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## Reiterated Concerns and Further Challenges for Mindfulness and Meditation Research: A Reply to Davidson and Dahl

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### Abstract

In response to our article, Davidson and Dahl offer commentary and advice regarding additional topics crucial to a comprehensive prescriptive agenda for future research on mindfulness and meditation. Their commentary raises further challenges and provides an important complement to our article. More consideration of these issues is especially welcome because limited space

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precluded us from addressing all relevant topics. While we agree with many of Davidson and Dahl's suggestions, the present reply (a) highlights reasons why the concerns we expressed are still especially germane to mindfulness and meditation research (even though those concerns may not be entirely unique) and (b) gives more context to other issues posed by them. We discuss special characteristics of individuals who participate in mindfulness and meditation research and focus on the vulnerability of this field inherent in its relative youthfulness compared to other more mature scientific disciplines. Moreover, our reply highlights the serious consequences of adverse experiences suffered by a significant subset of individuals during mindfulness and other contemplative practices. We also scrutinize common contemporary applications of mindfulness and meditation to illness, and some caveats are introduced regarding mobile technologies for guidance of contemplative practices.

### Keywords

mindfulness; meditation; adverse events; questionable research practices

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In their five-point commentary in this issue, Davidson and Dahl (2018) raise additional challenges for contemporary research on mindfulness and meditation that complement our original article (Van Dam et al., 2018). While we basically agree with them, the subsequent sections of this reply (a) highlight major reasons why our previous concerns remain especially relevant despite their first point and (b) provide further provisos regarding their second through fifth points.

### Nascent Scientific Fields Are Especially Susceptible to Methodological Issues

We agree that many methodological issues and pitfalls emphasized in our article are not limited to research on mindfulness and meditation. As pointed out, similar problems are also endemic to psychological science and neuroscience more generally (cf. Open Science Collaboration, 2015). Nevertheless, the practice and investigation of mindfulness and meditation remain especially fraught because of at least three specific contextual factors, which considerably increase the seriousness of the particular concerns that we previously raised.

The first factor involves the types of individual who participate in research on mindfulness and meditation practices. As we acknowledged in our original article, individual physiological differences can present challenges to neuroimaging studies generally. Yet these specific challenges may become systematic confounds in mindfulness and meditation research participants. For example, respiratory artifacts are likely more extreme in participants highly prone to focus on and manipulate their breath during meditative and/or nonmeditative rest states. Tendencies toward lower respiratory rates in meditators relative to control groups would present a confound in statistical analyses and interpretations of brain images that compare them. Furthermore, individuals who seek complementary and/or integrative treatments for various medical conditions may differ in important ways from those who seek traditional medical treatments (e.g., Honda & Jacobson, 2005).

The second factor pertains to the youth of mindfulness and meditation research. Domains of scientific research that have been under way for centuries (e.g., physics, chemistry, and biology) are less likely to have their trajectories misdirected by a few flashy findings. In contrast, relatively younger fields may be undermined when the reliability and reproducibility of empirical results based on exciting preliminary findings are subsequently ascertained to be questionable (e.g., Open Science Collaboration, 2015). Technical research on mindfulness and meditation is still in its infancy compared to psychological science more generally. Mindfulness and meditation research really began only in the 1970s, though it has already suffered one major setback through questionable research practices and unverifiable claims espoused by the transcendental meditation movement (Skolnick, 1991).

The third factor is that, unlike research in many other areas of psychological science, studies of mindfulness and meditation can occasionally be related to serious negative side effects. Because of this nascent subfield's relatively higher riskiness, extreme youthfulness, and past encounter with one near-miss "extinction" event, its prevailing methodological weaknesses and other improprieties should be resolved as soon as possible. Otherwise, funding agencies, scientists at large, and the public may soon choose to withdraw support from such research as a whole.

### **Caveat Emptor: Meditation Can Cause Adverse Side Effects Wherein Small Subsets of Participants Matter a Lot**

According to Davidson and Dahl (2018), it will be especially fruitful for future research to investigate additional types of meditation beyond the popular (e.g., mindfulness). We agree provisionally with this intriguing aspect of their expanded research agenda. Some crucial caveats, nonetheless, must continue to be kept in mind. Specifically, all new investigations of contemplative practices should pose minimal risk and offer well-justified potential for human benefit before being undertaken.

Our reasons for emphasizing this important concern stem from compelling evidence that injudicious participation in mindfulness-based interventions (MBIs) and other types of meditation can, and sometimes does, cause (or exacerbate) serious negative experiences (cf. Lindahl et al., 2017). At a minimum, it is plausible that such adverse effects occur at rates approximately equal to what happens generally in psychotherapy (i.e., approximately 5%; Crawford et al., 2016). Research on meditation-related adversities in 60 Buddhist meditation practitioners revealed that serious negative side effects occurred for 12% of the sample within 10 days after initiating practice, 25% of participants encountered adversities while practicing less than an hour per day, and 30% had adverse experiences in daily practice (Lindahl, Fisher, Cooper, Rosen, & Britton, 2017). These findings suggest that simple practice, not just intensive retreats (though the latter are more commonly associated with adverse outcomes), may result in adverse experiences.

Even if the adverse event rate for practitioners were only 5%, it would nonetheless be far from nontrivial in absolute terms. Nearly 18 million adults in the United States practice meditation annually (Clark, Black, Stussman, Barnes, & Nahin, 2015). So meditation-related negative side effects may occur in almost 1 million U.S. adults per year. Moreover, as

highlighted by news media and case reports (Kuijpers, van der Heijden, Tuinier, & Verhoeven, 2007; Vendel, 2017), some such effects (e.g., psychosis and suicide) are so severe that even very low frequencies of occurrence would not fully assuage our concerns.

## **Attention to Medical MBIs Remains Important and Future Studies of Meditation for Enhanced “Well-Being” May Be Misguided**

A related corollary point made by Davidson and Dahl is that our original article concentrated quite heavily on the use of mindfulness practice for treating illness and diseases. As they note, this usage is very recent: a late 20th- and early 21st-century development. However, mindfulness meditation and other contemplative practices were developed initially many centuries ago “primarily to actualize human flourishing.” Their commentary therefore advocates that future research should focus more on how various contemplative practices “can be used to improve well-being in ‘healthy’ individuals.”

Of course, we agree, *prima facie*, that the contemporary use of mindfulness practice in medical contexts is a recent development. Yet our agreement with this point should not be taken as a license from us for turning attention away from medical-based studies of mindfulness and exclusively toward studies of well-being enhancement through meditation. Rather, there are strong reasons for continuing to focus attention on medical MBIs and for maintaining some skepticism about prospective meditation-based improvements of healthy individuals’ well-being.

The grounds for continued attention to MBIs in medical contexts have several firm bases. For example, according to a recent Scopus search, 60% of past studies on mindfulness appeared in medical and/or health journals, with 30% of them (80% for psychology articles) mentioning the term *clinical* in their abstracts, keywords, or titles. This manifest popularity, qualified by serious concerns raised in our original article (Van Dam et al., 2018), well warrants conducting additional future MBIs for treating mental and physical illness. Moreover, even if mindfulness and other contemplative practices become prominent ways to enhance “well-being” and actualize “flourishing” in “otherwise healthy individuals,” doing so will still require helping unhealthy individuals to overcome their afflictions before pursuing these higher-level goals (Maslow, 1943).

Even if researchers could achieve valid psychological measurement of “well-being” and “flourishing” (concepts that experience similar measurement difficulties to mindfulness), the contemplative practices chosen for study may not be especially well suited to attaining contemporary versions of these particular higher-level goals. Historically, many such practices arose in religious and spiritual contexts where the motivations and goals for what could and would be achieved through meditation differed greatly from secular Western notions of health, well-being, and flourishing (McMahan, 2008; Sharf, 2015). Thus, given such qualifications, it is currently less than obvious that successful future research on uses of meditation for enhancement of human well-being and flourishing can be properly or easily accomplished.

## Optimal Dose-Response Curves Depend on Desired Outcomes

Davidson and Dahl (2018) also raise basic issues about what are the optimal duration, intensity, frequency, and temporal spacing (i.e., dosage script) for mindfulness and other contemplative practices. As they correctly note, resolving these issues may depend on how moments of meditation are coordinated with other activities of daily living. Other crucial considerations must be added to this mix.

While ascertaining appropriate “dosages” of contemplative practice is necessary to optimize mindfulness and meditation, doing so cannot happen without specifying what would be the desired outcome of the practice. Is it alleviating particular disease symptoms, becoming a more effective soldier, increasing a targeted metric of “well-being,” attaining enlightenment, or some alternative objective? After we have the answer, and sufficient information has been obtained about potential negative side effects (cf. Lindahl et al., 2017), then and only then we can proceed to formulate an optimal practice regimen that maximizes benefits and minimizes adverse experiences (Hansen, Lambert, & Forman, 2002; Muller & Milton, 2012). Most likely, the optimal “dosage script” for meditation to alleviate moderate anxiety will differ considerably from that needed to attain general well-being. Also, the dose-response curves are likely nonlinear, and their ideal parameters will vary within and across different populations.

## Mobile Platforms for Mindfulness and Meditation Should Be Properly Validated

Finally, Davidson and Dahl (2018) tout mobile technologies for implementing and evaluating contemplative practices. Indeed, such may have some promise (cf. Clough & Casey, 2015). Yet recent evaluations of current analogous technology for treating depression (Huguet et al., 2016) and anxiety (Sucala et al. 2017) have revealed multiple unresolved problems. Among them are insufficient development data from appropriate potential users, and infidelity of implemented objectives (e.g., apps that poorly implement practices that they are supposed to facilitate).

Similar challenges may continue to prevail for mindfulness and meditation apps, of which there were more than 500 in 2015 (Mani, Kavanagh, Hides, & Stoyanov, 2015). Only about 5% of them actually provided mindfulness education and training per se. Regardless, many such mobile technologies still do not adequately accommodate individual differences in motivation and trajectories of skill acquisition, a problematic gap that has likewise plagued manuals for implementing evidence-based psychotherapies (cf. Chorpita, 2002). Thus, before mindfulness and meditation come to use mobile technology as their preferred default support system, much more work will be needed to ensure fidelity of delivery and effectiveness compared with face-to-face guidance.

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