



# Being in the Present Moment: Toward an Epidemiology of Mindfulness

Jeff Levin<sup>1</sup>

Accepted: 16 June 2023

© The Author(s), under exclusive licence to Springer Science+Business Media, LLC, part of Springer Nature 2023

## Abstract

This paper is a commentary on Doug Oman’s article entitled, “Mindfulness for Global Public Health: Critical Analysis and Agenda,” published in this issue. The present paper lays out the parameters of how epidemiologists may go about investigating the population-health impact of practices and states of being related to mindfulness meditation. First, it discusses conceptual issues involved in researching mindfulness; second, it summarizes the empirical literature on mindfulness and population health; third, it proposes a new field of study around the epidemiology of mindfulness; and, fourth, it offers some suggestions regarding translation of epidemiologic research findings on mindfulness to public health. To this end, a series of questions is posed in order to provide a starting point for descriptive and analytic epidemiologic research on mindfulness, and the translation or application of such findings in pastoral, clinical, and public health settings is discussed, with examples given. Conducting epidemiologic studies is a natural next step in the emergence of mindfulness and meditation as a subject for health-related research. Moreover, public health can provide a new setting for mindfulness to demonstrate its salutary effects, not just on individual patients in clinical settings but at the population level, in terms of rates of physical and psychological morbidity.

**Keywords** Mindfulness · Meditation · Epidemiology · Health · Public Health

It is a great honor to have been invited to offer comments on Doug Oman’s masterful paper on mindfulness in public health (Oman, 2023). For response papers like this, it is standard practice to offer a few words of praise, followed by a more pointed, but polite, critique, perhaps offering some additional comments to aim the conversation in a direction more aligned with the commentator’s preferences. That will not be the case here. Oman’s praiseworthy paper is a veritable clinic on the relevance of mindfulness to public health—both a literature review and a call to action. It is hard to identify anything of substance that was left out. He beautifully outlines the relevance of mindfulness and meditative practice, in general, to public health in nearly all its facets, basic and applied. Especially laudatory is his effort to detail the points of convergence between the psychological, philosophical, and even theological underpinnings of mindfulness and what is often termed the public health ethic (Beauchamp, 1976).

More specifically, Oman laments the absence of mindfulness from the scientific and programmatic literature in public health. The phrase he uses for this is “unfulfilled potential,” which is perceptive and difficult to disagree with. He also notes that while outpatient mindfulness programs, beginning with Mindfulness-Based Stress Reduction (MBSR), formerly known as the Stress Reduction and Relaxation Program (Kabat-Zinn, 1982), as well as other mindfulness-based programs (MBPs) and mindfulness-based interventions (MBIs), have become clinically influential, they have left a minimal footprint within public health. Oman finds this disappointing, as so much potential exists here to do good.

A centerpiece of his paper is a comprehensive exploration and evaluation of 14 points of convergence (Oman calls these “axes”) between mindfulness and public health. One of these, point “A6,” he terms “Epidemiologic foundations,” for which he notes, correctly, that mindfulness “lags.” This is for several reasons including, up to now, minimal effort to detail (a) “population patterning” of mindfulness, which in turn has been inhibited by (b) certain “psychometric weaknesses,” notably inattention to developing and validating measures applicable specifically for population-health research, and (c) overlooked

---

✉ Jeff Levin  
jeff\_levin@baylor.edu

<sup>1</sup> Institute for Studies of Religion and Medical Humanities Program, Baylor University, One Bear Place # 97236, Waco, TX 76798, USA

attention to “theorizing” about the impact of mindfulness on respective physical and psychological outcomes.

With the Oman paper as a jumping-off point, the present paper outlines how an epidemiologist might approach the study of mindfulness. This paper is an effort to provide these missing foundations so as to bring the study of mindfulness into better alignment with the study of other putative psychosocial and behavioral determinants of population-health indicators. To this end, several tasks are undertaken. First, this paper unpacks conceptual issues regarding mindfulness. Second, the empirical research literature on mindfulness and health is summarized. Third, a research program is proposed for the epidemiology of mindfulness. Fourth, “translational” issues for such research are noted. Taken together, it is hoped, this paper will provide a template for the study of mindfulness as what epidemiologists term an exposure construct or variable—i.e., as a determinant (whether risk or protective factor) of subsequent morbidity or mortality, physical or psychological, and of other population-health outcomes.

## Mindfulness: Conceptual Issues

In outlining the epidemiologic task in confronting a novel exposure variable, one best begins by posing a series of questions, namely what, who, where, when, how, and why. The “what” of mindfulness, for example, is about positing a working conceptual definition, including inclusionary and exclusionary criteria. “Who,” “where,” and “when,” respectively, refer to what epidemiologists refer to as “PPT,” or person, place, and time, the primary foci of comparison when conducting descriptive epidemiology. For example, pertinent lines of inquiry here might be to identify religious, ethnic, or cultural differences in the prevalence or content of mindfulness practices, as well as any geographical or national variation or changes over time, provided sources of such data are available.

“How” is a two-part question: it is about identifying associations with particular health outcomes—this is called analytic epidemiology—as well as about the search for underlying mechanisms of action, also known as mediating or intervening factors. That is, if longitudinal findings link mindfulness practice to, say, a lower cumulative incidence of state anxiety, one might wish to follow up by investigating the physiological or psychophysiological pathways or processes that connect the exposure and the outcome. For example, one might ask, what is it about the neurological correlates of mindfulness-related states of consciousness that are known or hypothesized to mitigate stress or affective arousal? Helpful speculation along these lines has been offered in relation to other outside-the-mainstream psychosocial constructs such as religion and spirituality (Koenig

& Cohen, 2002), love (Esch & Stefano, 2005), and transcendence (Levin & Steele, 2005), and has contributed to advancing subsequent research in these fields of study.

Finally, “why” is a more existential question, and is about reflecting upon what a given finding means or implies, in a wider context, in this instance perhaps for personal growth or human conscious evolution. This is not a typical feature of epidemiologic research papers, but is a useful contribution when novel subjects like this are being broached. Mindfulness—whether speaking of particular meditative practices or of the states of consciousness that they entail or engender—is such a provocative concept, from the perspective of Western biomedicine, that thoughtful speculation on the deeper, existential meaning of any significant findings would be welcome.

One might also add to this list of questions that of “wherefore”—i.e., to what end—which is about potential applications or implications of an observed association in a therapeutic or public health setting. Here, one might ask, for example, what one’s particular research results imply for the design of community intervention studies or health policies. This brings us to the concept of “translation,” as in the emerging subjects of translational medicine and translational epidemiology, to be discussed later.

A systematic, multi-step approach along the lines just outlined is commonly used in epidemiology, especially in descriptive epidemiology (e.g., Byass, 2001), and has been employed or proposed by the present author for investigating the epidemiology of several unusual exposure variables which in some ways are akin to mindfulness. These include prayer (Levin, 2004), transcendent experience (Levin & Steele, 2005), human flourishing (Levin, 2020a), religion (Levin, 2022), and even more “mysterious” phenomena than these (see Levin & Steele, 2001). For the present paper, the focus will begin with “what,” and the other questions will be taken up in sequence later on.

In order to study mindfulness in the manner of an epidemiologist, one must first settle on a working definition based, presumably, on theory or clinical observation or prior studies. Such a definition can then be operationalized—that is, transformed into a reliable measure to be validated for use in research. This process and the associated decisions made about the scope of a construct and its instrumentation and measurement are known as exposure assessment (Armstrong et al., 1994). In light of the philosophical and religious provenance of mindfulness in traditions of Buddhist meditation, as Oman (2023) notes, this ought to be the place to begin piecing together a conceptual definition relevant to empirical study.

Among the most well-known descriptions of mindfulness is Thich Nhat Hanh’s famous statement, “Nothing is more precious than *being in the present moment*, fully alive and fully aware” (emphasis added) (Hanh, 1998, p.

70). Interestingly, this is reminiscent of the call to “be here now,” popularized by Hindu *yogī* and former Harvard psychologist Ram Dass (a.k.a. Richard Alpert) (Dass, 1971). Mindfulness-like states or mindfulness-generating practices are described in other spiritual and wisdom traditions, especially by religious mystics. These include the *hitbodedut* of Jewish Kabbalists (Kaplan, 1982), the *murāqabah* of Muslim Sūfis (Azeemi, 2005), and the *sāmāyika* of Jain monastics (Jain, 2012).

The term mindfulness as used in contemporary psychology and medicine, as readers of this journal are well aware, is not equivalent to the word meditation, but certainly there is conceptual overlap and shared history between these concepts (see Hickey, 2019; Oman, 2019). The former could be said to be a type of meditative practice, or, better, the fruit of such a practice, while distinct in its origins from, for example, the *rāja yoga* taught by the initiates of the Swāmī order. Oman’s (2023) paper does a great job of defining and outlining the characteristic features of the MBSR approach to mindfulness, identifying its Buddhist influences, and pointing to its clinical applications, so there is no need to restate any of that information here. While a more detailed unpacking of its Buddhist roots could be undertaken, for purposes of the present paper this summary from the most prominent clinical proponent of mindfulness should suffice:

Mindfulness is the fundamental attentional stance underlying all streams of Buddhist meditative practice: the Theravada tradition of the countries of Southeast Asia (Thailand, Burma, Cambodia, and Vietnam); the Mahayana (Zen) schools of Vietnam, China, Japan, and Korea; and the Vajrayana tradition of Tibetan Buddhism found in Tibet itself, Mongolia, Nepal, Bhutan, Ladakh, and now large parts of India in the Tibetan community in exile. It should be noted that these traditions all have various schools, subtraditions, and particular texts that they revere more than others, so the actual practices and emphases regarding mindfulness can vary considerably, even within one tradition . . . . (Kabat-Zinn, 2003, p. 146).

The contemporary mindfulness movement in Western psychotherapy and medicine has been subject to critique for “taking the Buddha out of Buddhism” (Carlsson, 2022) and for a marketing strategy that has been referred to as “McMindfulness” (Purser, 2019). While there may be some truth to these criticisms, there is also considerable overstatement and a disparaging tone that may not be warranted. After all, MBSR has helped so many people. MBPs and MBIs have been shown to be efficacious for certain psychological (e.g., Khoury et al., 2015) and physical (e.g., Pardos-Gascón et al., 2021) morbidities, as well as for reducing antisocial behavior (e.g., Samuelson et al.,

2007), and has been hypothesized to be therapeutic for many other pathological conditions including age-related neurodegeneration and cognitive impairment (Larouche et al., 2015). Such programs and interventions are well documented and studied and existing resources are available for prospective teachers and practitioners (e.g., Griffith et al., 2021). None of this was really the case as recently as 20 years ago (Bishop, 2002).

MBSR’s developer, Jon Kabat-Zinn, moreover, has probably done more to promote meditation, in general, into the Western mainstream than anyone since the heyday of Maharishi Mahesh Yogi (1963) and Transcendental Meditation over half a century ago. There is much here to appreciate even if in its presentation MBSR does not hew to an academic’s exacting standards of Buddhist philosophy or practice, something which Kabat-Zinn (2015) openly acknowledges. It “stems from Buddhist tradition” (Kabat-Zinn, 2015, p. 9), for sure, but is “not a catechism, an ideology, a belief system, a technique or set of techniques, a religion, or a philosophy. It is best described as ‘a way of being’” (Kabat-Zinn, 2015, p. 9). MBPs and MBIs are thus not religious interventions, and are not intended to be, but rather potentially therapeutic strategies for healing and wellness and well-being, physical and psychological, as evidenced from numerous studies (Van Gordon & Shonin, 2020).

Efforts have been made to develop and validate measurement instruments assessing mindfulness and/or constituent factors. These have been reviewed elsewhere on many occasions (e.g., Goodman et al., 2017; Hill & Labbé, 2014; Malinowski, 2008; Park et al., 2013; Sauer et al., 2013). The important point here is that investigators wishing to study this construct, like others used in psychosocial epidemiology, have available to them many validated scales and indices and thus they do not have to reinvent the wheel. This has long been a problem in the research field that has grown up around religion and health: as newer generations of investigators come on the scene, so many seem unaware that as far back as a quarter century ago there were already over 100 measures developed by sociologists, psychologists, and others to assess every conceivable aspect of religious expression (Hill & Hood, 1999) and that starting from scratch threatens the comparability of any new findings. It would be a shame for this to happen in epidemiologic research on mindfulness. This is not to say that there may not be a call for newer, more specialized measures of mindfulness, as with any research topic—Oman (2023) advocates for this—just that researchers new to the field first ought to do a deep dig into the published literature to determine whether their intended conceptual perspective is captured in any existing instruments.

## Mindfulness and Population Health

The research literature on the health impact of meditation, in general, is quite extensive and long-standing. This includes clinical studies of physical (Sampaio et al., 2017) and mental (Álvarez-Pérez et al., 2022) health, as well as biomedical research investigating physiological (e.g., Balban et al., 2023) and psychophysiological (Woolfolk, 1975) outcomes, and even the pathophysiology of aging (Lutz et al., 2021). The earliest and most comprehensive published summary of this work was an annotated bibliography published under the auspices of the Institute of Noetic Sciences (IONS), a California-based research institute and think tank focused on consciousness, human potential, and healing. The second edition of the bibliography, lead-authored by Michael Murphy, co-founder of the Esalen Institute, contained references to over 1500 studies published from 1931 to 1996 (Murphy & Donovan, 1997). A later supplement cited more than 50 additional studies (Institute of Noetic Sciences, 2002). Subsequently, the size of the literature accelerated so rapidly that the bibliography project became unwieldy and was updated only online, on the IONS website, and even that was eventually discontinued in 2013. The present author's recollection, which cannot be formally verified, is that by that point the number of studies was approaching 7000. A PubMed search on the term "meditation" currently obtains over 9000 hits (including over 1600 reviews, systematic reviews, or meta-analyses) just in those journals indexed by the National Library of Medicine, so perhaps this memory is correct.

The body of research in the IONS bibliography covers meditation and spiritual states of consciousness of almost every type imaginable which have been empirically studied in relation to human psychology or health. There is no separate breakout for those studies just of something labeled as "mindfulness," so it would not be accurate to state that this research validates mindfulness as a psychologically or medically relevant state or intervention. Further, despite a general consensus by now regarding the salutary effects of meditation, including mindfulness meditation, for selected outcomes (e.g., Hilton et al., 2017; Sedlmeier et al., 2012), there is still no uniformity of opinion, with skeptics continuing to cite a famous critique debunking the physiological claims for meditation published nearly 40 years ago (Holmes, 1984).

Notwithstanding, the extensive research literature on the physiological and health effects of meditation does not, strictly speaking, enable us to make any conclusive statements about the evidence linking mindfulness, specifically, to population-health outcomes, in particular. The two realms of investigation are related, for sure, but evidence for the former (meditation) does not equate to evidence

for the latter (mindfulness). Compared to the psychological literature on meditation, in general, there is indeed a lacuna of mindfulness research, especially on the effects of mindfulness-related practices and states in relation to population-based incidence (new cases) and prevalence (total cases) data on rates of particular diseases or health outcomes. A search of PubMed on "mindfulness AND epidemiology," turns up over 2000 articles, including over 350 reviews, systematic reviews, or meta-analyses. However, these are nearly all focused on the effects of MBIs (e.g., Zhang et al., 2021), not on the impact of mindfulness-like states or ongoing mindfulness practices on population rates of health or disease, although they do identify statistically significant and meaningful effects on numerous physical and psychological conditions. They conclude, however, that the quality of studies, on the whole, leaves much to be desired methodologically.

Technically speaking, one might contend that these are not conventional epidemiologic studies, but rather population-based trials or interventional studies. Still, there is enough in the way of interesting findings to suggest that with a substantial upgrade in methods, this may become a fruitful area of inquiry for epidemiologists and public health scientists, especially those with expertise in the study of psychosocial determinants of population health, including religious or spiritual antecedents.

## An Epidemiology of Mindfulness

An important question to pose is how would the epidemiologic study of mindfulness differ from how it has been studied up to now? The answer is quite simple: rather than a focus on the efficacy of mindfulness as a therapeutic intervention, the focus would be on whether people who practice mindfulness meditation or who cultivate mindful states of consciousness or states of being have different health profiles from those who do not. Methodologically, this means that instead of conducting intervention studies or clinical trials in samples of recruited subjects, one would be ascertaining baseline rates of mindfulness practices or states in a defined population or population sample and then following respondents forward in time in order to calculate risk or protection for subsequent health or medical events that could be attributed in part to mindfulness. Epidemiologists call this a prospective cohort study, and it enables calculation of cumulative incidence and, accordingly, true risk. Alternatively, one might construct a case-control study for a relatively rare health or disease outcome and then, after inquiring about mindfulness experiences, "follow" respondents back in time, enabling calculation of odds, which are an estimate of risk. In both instances, such studies would enable

one to gauge whether and the extent to which mindfulness serves as a protective or preventive factor (or, alternatively, as a risk factor) for subsequent illness. This is a basic Epidemiology-101-level depiction of what epidemiologists do (see Kleinbaum et al., 2007).

This distinction between studies of mindfulness-as-an-intervention seeking changes in health status and studies of mindfulness-as-a-characteristic-or-behavior-of-people analyzed in relation to population rates of morbidity or mortality is fundamental, but is often confusing to non-epidemiologists. It is analogous in the religion and health field to the distinction between garden-variety epidemiologic studies of religious behavior, including frequency of prayer, in the general population and clinical trials of praying for patients. No matter how often it is made clear that these are two entirely different types of studies with different goals, different methodologies, and producing different conclusions, the epidemiologic studies continue to be confused with the clinical trials, which remain extremely controversial, something that tends to frustrate those epidemiologists and social and behavioral scientists who do the population-based studies only (e.g., Levin, 2020b).

Studies of the impact of MBPs and MBIs on health outcomes, including population-based research, were nicely summarized by Oman (2023). They demonstrate that there is good reason to believe that introducing mindfulness practices can lead to the betterment of health, physical and mental, and for reasons that are coherent with current understandings of human physiology. Specifically, mindfulness has been shown to be effective and efficacious, as well as beneficial in various healthcare settings, and hypothesized neurophysiological mechanisms for these effects seem to be uncontroversial (Zhang et al., 2021). Mindfulness has been found to mediate physiological (especially neurobiological) markers of stress and to lead to salutogenic changes in blood cortisol levels and selected immune outcomes and autonomic measures in a variety of populations (Pascoe et al., 2017). In all, hundreds of MBIs exist, mostly in clinical settings, with evidence of positive effects on human flourishing and general well-being (Allen et al., 2021), including results of rigorously designed randomized controlled trials which provide evidence in relation to numerous health, cognitive, affective, and interpersonal outcomes (Creswell, 2017). Moreover, MBIs are both cost-effective and cost-beneficial and compare favorably in this regard to conventional therapy for use in high-risk populations (Zhang et al., 2022), and have proven themselves, for example, during the COVID-19 pandemic (Oman et al., 2022). Still, these findings are mostly not from epidemiologic studies as defined earlier, and there remains a lacuna of longitudinal research on the impact of mindfulness practices and states on population-based rates of physical and psychological morbidity.

Constructing a field of study around a true “epidemiology of mindfulness” would imply investigating how people who practice mindfulness meditation and/or experience mindfulness as a state of consciousness fare with their subsequent physical or mental health, or rates of morbidity (disease) or mortality (death) compared to those without a mindfulness background. In the parlance of epidemiology, mindfulness—conceptualized and measured in any of the myriad ways that it might be done—is the exposure; the disease or condition being studied is the outcome. The product of study, as noted above, would be a measure of association—risk or odds—identifying whether and how much mindfulness is associated with either a higher incidence of said outcome, which would make it a risk factor, or a lower incidence, which would make it a protective factor. Of course, the nuts and bolts of epidemiologic analysis are much more complex than that, but this is the general approach. Note that such research would provide no information about whether mindfulness cures or heals diseases, or whether MBPs or MBIs lead to a reduction of symptoms in an experimental population. Again, that information comes from an entirely different type of study, and, according to PubMed, as noted earlier, many of these have already been undertaken.

So what questions might be asked by epidemiologists investigating mindfulness? All sorts of interesting lines of inquiry are possible, including both descriptive epidemiologic studies of differences in the prevalence of mindfulness in the population, by characteristics of person, place, and time, and analytic epidemiologic studies of associations between mindfulness and particular outcomes, as well as of the underlying physiological mechanisms that might explain any significant findings. The former addresses the “who,” “where,” and “when” questions noted at the start of this paper, and the latter address the “how” and “why” questions.

Some examples follow. These are not meant to be formal and precisely worded questions, like one might find on a population survey instrument, but rather are general topics for investigation:

- What are the lifetime and current prevalence of mindfulness meditation? Are there certain types of mindfulness practices that are more prevalent than others?
- How often is mindfulness practiced? How long have respondents been practicing it? How has their practice changed over time?
- Are there observable differences in the incidence or prevalence of mindfulness by categories of person, place, or time?
- Is there an association between parameters of mindfulness practice and population rates of morbidity, physical or psychological, overall or cause-specific?
- Is a mindfulness practice associated with greater general well-being, life satisfaction, marital satisfaction, mental

health, self-esteem, and any of various other psychosocial outcomes?

- Is a mindfulness practice associated with reduced pain or other types of symptomatology? Is it associated with greater physical or cognitive functioning?
- How many folks engage in more than one type or school of meditation, alongside a mindfulness practice? Do the practices work in tandem? Do they conflict with each other?
- Is there a religious or spiritual context to one's mindfulness practice? Does this impact on the efficacy of mindfulness for respective outcomes?
- Are there noticeable states of consciousness or states of being associated with the experience of mindfulness? For example, bliss, detachment, balance or equilibrium, a sense of oneness, being surrounded by the presence of God or the divine, feelings of love, unusual sensations? Any other affects or ideations?
- Are such states experienced only while practicing mindfulness, or do they persist for some time afterwards? Have any states become permanent? Has one been transformed in any other ways?

These are just a sample of the kinds of questions that might be asked in a population survey. Many more could surely be proposed. The idea here is to pose questions that solicit information that describes the distribution and determinants of behaviors, affects, and cognitions related to mindfulness and that also helps to lay out analyses of the effects of these mindfulness-related parameters on rates of myriad health-related outcomes across populations. The possibility of obtaining responses that could be quantified over a large population, such as in a representative national health survey of possibly thousands of respondents, is an exciting prospect for any epidemiologist interested in mind–body connections and human spirituality.

Accomplishing this aim may be easier proposed than achieved. Mounting a large-scale prospective epidemiologic study may be considerably costlier than conducting a smaller survey or a clinical trial or intervention study. The infrastructure costs are often substantial, and may run to seven figures. Further, piggy-backing a set of questions, such as inquiring about facets of mindfulness, onto an existing national survey in order to take advantage of an established survey program with a proven design and methodology may not be a feasible solution for everyone except the most well funded research shops. The cost of “buying time” on such a survey may be eye-opening to, for example, psychologists used to conducting small experimental or quasi-experimental studies. Moreover, there may be strict limitations on the numbers of questions that can be asked and possibly on their format, as well, which may inhibit the ideal study from being done without compromises. Even so, one may need to spend

well into six figures just for such an opportunity. On the other hand, one would not have to reinvent the wheel, and could take advantage of an existing population-based survey and a (possibly) national or global sampling frame. A funding agency might look at this as a promising investment, and as a potential down payment on a more substantial follow-up investigation.

Another complicating factor is the desirability of reproducible, replicable findings when conducting observational epidemiologic research, especially on subject matter with substantive policy implications (Peng et al., 2006). This may mean that for an epidemiology of mindfulness to truly take off, we are not speaking of conducting just one study, but rather recruiting multiple investigators to conduct multiple studies in multiple settings. This may take years, as was the case with the epidemiology of religion, which was proposed as a field of research in the late 1980s (Levin & Vanderpool, 1987) and then was acknowledged by the National Institutes of Health with its first official research conference on the topic nearly a decade later. A similar trajectory, with an even greater lag time, was observed for the epidemiology of love (Levin, 2023). Building a community of scholars is thus another factor to consider if one wishes to mount a longitudinal epidemiologic study of mindfulness or of any other putative determinant factor, psychosocial, biological, or otherwise, and to truly create a new field of study.

## Public Health Translation

Besides the descriptive and analytic types of epidemiology, modern definitions typically include a third category: applied epidemiology (Porta, 2014). This is about the application of epidemiologic findings to address public health issues, such as disparities in population-health indicators like morbidity or mortality by categories of sociodemographic or exposure variables. In the context of the template laid out in this paper, this is what is meant by the “wherefore” question. It is also known as doing translational epidemiology (Khoury et al., 2010), an offshoot or subtype of the larger field of translational medicine (Wehling, 2022), the latter being the application of basic biomedical research findings from “bench to bedside.” For translational epidemiology, the bridging function is not from the lab to the clinic, but rather from population-based findings (e.g., on the impact of mindfulness) to community health interventions or other public health programs or policymaking (Levin, 2022).

The idea of a translational epidemiology of mindfulness is appealing, and Oman (2023) has already laid out a few parameters for the application of research on mindfulness. For example, he notes that new findings on religiously or spiritually based mindfulness interventions can serve to advance our understanding of mindfulness practices and

states, something he termed “contemplative translation.” Folding in recent insights on translating findings on other religious or spiritual determinants of population health (Levin, 2022) suggests additional applications of epidemiologic research findings on mindfulness. These include pastoral, clinical, and public health translation.

First, pastoral translation could involve applying epidemiologic findings on mindfulness to clinical pastoral and counseling settings, helping patients or clients to adjust emotionally and spiritually to ongoing health challenges. Mindfulness has been applied in psychotherapeutic settings, both secular and faith-based (Bingaman, 2011), but not yet systematically evaluated (Michalak et al., 2020). Findings from population-based studies may serve to identify what it is about mindfulness meditation and associated psychological states that best ameliorates psychological and spiritual distress, and thus could valuably inform standards of practice for pastoral care as well as further disseminate the practice of meditation.

Second, clinical translation could entail applying epidemiologic findings to the work of physicians and other healthcare professionals who seek to mobilize patients’ psychological resources in order to impact on health services outcomes, such as length of hospitalization, adherence to prescriptive regimens, patient satisfaction with provider encounters, and other patient-centered outcomes (McCubbin et al., 2014). Mindfulness may also contribute to the well-being of healthcare professionals themselves, improving their ability to function and cope with job-related stress (e.g., Fendel et al., 2020; Irving et al., 2014). Systematic study across populations is needed, in order to more conclusively evaluate such programs and interventions.

Third, public health translation might involve the application of epidemiologic mindfulness research to a host of functions, including “disease prevention and health promotion efforts, monitoring of vital statistics, formulation of public health policy, and advocacy and regulatory efforts related to the environment, the distribution of health services, and relations with global NGOs, public health missions, and national health ministries” (Levin, 2022, p. 28). Public health applications of mindfulness research are thoroughly outlined by Oman (2023), yet one might add that such studies form a cornerstone of the field of research rapidly coalescing around the concept of human flourishing (Davidson, 2021). Epidemiologic research on mindfulness could be a valuable contributor to meeting the global health challenges of the twenty-first century and to helping to reduce population-health disparities and promote global well-being (Addiss, 2017).

This is not an exhaustive list. There are likely other domains of translation, unanticipated so far, to which population-based findings on mindfulness could contribute. While this may sound clichéd, the sky is the limit when it

comes to how empirical research findings on the putative population-health impact of mindfulness might be applied to real-world settings and situations for purposes of fulfilling the World Health Organization’s famous endorsement of “health for all” as a global institutional goal (Mahler, 1981). Those of us who support the mindfulness movement and who wish to see mindfulness research grow and flourish, presumably the contributors to and readers of this journal, can surely appreciate that there remain many frontiers for application of mindfulness research that, to now, have been unexplored.

Just as public health is a worthy new research domain for mindfulness to prove its worth, so, too, would research on mindfulness be beneficial for public health. Oman (2023) emphasizes this point throughout his paper, making special note of this in his conclusion: “Public health, especially at a global level, is perhaps the only health field that directly engages with problems on a scale that match the mindfulness field’s aspiration to ignite a global renaissance.” One could say that this is the statement of a true believer; fair enough. But it is also the astute conclusion of a renowned public health scientist, and, in the present author’s opinion, is entirely reasonable, correct, and justified. The world needs more mindfulness, not solely for the personal psychological and spiritual benefits that have already been richly documented, but for the potential to transform the health of populations.

## Declarations

**Ethical Approval** None required for a Commentary article.

**Conflict of Interest** The author declares no competing interests.

## References

- Addiss, D. G. (2017). Mindfulness, compassion, and the foundations of global health ethics. In L. Monteiro, J. Compson, & F. Musten (Eds.), *Practitioner’s guide to ethics and mindfulness-based interventions* (pp. 295–322). Springer.
- Allen, J. G., Romate, J., & Rajkumar, E. (2021). Mindfulness-based positive psychology interventions: A systematic review. *BMC Psychology*, 9(1), 116. <https://doi.org/10.1186/s40359-021-00618-2>
- Álvarez-Pérez, Y., Rivero-Santana, A., Perestelo-Pérez, L., Duarte-Díaz, A., Ramos-García, V., Toledo-Chávarri, A., Torres-Castaño, A., León-Salas, B., Infante-Ventura, D., González-Hernández, N., Rodríguez-Rodríguez, L., & Serrano-Aguilar, P. (2022). Effectiveness of mantra-based meditation on mental health: A systematic review and meta-analysis. *International Journal of Environmental Research and Public Health*, 19(6), 3380. <https://doi.org/10.3390/ijerph19063380>
- Armstrong, B. K., White, E., & Saracci, R. (1994). *Principles of exposure measurement in epidemiology*. Oxford University Press.
- Azeemi, K. S. (2005). *Muraqaba: The art and science of Sufi meditation*. Trans. and ed. by S. S. Reaz. Plato Pub.

- Balban, M. Y., Neri, E., Kogon, M. N., Weed, L., Nouriani, B., Jo, B., Holl, G., Zeitzer, J. M., Spiegel, D., & Huberman, A. D. (2023). Brief structured respiration practices enhance mood and reduce physiological arousal. *Cell Reports Medicine*, 4(1), 100895. <https://doi.org/10.1016/j.xcrm.2022.100895>
- Beauchamp, D. E. (1976). Exploring new ethics for public health: Developing a fair alcohol policy. *Journal of Health Politics, Policy and Law*, 1(3), 338–354. <https://doi.org/10.1215/03616878-1-3-338>
- Bingaman, K. A. (2011). The art of contemplative and mindfulness practice: Incorporating the findings of neuroscience into pastoral care and counseling. *Pastoral Psychology*, 60(3), 477–489. <https://doi.org/10.1007/s11089-011-0328-9>
- Bishop, S. R. (2002). What do we really know about Mindfulness-Based Stress Reduction? *Psychosomatic Medicine*, 64(1), 71–83. <https://doi.org/10.1097/00006842-200201000-00010>
- Byass, P. (2001). Person, place and time—but who, where, and when? *Scandinavian Journal of Public Health*, 29(2), 84–86.
- Carlsson, S. (2022). Taking the Buddha out of Buddhism: A literature study on the concept of mindfulness. Faculty of Social Sciences, Lund University. <https://lup.lub.lu.se/luur/download?func=downloadFile&recordId=9083355&fileId=9083385>
- Creswell, J. D. (2017). Mindfulness interventions. *Annual Review of Psychology*, 68, 491–516. <https://doi.org/10.1146/annurev-psych-042716-051139>
- Dass, R. (1971). *Be here now*. Lama Foundation.
- Davidson, R. J. (2021). Mindfulness and more: Toward a science of human flourishing. *Psychosomatic Medicine*, 83(6), 665–668. <https://doi.org/10.1097/PSY.0000000000000960>
- Esch, T., & Stefano, G. B. (2005). Love promotes health. *Neuroendocrinology Letters*, 26(3), 264–267.
- Fendel, J. C., Aeschbach, V. M., Göritz, A. S., & Schmidt, S. (2020). A mindfulness program to improve resident physicians' personal and work-related well-being: A feasibility study. *Mindfulness*, 11(6), 1511–1519. <https://doi.org/10.1007/s12671-020-01366-x>
- Goodman, M. S., Madni, L. A., & Semple, R. J. (2017). Measuring mindfulness in youth: Review of current assessments, challenges, and future directions. *Mindfulness*, 8(6), 1409–1420. <https://doi.org/10.1007/s12671-017-0719-9>
- Griffith, G., Crane, R., Karunavira, & Koebel, L. (2021). The mindfulness-based interventions: Teaching and learning companion (MBI:TLC). In R. S. Crane, Karunavira, & G. M. Griffith (Eds.), *Essential resources for mindfulness teachers* (pp. 125–148). Routledge.
- Hanh, T. N. (1998). *The heart of the Buddha's teaching: Transforming suffering into peace, joy, and liberation: The four noble truths, the noble eightfold path, and other basic Buddhist teachings*. Harmony Books.
- Hickey, W. S. (2019). *Mind cure: How meditation became medicine*. Oxford University Press.
- Hill, B. D., & Labbé, E. E. (2014). Measuring mindfulness. In N. N. Singh (Ed.), *Psychology of meditation* (pp. 11–27). Nova Science Publishers.
- Hill, P. C., & Hood, R. W., Jr. (1999). *Measures of religiosity*. Religious Education Press.
- Hilton, L., Hempel, S., Ewing, B. A., Apaydin, E., Xenakis, L., Newberry, S., Colaiaco, B., Maher, A. R., Shanman, R. M., Sorbero, M. E., & Maglione, M. A. (2017). Mindfulness meditation for chronic pain: Systematic review and meta-analysis. *Annals of Behavioral Medicine*, 51(2), 199–213. <https://doi.org/10.1007/s12160-016-9844-2>
- Holmes, D. S. (1984). Meditation and somatic arousal reduction: A review of the experimental evidence. *American Psychologist*, 39(1), 1–10. <https://doi.org/10.1037/0003-066X.39.1.1>
- Institute of Noetic Sciences. (2002). *The physical and psychological effects of meditation: Annotated update, September, 2002*. Institute of Noetic Sciences.
- Irving, J. A., Park-Saltzman, J., Fitzpatrick, M., Dobkin, P. L., Chen, A., & Hutchinson, T. (2014). Experiences of health care professionals enrolled in mindfulness-based medical practice: A grounded theory model. *Mindfulness*, 5(1), 60–71. <https://doi.org/10.1007/s12671-012-0147-9>
- Jain, V. K. (2012). *Shri Amritchanda Suri's Puruṣārthasiddhyupaya (Purushartha Siddhyupaya)*. Vikalp Printers.
- Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry*, 4(1), 33–47. [https://doi.org/10.1016/0163-8343\(82\)90026-3](https://doi.org/10.1016/0163-8343(82)90026-3)
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10(2), 144–156. <https://doi.org/10.1093/clipsy/bpg016>
- Kabat-Zinn, J. (2015). Foreword. In Mindfulness All-Party Parliamentary Group, *Mindful nation UK* (pp. 9–10). <https://www.themindfulnessinitiative.org/Handlers/Download.ashx?IDMF=1af56392-4cf1-4550-bdd1-72e809fa627a>
- Kaplan, A. (1982). *Meditation and kabbalah*. Weiser Books.
- Khoury, M. J., Gwinn, M., & Ioannidis, J. P. A. (2010). The emergence of translational epidemiology: From scientific discovery to population health impact. *American Journal of Epidemiology*, 172(5), 517–524. <https://doi.org/10.1093/aje/kwq211>
- Khoury, B., Sharma, M., Rush, S. E., & Fournier, C. (2015). Mindfulness-based stress reduction for healthy individuals: A meta-analysis. *Journal of Psychosomatic Research*, 78(6), 519–528. <https://doi.org/10.1016/j.jpsychores.2015.03.009>
- Kleinbaum, D. G., Sullivan, K. M., & Barker, N. D. (2007). *A pocket guide to epidemiology*. Springer.
- Koenig, H. G., & Cohen, H. J. (2002). *The link between religion and health: Psychoneuroimmunology and the faith factor*. Oxford University Press.
- Larouche, E., Hudon, C., & Goulet, S. (2015). Potential benefits of mindfulness-based interventions in mild cognitive impairment and Alzheimer's disease: An interdisciplinary perspective. *Behavioural Brain Research*, 276(1), 199–212. <https://doi.org/10.1016/j.bbr.2014.05.058>
- Levin, J. (2004). Prayer, love, and transcendence: An epidemiologic perspective. In K. W. Schaie, N. Krause, & A. Booth (Eds.), *Religious influences on health and well-being in the elderly* (pp. 69–95). Springer.
- Levin, J. (2020a). Human flourishing and population health: Meaning, measurement, and implications. *Perspectives in Biology and Medicine*, 63(3), 401–419.
- Levin, J. (2020b). Scientists and scholars. Chapter 5 in *Religion and medicine: A history of the encounter between humanity's two greatest institutions* (pp. 85–115). Oxford University Press.
- Levin, J. (2022). Toward a translational epidemiology of religion: Challenges and opportunities. *Annals of Epidemiology*, 75, 25–31. <https://doi.org/10.1016/j.annepidem.2022.08.053>
- Levin, J. (2023). The epidemiology of love: Historical perspectives and implications for population-health research. *Journal of Positive Psychology*, 18(1), 34–43. <https://doi.org/10.1080/17439760.2022.2053876>
- Levin, J., & Steele, L. (2001). On the epidemiology of “mysterious” phenomena. *Alternative Therapies in Health and Medicine*, 7(1), 64–66.
- Levin, J., & Steele, L. (2005). The transcendent experience: Conceptual, theoretical, and epidemiologic perspectives. *Explore: The Journal of Science and Healing*, 1(2), 89–101. <https://doi.org/10.1016/j.explore.2004.12.002>
- Levin, J. S., & Vanderpool, H. Y. (1987). Is frequent religious attendance really conducive to better health?: Toward an epidemiology of religion. *Social Science and Medicine*, 24(7), 589–600. [https://doi.org/10.1016/0277-9536\(87\)90063-3](https://doi.org/10.1016/0277-9536(87)90063-3)



- Lutz, A., Chételat, G., Collette, F., Klimecki, O. M., Marchant, N. L., & Gonneaud, J. (2021). The protective effect of mindfulness and compassion meditation practices on ageing: Hypotheses, models and experimental implementation. *Ageing Research Reviews*, 72, 101495. <https://doi.org/10.1016/j.arr.2021.10149>
- Mahler, H. (1981). The meaning of “health for all by the year 2000.” *World Health Forum*, 2(1), 5–22.
- Malinowski, P. (2008). Mindfulness as a psychological dimension: Concepts and applications. *Irish Journal of Psychology*, 29(1–2), 155–166. <https://doi.org/10.1080/03033910.2008.10446281>
- McCubbin, T., Dimidjian, S., Kempe, K., Glassey, M. S., Ross, C., & Beck, A. (2014). Mindfulness-based stress reduction in an integrated care delivery system: One-year impacts on patient-centered outcomes and health care utilization. *Permanente Journal*, 18(4), 4–9. <https://doi.org/10.7812/TPP/14-014>
- Michalak, J., Steinhaus, K., & Heidenreich, T. (2020). (How) do therapists use mindfulness in their clinical work?: A study on the implementation of mindfulness interventions. *Mindfulness*, 11(2), 401–410. <https://doi.org/10.1007/s12671-019-01250-3>
- Murphy, M., & Donovan, S. (1997). *The physical and psychological effects of meditation: A review of contemporary research with a comprehensive bibliography, 1931–1996*, second edition. Ed. by E. Taylor. Institute of Noetic Sciences.
- Oman, D. (2019). Studying the effects of meditation: The first fifty years. In M. Farias, D. Brazier, & M. Lalljee (Eds.), *The Oxford handbook of meditation* (pp. 41–75). Oxford University Press.
- Oman, D. (2023). Mindfulness for global public health: Critical analysis and agenda. *Mindfulness*. <https://doi.org/10.1007/s12671-023-02089-5>
- Oman, D., Bormann, J. E., & Kane, J. J. (2022). Mantram repetition as a portable mindfulness practice: Applications during the COVID-19 pandemic. *Mindfulness*, 13(6), 1418–1429. <https://doi.org/10.1007/s12671-020-01545-w>
- Pardos-Gascón, E. M., Narambuena, L., Leal-Costa, C., & van-der Hofstadt-Román, C. J. (2021). Differential efficacy between cognitive-behavioral therapy and mindfulness-based therapies for chronic pain: Systematic review. *International Journal of Clinical and Health Psychology*, 21(1), 100197. <https://doi.org/10.1016/j.ijchp.2020.08.001>
- Park, T., Reilly-Spong, M., & Gross, C. R. (2013). Mindfulness: A systematic review of instruments to measure an emergent patient-reported outcome (PRO). *Quality of Life Research*, 22(10), 2639–2659. <https://doi.org/10.1007/s11136-013-0395-8>
- Pascoe, M. C., Thompson, D. R., Jenkins, Z. M., & Ski, C. F. (2017). Mindfulness mediates the physiological markers of stress: Systematic review and meta-analysis. *Journal of Psychiatric Research*, 95, 156–178. <https://doi.org/10.1016/j.jpsychires.2017.08.004>
- Peng, R. D., Dominici, F., & Zeger, S. L. (2006). Reproducible epidemiologic research. *American Journal of Epidemiology*, 163(9), 783–789. <https://doi.org/10.1093/aje/kwj093>
- Porta, M. (2014). *A dictionary of epidemiology* (6th ed.). Oxford University Press.
- Purser, R. E. (2019). *McMindfulness: How mindfulness became the new capitalist spirituality*. Repeater Books.
- Sampaio, C. V. S., Lima, M. G., & Ladaeia, A. M. (2017). Meditation, health, and scientific investigations: Review of the literature. *Journal of Religion and Health*, 56(2), 411–427. <https://doi.org/10.1007/s10943-016-0211-1>
- Samuelson, M., Carmody, J., Kabat-Zinn, J., & Bratt, M. A. (2007). Mindfulness-based stress reduction in Massachusetts correctional facilities. *The Prison Journal*, 87(2), 254–268.
- Sauer, S., Walach, H., Schmidt, S., Hinterberger, T., Lynch, S., Büssing, A., & Kohls, A. (2013). Assessment of mindfulness: Review on state of the art. *Mindfulness*, 4(1), 3–17. <https://doi.org/10.1007/s12671-012-0122-5>
- Sedlmeier, P., Eberth, J., Schwarz, M., Zimmerman, D., Haarig, F., Jaeger, S., & Kunze, S. (2012). The psychological effects of meditation: A meta-analysis. *Psychological Bulletin*, 138(6), 1139–1171. <https://doi.org/10.1037/a0028168>
- Van Gordon, W., & Shonin, E. (2020). Second-generation mindfulness-based interventions: Toward more authentic mindfulness practice and teaching. *Mindfulness*, 11(1), 1–4. <https://doi.org/10.1007/s12671-019-01252-1>
- Wehling, M. (2022). *Principles of translational science in medicine: From bench to bedside* (3rd ed.). Academic Press.
- Woolfolk, R. L. (1975). Psychophysiological correlates of meditation. *Archives of General Psychiatry*, 32(10), 1326–1333. <https://doi.org/10.1001/archpsyc.1975.01760280124011>
- Yogi, M. M. (1963). *The science of being and art of living*. Allied Publishers.
- Zhang, D., Lee, E. K. P., Mak, E. C. W., Ho, C. Y., & Wong, S. Y. S. (2021). Mindfulness-based interventions: An overall review. *British Medical Bulletin*, 138(1), 41–57. <https://doi.org/10.1093/bmb/ldab005>
- Zhang, L., Lopes, S., Lavelle, T., Jones, K. O., Chen, L., Jindal, M., Zinzow, H., & Shi, L. (2022). Economic evaluations of mindfulness-based interventions: A systematic review. *Mindfulness*, 13(10), 2359–2378. <https://doi.org/10.1007/s12671-022-01960-1>

**Publisher's Note** Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.

Springer Nature or its licensor (e.g. a society or other partner) holds exclusive rights to this article under a publishing agreement with the author(s) or other rightsholder(s); author self-archiving of the accepted manuscript version of this article is solely governed by the terms of such publishing agreement and applicable law.