

Outstanding Challenges in Scientific Research on Mindfulness and Meditation

Richard J. Davidson and Cortland J. Dahl

Center for Healthy Minds, University of Wisconsin-Madison

Abstract

Van Dam et al. raise a number of critical issues in contemporary research on mindfulness and meditation and offer a prescriptive agenda for future work in this area. While we agree with all of the key points made in their article, there are a number of important issues omitted that are central to a comprehensive agenda for future research in this area. This commentary highlights five key points: (a) Many of the key methodological issues the article raises are not specific to research on mindfulness; (b) contemplative practices are varied, and the landscape of modern scientific research has evolved to focus almost exclusively on one or two types of practice to the exclusion of other forms of practice that are potentially highly impactful; (c) mindfulness and related contemplative practices were not originally developed to treat disease; (d) key issues of duration, intensity and spacing of practice, and the extent to which formal meditation practice is required or whether practice can be piggybacked onto other non-cognitively demanding activities of daily living (e.g., commuting) remain as among the most important practical questions for disseminating these practices more widely, yet have received scant serious research attention; and (e) the use of mobile technology in both disseminating contemplative training and assessing its impact is going to be required to solve some of the key methodological challenges in this area including standardizing training across sites and addressing individual differences (which will require very large-*N* studies).

Keywords

mindfulness, meditation, attention, consciousness

The article by Van Dam and colleagues (XXXX [this issue]) presents a very useful corrective to the hype and claims associated with the burgeoning interest in mindfulness and meditation. The authors review a number of key issues and concerns with research in this domain including the problematic meaning of the term “mindfulness,” the differing measures of mindfulness and challenges to their construct validity, challenges for clinical intervention methodology including the variations in the types and content of various mindfulness-based interventions (MBIs) that have been examined, the growing evidence of potential adverse effects in a small subset of individuals who partake of MBIs, and the challenge of conducting neuroscientific research in this area. For each of these topics, the authors also provide a prescriptive vision for the types of research that are needed to address the concerns and challenges that are described. While we wholeheartedly agree with the central issues highlighted in this article and believe that this article, along with several other critical articles that have appeared recently (e.g., Davidson & Kaszniak,

2015; Goyal et al., 2014), will provide an important recalibration of the claims and conclusions that are warranted from the contemporary scientific literature on this topic, we believe that the prescriptive agenda offered in their article can be usefully expanded. In this commentary, we address a few of the specific concerns raised by the authors and show that they are not specific to mindfulness or meditation research and that attention to the broader context of these challenges can be helpful in addressing them. Second, we widen the prescriptive agenda offered in their article and underscore several key questions that the authors did not raise that warrant serious research attention for this field to have impact. In this commentary we make five key points that build from the issues raised by Van Dam and colleagues:

Corresponding Author:

Richard J. Davidson, University of Wisconsin–Madison, Center for Healthy Minds, 625 W. Washington Ave., Madison, WI 53703
E-mail: rjdavids@wisc.edu

1. Many of the key methodological issues raised by Van Dam et al. are not specific to research on mindfulness.
2. Contemplative practices are varied, and the landscape of modern scientific research has evolved to focus almost exclusively on one or two types of practice to the exclusion of other forms of practice that are potentially highly impactful.
3. Mindfulness and related contemplative practices were not originally developed to treat disease.
4. Key issues of duration, intensity, and spacing of practice and the extent to which formal meditation practice is required or whether practice can be piggybacked onto other non-cognitively demanding activities of daily living (e.g., commuting) remain as among the most important practical questions for disseminating these practices more widely, yet have received scant serious research attention.
5. The use of mobile technology in both disseminating contemplative training and in assessing its impact is going to be required to solve some of the key methodological challenges in this area including standardizing training across sites and addressing individual differences (which will require very large-*N* studies).

In the remainder of this commentary we amplify each of these points and in the conclusion also address the proper role of neuroscientific approaches, an issue also considered by Van Dam et al.

1. Many of the key methodological issues raised by Van Dam et al. are not specific to research on mindfulness.

Jerome Kagan, the great developmental psychologist, authored an article in 1988 in the *American Psychologist* titled “The Meanings of Personality Predicates” (Kagan, 1988). While Kagan’s article was focused on personality and emotion constructs such as *anxiety*, everything he explains can easily be applied to the term *mindfulness*. Kagan noted in this article that the same word like *anxiety* may refer to many different things ranging from the experience of a person to a conditioned stimulus in the laboratory that is paired with shock to learning the outcome of a biopsy to determine if one has cancer. These are likely quite different emotional states despite the usage of the same label to denote them. Kagan argues that we must use operational criteria to specify the meaning of a psychological construct, that is, describe the means by which it is measured or inferred. The same is true of mindfulness. While it is perfectly reasonable, particularly at this early stage in research,

for the term to have multiple meanings, scientists must be called to a more rigorous standard and specify with some precision how they are measuring or inferring this construct when they choose to use it. And they must qualify the generalizations that are made to the specific method by which the construct is measured.

Van Dam and colleagues (XXXX) also underscore the limitations of self-report measures of mindfulness, something our laboratory has also highlighted (Goldberg et al., 2016) in recent research. Again the limitations of self-report measures of complex psychological characteristics such as emotion and cognition are very well recognized and there is widespread acknowledgment that the information available in self-report measures often does not closely converge with information from other more implicit sources (e.g., Mauss & Robinson, 2009).

2. Contemplative practices are varied, and the landscape of modern scientific research has evolved to focus almost exclusively on one or two types of practice to the exclusion of other forms of practice that are potentially highly impactful.

Meditation and other contemplative practices have played an important role in the world’s spiritual, philosophical, and humanistic traditions since antiquity. These traditions often employ a range of practices, and each style of practice involves different psychological processes and is designed to bring about a specific set of outcomes or results (Dahl, Lutz, & Davidson, 2015). These practices, moreover, are typically situated within a broader context of self-transformation and self-actualization and are therefore not viewed as mere therapeutic tools, but rather as practical methods to bring about a state of flourishing or optimal well-being.

Van Dam et al. make a vitally important point in calling attention to the limiting nature of using “mindfulness” as a unifying rubric to understand and study this diverse range of practices. We echo their call for a more nuanced perspective on the rich world of contemplative practice. In particular, it is important to call attention to the families of practice and modes of training that are excluded when we focus on one particular style or approach, even one as broad and ill-defined as “mindfulness.” As Van Dam et al. point out, mindfulness practices typically emphasize attention and awareness as the primary foci of the training process. While certainly important, there are other equally important families that may also impact attentional processes, but which are primarily designed for different ends. For instance, the use of meditation and other contemplative practices to strengthen adaptive psychological states, or what are typically thought of as “virtues,” are

widespread in the world's contemplative traditions. Another important family of practices that has received scant attention from the scientific community are those that involve self-inquiry and investigation to bring about self-knowledge, insight, and wisdom. Again, these practices are widespread across a range of traditions, but have not been considered in the world of mindfulness-oriented research (see Dahl et al., 2015).

Another important dimension of contemplative practice that has received little scientific attention is the modes of training that are thought to strengthen psychological processes—such as those related to the regulation of attention—but through pathways other than those emphasized in formal sitting meditation practice. For instance, interpersonal dialogue (Kok & Singer, 2017) may be used as a form of self-inquiry, or body-based practices as a way to bring about unique forms of insight and self-knowledge. Similarly, the routines of daily life may be used as opportunities to cultivate virtuous qualities such as patience, equanimity, and kindness.

Thus, as Van Dam et al. point out, the current focus on practices related to mindfulness has had the inadvertent effect of limiting the scope of scientific research. As a consequence, other families of training and modes of practice—as well as the differential and synergistic effects of this diversity of approaches—have not received the attention they deserve. Future research would therefore benefit from heeding their call to focus on the psychological mechanisms and outcomes of specific practices and to look beyond the confines of the current paradigm.

3. Mindfulness and related contemplative practices were not originally developed to treat disease.

The application of meditation and other contemplative practices as treatments for disease is a unique 21st-century phenomenon. The Van Dam article mentioned well-being only a single time (and in the abstract), yet we believe this to be among the most important applications for contemplative training and yet one that has received a paucity of attention at this time. Much of the evidence reviewed in the Van Dam article is focused on the impact of MBIs on clinical problems, including mental and physical diseases, pain, anxiety, depression, obesity, and addiction. It is very important to recognize that MBIs were not originally developed to treat illnesses. These practices were designed primarily to actualize human flourishing. While in certain ways a much tougher bar, since improving well-being in those who are already doing pretty well is more challenging than in those who are not, it is imperative that future research

address the question of whether these interventions can be used to improve well-being in otherwise “healthy” individuals.

4. Key issues of duration, intensity, and spacing of meditation practice and the extent to which formal practice is required or whether practice can be piggybacked onto other non-cognitively demanding activities of daily living (e.g., commuting) remain as among the most important practical questions for disseminating these practices more widely, yet those that have received scant serious research attention.

The issue of practice dosage is among the most important practical questions regarding the dissemination of MBIs yet has received virtually no serious research attention. Is it more effective to practice in multiple, brief sessions in a given day, or in one longer session? Are periods of intensive practice, such as retreats, more or less impactful than consistent daily practice? At present, we do not know the answers to these questions. Or perhaps the answer varies for different types of people. Related to this, we can ask whether formal practice is necessary or whether learning can occur in the context of other activities of daily living onto which practice is piggybacked, such as commuting. We also do not know the impact of simple empirically examined strategies for promoting healthy habits (Rothman et al., 2015) on MBIs.

5. The use of mobile technology in both disseminating contemplative training and in assessing its impact is going to be required to solve some of the key methodological challenges in this area including standardizing training across sites and addressing individual differences (which will require very large-*N* studies).

Van Dam et al. highlight the challenge of comparing MBI interventions across sites and also underscore the problems with studies that utilize small sample sizes. They also appropriately note that MBIs may be beneficial for some people and not for others. Both of these issues might be more effectively addressed by studies that utilize mobile technology to disseminate MBIs. As Van Dam et al. noted, the delivery of MBIs over the Internet is now occurring with increasing frequency and serious research on the impact of such modes of dissemination is beginning (e.g., Dimidjian et al., 2014). We envision a future where mobile technology is increasingly harnessed to both deliver MBIs and related contemplative interventions and also simultaneously

used to acquire data in the field at scale. This will enable standardization and the collection of very large- N datasets that will facilitate addressing many outstanding questions that remain unanswered.

Finally, the cautions urged regarding neuroscientific research by Van Dam et al. are well-founded and again pertain to research beyond contemplative neuroscience. We strongly agree with the interpretative problems that plague neuroscientific studies of mindfulness meditation, highlighted by Van Dam et al. As with most of the other problems they raised, the issues are not unique to mindfulness research. The same concerns pertain to neuroimaging studies of emotion, for example. In general, we strongly advocate the importance of publishing “nonfindings” where investigators do not observe what they hypothesized they would observe. As one example, we reported that long meditators were no different from nonmeditator controls on a heartbeat detection task, an objective measure of interoceptive awareness (Khalsa et al., 2008). We clearly hypothesized that meditators would be superior and the only difference we observed was that they reported increased confidence in the accuracy of their performance, despite the fact that the meditators objective performance did not differ from nonmeditating controls.

In conclusion, the critical evaluation of this large group of scholars who are coauthors of the Van Dam et al. article is a much-needed corrective to some of the less rigorous trends in contemplative science. As we note in this commentary, while Van Dam et al. touch on many important themes, there are many more that also deserve emphasis in future research in this area. We look forward to the next generation of research on contemplative interventions. These interventions will play an increasingly important role in many sectors of society that are coming to appreciate the importance of regarding well-being as a skill that can be cultivated.

Declaration of Conflicting Interests

The authors declared that they had no conflicts of interest with respect to their authorship or the publication of this article.

References

- Dahl, C. J., Lutz, A., & Davidson, R. J. (2015). Reconstructing and deconstructing the self: Cognitive mechanisms in meditation practice. *Trends in Cognitive Sciences*, *19*, 515–523. doi:10.1016/j.tics.2015.07.001
- Davidson, R. J., & Kaszniak, A. W. (2015). Conceptual and methodological issues in research on mindfulness and meditation. *American Psychologist*, *70*, 581–592. doi:10.1037/a0039512
- Dimidjian, S., Beck, A., Felder, J. N., Boggs, J. M., Gallop, R., & Segal, Z. V. (2014). Web-based mindfulness-based cognitive therapy for reducing residual depressive symptoms: An open trial and quasi-experimental comparison to propensity score matched controls. *Behaviour Research and Therapy*, *63*, 83–89. doi:10.1016/j.brat.2014.09.004
- Goldberg, S. B., Wielgosz, J., Dahl, C., Schuyler, B., MacCoun, D. S., Rosenkranz, M., . . . Davidson, R. J. (2016). Does the Five Facet Mindfulness Questionnaire measure what we think it does? Construct validity evidence from an active controlled randomized clinical trial. *Psychological Assessment*, *28*, 1009–1014. doi:10.1037/pas0000233
- Goyal, M., Singh, S., Sibinga, E. M. S., Gould, N. F., Rowland-Seymour, A., Sharma, R., . . . Haythornthwaite, J. (2014). Meditation programs for psychological stress and well-being: A systematic review and meta-analysis. *JAMA Internal Medicine*, *174*, 357–368. doi:10.1001/jamainternmed.2013.13018
- Kagan, J. (1988). The meanings of personality predicates. *American Psychologist*, *43*, 614–620. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/3052196>
- Khalsa, S. S., Rudrauf, D., Damasio, A. R., Davidson, R. J., Lutz, A., & Tranel, D. (2008). Interoceptive awareness in experienced meditators. *Psychophysiology*, *45*, 671–677. doi:10.1111/j.1469-8986.2008.00666.x
- Kok, B. E., & Singer, T. (2017). Effects of contemplative dyads on engagement and perceived social connectedness over 9 months of mental training: A randomized clinical trial. *JAMA Psychiatry*, *74*, 126–134. doi:10.1001/jamapsychiatry.2016.3360
- Mauss, I. B., & Robinson, M. D. (2009). Measures of emotion: A review. *Cognition & Emotion*, *23*, 209–237. doi:10.1080/02699930802204677
- Rothman, A. J., Gollwitzer, P. M., Grant, A. M., Neal, D. T., Sheeran, P., & Wood, W. (2015). Hale and hearty policies: How psychological science can create and maintain healthy habits. *Perspectives on Psychological Science*, *10*, 701–705. doi:10.1177/1745691615598515
- Van Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., . . . Meyer, D. E. (XXXX). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science*, *XX*, XX–XX.