that number has grown to 2,500, with over 255 million downloads (Mani et al., 2015; Singh, 2023). These examples show how radically the purposes of mindfulness meditation have evolved since its beginnings in Indian Buddhism more than 2,500 years ago. Meditation techniques first used by monastics to disengage from the world and develop deep insights into reality that lead to the attainment of enlightenment are now used in contemporary Western and Westernized countries to deliver “culturally specific practical benefits” (Wilson, 2014, p. 106).

Describing a phenomenon as popular can connote faddishness and insignificance, even frivolity (Helderman, 2023), but popular turns in mindfulness are not new. The history of Asian Buddhism is marked by transformations that were sustained because the concepts and practices were perceived to have practical benefit (Cho, 2012). The

movement of Buddhist meditative practice out of the monasteries and into the homes of laypeople began in Burma, then spread to other countries and eventually across the globe (McMahan & Braun, 2017). A central figure spearheading this initial popularization was Burmese Buddhist monk Ledi Sayadaw, who believed that “one can be a monk in the world, even though a regular layperson” (quoted in McMahan & Braun, 2017). Dōgen Zenji brought meditative practices from China to Japan, promoting the practice of *zazen* beyond the monastery. Zen practices and sensibilities were extended to martial arts, crafts, and artistic activities (Deal & Ruppert, 2015; Suzuki, 2019). Today, the monastic practice of mindfulness (and other forms of) meditation survive and thrive in many parts of the world, but the typical contemporary meditation practitioner is a parent, a businessperson, a physician, a psychotherapist, an educator, a scientist, a soldier, a software engineer, a college or high school student . . . or even a child.

Yet, as with many popular trends, there is critical backlash—and in the case of mindfulness, along two fronts (McMahan & Braun, 2017): First, the hype surrounding mindfulness in news reports, popular books, and other media has led to claims that mindfulness is presented as a panacea to cure all mental and physical ills and promote all that is good. Second, critics have railed against the commercialization and commodification of mindfulness (Purser & Loy, 2013), as meditative practices can be disconnected from core Buddhist ethical frameworks supporting “right mindfulness” (e.g., Anālayo, 2004).

The widespread interest in mindfulness—and some might say, the hype too (Thompson, 2020)—has been stoked by mindfulness science, which has also burgeoned in recent decades. The number of mindfulness-related articles published per year has doubled since the first edition of this handbook was published (Black, 2023). Federal grant-funding agencies such as the U.S.-based National Institutes of Health pour millions of dollars every year into scientific research on mindfulness and related mind–body techniques and therapies. Many colleges now offer courses and degree programs in mindfulness science, and institutes, academic societies, and university research centers promote rigorous scientific and scholarly work on contemplative practices like mindfulness. The end result of the popularization of mindfulness is that it has become “naturalized” and is helping to reshape American and other cultures (McMahan & Braun, 2017).

## WHAT IS MINDFULNESS?

The term *mindfulness* appears to have been coined by the British scholar T. W. Rhys Davids (Rhys Davids, 1899) as a translation of the Pali word *sati* (Sanskrit: *smṛiti*). Originally meaning memory, or recalling that which has been remembered, the contemporary meanings of mindfulness are highly variable, differing by Buddhist and secular tradition, geography and culture, and audience—for example, when described in an introduction to mindfulness for beginning meditators or instead to practitioners of Theravadin, Tibetan, or Zen Buddhism. Thus, there is no single meaning of

mindfulness, but a core concept across many definitions of mindfulness concerns the sustained regulation of attention toward currently salient stimuli on a moment-to-moment basis. This can be illustrated by two broad forms of such regulation commonly practiced today under the banner of mindfulness meditation, namely, focused attention and open awareness. As discussed by Brown and Grossman (Chapter 3, this volume) and others (e.g., Lutz et al., 2008), focused attention involves directing attention toward a focal perceptual object such as the breath flowing in and out, or kinesthetic sensations in the body. Open awareness (also termed open monitoring) involves attending to a wide scope of perceptual stimuli as they enter awareness—sensory events (e.g., sounds), emotions, and thoughts, for example—without efforts to retain them or dispense with them. Mindfulness programs, apps, and so on typically offer both kinds of meditation.

A major focus of mindfulness science has been “therapeutic mindfulness” (Helderman, 2023), which attempts to quantify the health- and well-being-promoting effects of mindfulness for modern people in developed societies (McMahan & Braun, 2017). Thousands of empirical studies have now examined whether and how mindfulness training—which has largely been operationalized in terms of meditative practices of various kinds—impacts thought, emotion, and behavior in day-to-day, normative, intrapersonal and interpersonal functioning, as well as a variety of physical and psychological conditions in healthy and clinical populations. These conditions include stress, pain, addiction, anxiety, depression, and personality disorders. All of these basic and applied science areas of inquiry are discussed in this handbook. The fact that mindfulness has become an important and highly visible topic in psychology, psychiatry, and other behavioral sciences does not mean that practicing it will cure all ills. But mindfulness concerns a fundamental, functional feature of the human mind, namely, attention, and it is difficult to conceive of any realm of human activity in which attention is not engaged or implicated.

## **A BRIEF HISTORY OF MINDFULNESS SCIENCE: HOW DID WE GET TO HERE?**

Historical interest in mindfulness comes from two primary sources: Buddhism and psychology. Mindfulness science owes its biggest debt to Buddhism, the seeds of which were planted over 2,500 years ago. Each of the three main schools of Buddhist thought, namely, Theravadin, Tibetan, and Zen Buddhism, has made significant contributions to a still-developing understanding of mindfulness among scholars, scientists, and the general public. Yet each conceives of mindfulness differently, and practitioners of each tradition have unique goals in undertaking mindfulness meditation. Ancient and some modern practitioners seek solitude and withdrawal from society to cultivate tranquility and insight into the operations of the mind and reality, while today most lay practitioners of mindfulness seek to engage with the world in search of the good life, the successful life, or the life well lived (McMahan & Braun, 2017). However, important representatives from all three Buddhist schools of thought have

embraced contemplative (including mindfulness) science as it has evolved over the past 40 years, and an ongoing dialogue between Buddhist teachers, scholars, and practitioners, and behavioral and other scientists has enriched the understanding and empirical investigation of mindfulness. For example, the Mind and Life Institute, of which His Holiness the 14th Dalai Lama is Honorary Board Chair, has regularly sponsored dialogues between representatives of Buddhism and science that have resulted in a number of scientific collaborations and books (e.g., Hasenkamp & White, 2017; Kabat-Zinn & Davidson, 2012; Singer & Ricard, 2015).

As McMahan and Braun (2017) discuss, psychologists' interests in mindfulness, and Buddhist meditation more broadly, were spurred by the works of American and Japanese scholars and writers such as D. T. Suzuki (e.g., 1950, 1951), whose books on Zen meditation helped to spark a dialogue between Freudian psychoanalysis and Zen at a time when Freudian psychoanalysis was at the height of its popularity. For example, psychologist and psychoanalyst Erich Fromm believed that Zen meditation could help to render conscious the entire contents of the unconscious mind (Fromm et al., 1960). Psychoanalytic thinker and clinician Karen Horney drew from Zen to emphasize self-acceptance—that is, a nonreactive relating to the self rather than seeking to change the self (Parsons, 2009). This helped to set the stage for a non-judgmental acceptance of one's thoughts, emotions, and behavior that has become a prominent feature of contemporary mindfulness-based and -integrated therapies such as mindfulness-based stress reduction (Kabat-Zinn, 2013), mindfulness-based cognitive therapy (Segal et al., 2018), dialectical behavior therapy (Linehan, 2018), and acceptance and commitment therapy (e.g., Hayes et al., 2011), as well as theories of mindfulness (e.g., Monitor and Acceptance Theory; Lindsay & Creswell, 2017; see Lindsay, Chapter 13 and Creswell, Chapter 14, this volume).

Psychological research into Buddhist styles of meditation, such as Zen, began in the 1960s (e.g., Deikman, 1963; Maupin, 1962), and empirical research on mindfulness meditation began in the 1970s (e.g., Goleman & Schwartz, 1976; Kornfield, 1977). Psychologist and writer Daniel Goleman wrote his Harvard University doctoral dissertation on meditation and stress reactivity (Goleman, 1973) and published articles that described meditation as a primary gateway to mental health in Buddhist thought (e.g., Goleman, 1975), with particular attention to mindfulness as a means to reprogram perception and cognition in the service of psychological transformation (Wilson, 2014). Psychologist and meditation teacher Jack Kornfield, a co-founder of two meditation centers in the United States (Insight Meditation Society in Massachusetts and Spirit Rock Meditation Center in California) based his doctoral dissertation on an investigation of psychological effects of intensive mindfulness meditation, such as occurs in retreat environments (Kornfield, 1977).

An inflection point in the development of mindfulness science and secular practice came with Jon Kabat-Zinn's founding of the Stress Reduction and Relaxation Program at the University of Massachusetts Medical School in 1979 and his subsequent articles and books. It is difficult to overstate the influence of Kabat-Zinn and his collaborators' work on mindfulness science and Western secular approaches to mindfulness meditation, including therapeutic mindfulness. And for the first time we

see the study of mindfulness largely stripped of its markers of Buddhist origin and identity in order to fit into secular spaces (McMahan, 2023; McMahan & Braun, 2017), first into hospitals and later into public schools, businesses, governments, and other cultural institutions (and of course, into countless homes). As McMahan (2023) discusses, this approach gave scientific research on mindfulness a legitimacy that could only come with this occupation of secular spaces.

Much mindfulness research rests on Kabat-Zinn's claim that mindfulness does not involve the cultivation of positive personal qualities, whether ethical, moral, or characterological, because such qualities already lie within each person, waiting to be uncovered (Kabat-Zinn, 1994). This innatist stance (Dunne, 2013, 2015) is present in several Buddhist traditions, including Chan/Zen, Mahamudra, and Dzogchen. It finds an auspicious match with Western Romanticism and Transcendentalism, therapeutic emphases on self-acceptance, as well as with certain strands of Protestant Christianity (e.g., Fox, 2000), all of which emphasize innate human goodness, inner authenticity, and wisdom. These ideas have become baked into modern Western culture (McMahan, 2023) and may have helped to enhance the widespread acceptance of mindfulness science and practice.<sup>1</sup>

Mindfulness science began in earnest in the 1980s, with fundamental questions about treatment effectiveness for pain, anxiety, and other psychiatric and physical health conditions (e.g., Kabat-Zinn, 1982; Kabat-Zinn et al., 1985). Like many developing fields of study, this research has had serious methodological drawbacks. As Ludwig and Kabat-Zinn (2008, p. 1352) discussed 17 years ago (as of this writing),

The available research on mindfulness has major limitations, precluding any definitive assessment of effectiveness at this time. Published clinical studies frequently have small numbers of participants, lack an active control group, and include only subjective end points. Most of these studies do not adequately consider participant characteristics (making it difficult to generalize the effects to other groups), treatment methods (relating to reproducibility), study staff protocol adherence and participant skill acquisition (treatment fidelity), and relevant covariates (confounders and mediators).

Since that time, researchers in the field of mindfulness studies have been asking more sophisticated questions, using more sophisticated methods, and developing a more detailed understanding of mindfulness, its mechanisms, and its effects. At the same time, they have become aware of important issues to be addressed with the conceptualization of mindfulness, the methods used to investigate mindfulness training and intervention effects, and the populations toward whom mindfulness training is directed. All these developments reflect a maturation of the field, with significant advancements in theory, research, and practice over the years. As the quote above suggests, the field has a healthy capacity for self-criticism, and there is still considerable room for enhancing the rigor of the science (see Van Dam et al., 2018, for a review). Today mindfulness research occupies an important place in an interdisciplinary field of study known as contemplative science, which conjoins rigorous science with contemplative wisdom to better understand how mind-body practices such as

meditation can alter mind, brain, and body to impact mental and physical health, and individual and collective well-being.

## THE STRUCTURE OF THE HANDBOOK

The study of mindfulness has emerged in five overlapping domains, and so the book is organized along these lines. Part I concerns the interface between contemporary Buddhist scholarship and science. In Chapter 2, Buddhist scholar Jake Davis seeks to uncover assumptions held by those working in each camp and argues that engagement of these two “cultures” is essential to assess the value of mindfulness in contemporary societies. Chapter 3 highlights developments in the Western conceptualization of mindfulness and the methods used to study it, authored by two historically adversarial scholars, namely, Kirk Warren Brown and Paul Grossman. This chapter also offers critiques of the modern “science of mind” that defines much contemporary mindfulness research, and as the chapter shows, upon which the two authors do not always agree.

One goal of Part II is to better situate mindfulness within the contexts of Western psychological theory, research, and practice in an effort to better understand and study the phenomenon and to reach a wider audience than has been the case to date. In Chapter 4, neuroscientists Yi-Yuan Tang and Michael Posner position mindfulness within a predominant neurocognitive model of attention. In Chapter 5, psychologists Richard Ryan and James Donald apply a self-determination theory framework to discuss how mindfulness subserves autonomous self-regulation, based on the capacity to make informed choices, and integrative emotion regulation, with downstream benefits for well-being and wellness in contemporary, fast paced societies. In Chapter 6, Steven Hayes and colleagues question the predominant nomothetic approach to the study of mindfulness interventions and apply a novel “idionomic approach” to understand how mindfulness can serve as a tool to meet individual, person-based ends. Carrying forward this focus on individual heterogeneity, Andrea Haidar and colleagues close the section with Chapter 7. They present a review of, and guidelines for, mindfulness-based research and practices adapted to Black communities, an underserved population in the United States for these types of programs. More broadly, this chapter also highlights the importance of diversifying the ethnoracial groups for which mindfulness is offered, a topic that is also taken up in many of the other chapters.

Part III discusses the advances in basic science that are expanding our scientific knowledge and understanding of fundamental principles of mindfulness, with the aim of answering abiding theoretical questions and uncovering key mechanisms or processes through which mindfulness works in both healthy and clinical populations. In Chapter 8, neuroscientist David Vago dives deeply into the neurophenomenology of mindfulness to better map subjective experiences to neurobiological substrates. Building on systems-based and computational models to the self and mindfulness, this approach may help us improve our understanding of how mind, brain, and body

interact to alter perception, cognition, emotion, and behavior. Chapter 9, authored by cognitive scientist Marieke van Vugt, applies computational modeling to explore the benefits of mindfulness for the fundamental processes of attention, memory, and cognitive control. The use of computational models promises to clarify our understanding of how different forms of mindfulness practice, such as focused attention and open monitoring, operate to impact cognition. In Chapter 10, social psychologist Denise Zheng and colleagues discuss the role of mindfulness training in enhancing emotional well-being, with a particular focus on positive and negative emotions, as studied in both laboratory settings and “in the wild” of individuals’ daily lives. In Chapter 11, Daniel Berry explores how mindfulness can foster social well-being, as accrued through close relationships, interpersonal interactions, and intergroup relations. The authors highlight the importance of prosocial emotions and cognitions, such as compassion and social connection, for these outcomes. Closing this section, in Chapter 12, Scott Rigby and Richard Ryan undertake an inquiry into how mindfulness relates to concepts and processes of *self*, a construct of key interest to Buddhist teachers, scholars, practitioners, and psychological scientists. While the concept of *no-self* is prominent in many strands of Buddhist thought, Rigby and Ryan show how mindfulness can support healthy functioning of the self through an openness to and integration of experiences made possible by a “self-as-process.”

The chapters in Part IV turn attention to mindfulness interventions and treatments to enhance cognitive, affective, and interpersonal processes in neurotypical children, youth, and adults. This section also highlights applied research with healthy and healthy stressed populations that uses mindfulness-based and -integrated intervention models in educational and workplace settings. Opening the section, in Chapter 13 health psychologist Emily Lindsay examines mindfulness-based intervention influences on subjective and physiological stress in the general population, in highly stressed individuals, and among high-stress populations. She also discusses how such interventions may work to buffer stress. In Chapter 14, psychologist and neuroscientist David Creswell depicts ways in which mindfulness interventions alter stress-related neural and peripheral nervous system biological pathways. He then discusses how these alterations may explain the benefits of these interventions for mental and physical health.

Educational psychologist Patricia Jennings then addresses the role of mindfulness- and compassion-based programming for improving the well-being of highly stressed teachers and for promoting classroom interaction quality and positive student outcomes (Chapter 15). Taking an ecological or whole-school perspective, Jennings argues that contemplative practice programming should focus on teachers first so as to support their abilities to sustain successful student learning environments and stand on firmer ground in introducing contemplative practices to their students. Chapter 16, authored by organizational psychologists Christopher Lyddy and Darren Good, focuses on the growing role of mindfulness in enhancing workplace culture and worker well-being. Lyddy and Good introduce a conceptual framework built on contemplative management and practice to understand the nature, antecedents, and outcomes of mindfulness practice in the workplace.

Part V discusses clinical mindfulness interventions for mental and physical health conditions, sampling compelling mindfulness-based and -integrated intervention research on the treatment of emotion dysregulation, depression, anxiety, pain, and addictions. In Chapter 17, neuroscientist Simón Guendelman applies his embodied emotion regulation model to recent evidence on mindfulness-based intervention effects on emotion regulation capacities; he then applies this model to disorders that appear to have emotion regulation substrates, including several discussed in this section. From the original mindfulness-based stress reduction model have come a number of adaptations. Among them is mindfulness-based cognitive therapy, a highly successful treatment that has been applied to a variety of clinical conditions, including treatment-resistant depression, recurrent suicidality, and anxiety disorders. In Chapter 18, clinical psychologists Amanda Shamblaw and Zindel Segal discuss theory and evidence for the effectiveness of mindfulness-based cognitive therapy for such conditions, and they demonstrate its application to populations such as children, older adults, and perinatal mothers. These authors also discuss the digitization of mindfulness-based cognitive therapy that has begun to reach those in need who live in remote locations or for whom mobility is limited.

In Chapter 19, Shalini Bhattacharya and colleagues provide a comprehensive overview of the treatment of anxiety-related disorders through mindfulness-based interventions, critically examining their effectiveness and exploring their mechanisms of symptom improvement. Chapter 20, by psychologist Joshua Grant, reviews the most compelling evidence for meditation-based practices targeting pain conditions, with a particular emphasis on how these practices impact pain in otherwise healthy persons. Closing out this section and the handbook in Chapter 21, clinical psychologist Eric Garland and coauthors unpack the nature of substance use and behavioral addictions, particularly their development and staying power. He also discusses compelling evidence supporting the role of mindfulness-based interventions such as mindfulness-oriented recovery enhancement for treating addiction and related symptomology, as well as their mechanisms of effectiveness.

## CONCLUSION

Mindfulness science has come a long way in the past decade, and indeed in the last 50 years. Significant advances have been made in theory, empirical and scholarly research, and the application of mindfulness to an increasingly wide range of topics, populations, and mental and physical health conditions. The field has become more interdisciplinary, wherein contributors from Buddhist studies, psychology, psychiatry, neuroscience, medicine and allied disciplines, and others have brought unique perspectives to the understanding of mindfulness and its applications. Alongside, and in part due to this cross-discipline dialogue, the science of mindfulness has become more rigorous in its methodologies and data analysis techniques, with growing emphases on well-controlled experiments and trials, and more sophisticated statistical approaches that are helping to address important questions about whether, how,



and for whom mindfulness is beneficial. This handbook is designed both to give the reader a wide-angle view on the field and provide more focused views of research on specific outcomes. In a reflection of mindfulness practice itself, the authors of each chapter have been openly attentive to both the strengths and weaknesses of present-day research, with an eye toward fostering ever-higher quality research as mindfulness science continues to develop.

## NOTE

1. Innatism stands in contrast to constructivism and deconstructivism, which emphasize, respectively, the cultivation of positive qualities such as compassion and gratitude, and the deconstruction of fixed concepts and views, and reified thoughts and beliefs (Dunne, 2015; McMahan, 2023).

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