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Toward a Framework for Reporting and Differentiating Key Features of Meditation- and Mindfulness-Based Interventions

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Abstract

Objectives Meditation practices and the therapeutic interventions that involve them are numerous, heterogeneous, and multidimensional. Despite this, many researchers have noted a tendency for studies of meditation- and mindfulness-based interventions to inadequately describe the interventions themselves, limiting valid comparisons, generalizations, and identification of mediators and moderators of therapeutic change. To address this, we identified and organized features of meditation-based interventions reported in study publications as an initial step toward systematically developing a reporting guideline.

Methods A content analysis of 118 meditation-based intervention studies, informed by existing theoretical proposals of key features of meditation practices and interventions.

Results Significant variability and inconsistency were found in the reporting of structural features of meditation-based programs as well as descriptions of the practices and activities within them. Based on features' prevalence, co-occurrences, and defining themes, a preliminary Meditation-based Intervention Design (MInD) framework and reporting checklist were developed.

Conclusions Findings can inform further development of a reporting guideline and aid in identifying variables of meditation practices and their contexts that are responsible for or influence their effects. This can enhance the quality of research in the field and contribute to improving the effectiveness of meditation- and mindfulness-based interventions.

Keywords Meditation · Mindfulness · Interventions · Research reporting guidelines · Content analysis

Meditation is a generic term used to describe a wide variety of spiritual, healing, and contemplative practices employed for over 5000 years (Nash et al. 2013; Ospina et al. 2007). There is no consensus definition, although meditation is commonly described as some form of mental training (Eifring 2016; Nash et al. 2013; Ospina et al. 2007). In scientific literature, meditation is generally described as a practice, exercise, or training of awareness or self-, emotion, or attention regulation (Eifring

2016). Meditation may also refer to the states of consciousness or experience that arise during these practices (Nash et al. 2013).

Meditation practices are found in many religious traditions, including Judaism, Christianity, Islamic Sufism, and Daoism, but are particularly emphasized in Buddhism and Hinduism (Eifring 2016; Lutz et al. 2007). Types of Buddhist meditations include mindfulness of breathing, foundations of mindfulness, loving-kindness, compassion, contemplation of mortality, meditation on foulness, the six recollections, tantric techniques, and mantra recitation, among others. There are also several meditations specific to Tibetan Buddhist teachings (e.g., Dzogchen, Mahamudra), Zen Buddhism (e.g., Zazen, Shikantaza, Koan), and other Buddhist schools (Dahl et al. 2015; Lutz et al. 2007). Meditation practices from Hinduism include *pratyahara* (i.e., sense withdrawal), *pranayama* (i.e., breath regulation), *dharana* (i.e., concentration on an object), and *dhyana* (i.e., absorption; Yoga school), as well as self-inquiry (Advaita Vedanta school; Dahl et al. 2015; Tomasino et al. 2014). Examples of meditation

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practices from other religions include Centering Prayer (Christianity), Muraqaba (Sufism), and inward cultivation (Daoism; Dahl et al. 2015). Given the many definitions and broad usage of the term, a few spiritually oriented practices are sometimes, but not consistently, considered meditation. These include Tai Chi, Qigong, and movement-centric yogic practices (Eifring 2016).

Several theoretical frameworks have been proposed for classifying the myriad types of meditation. Lutz et al. (2008) suggested two categories based on the attentional strategy used (i.e., focused attention vs. open monitoring), while Nash et al. (2013) proposed three categories based on targeted mental states (i.e., affective, cognitive, null), and Dahl et al. (2015) put forth another three-category taxonomy based on theorized cognitive mechanisms (i.e., attentional, constructive, deconstructive). Each theory focuses on a different aspect of meditation as the basis for classification, highlighting the multidimensionality of meditation practices and lack of consensus on what fundamentally differentiates them. In sum, meditation is an umbrella term that includes numerous practices from a wide range of traditions, and there are competing perspectives on their essential similarities and differences.

In recent years, secularized meditation practices and programs, primarily for mental and physical health benefits, have become increasingly popular in the USA, Europe, and other parts of the world (Eifring 2016). Despite this trend, much of the general public appears to lack accurate knowledge of and familiarity with meditation as a subject and practice. There is limited public literacy of the multitude of types of meditation, of what these practices entail, and of their potential uses and effects (Van Dam et al. 2018). While this may be attributed to the multiplicity of information sources on meditation, the relative recency of its emergence in the public arena, and misunderstandings propagated through the media, it is likely that limitations in scope and inconsistencies in the quality of scientific research on meditation have played a significant role.

The scientific study of meditation was propelled by the Mindfulness-based stress reduction (MBSR) program created by Jon Kabat-Zinn in the late 1970s. Since then, research and subsequent interest by the general public have been dominated by the concept of *mindfulness* (Van Dam et al. 2018). Mindfulness has been described as a mental state, trait or dispositional quality, skill, and type of meditation practice involving a receptive, non-judgmental attentiveness to or awareness of present moment experience (Baer 2014; Kabat-Zinn 2011). Mantra-based and, more recently, kindness-based (i.e., loving-kindness and compassion) forms of meditation have also undergone some scientific investigation (e.g., Galante et al. 2014; Lynch et al. 2018); however, the wide range of practices found across religious and spiritual traditions remains largely unexplored. Little to no research has been dedicated to the Buddhist-derived practices of Dzogchen, Mahamudra, analytical meditation, Shikantaza,

and Koan, nor practices from other traditions such as Centering Prayer (Christianity), Muraqaba (Sufism), and self-inquiry (Advaita Vedanta; Dahl et al. 2015).

In addition to limitations in the scope of meditation practices that have been studied, meditation research to date has underappreciated the importance and influence of context. Traditional meditation practices are situated in religious, cultural, ethical, and philosophical contexts, which shape the purpose, meaning, and relative importance of these practices, and may significantly influence their effects (Josipovic and Baars 2015; Vieten et al. 2018). Meditation practices in Buddhism, for example, are only one aspect of a multifaceted approach to life which involves many other spiritual activities and is founded on specific ethical and philosophical positions (Keng et al. 2011; Shonin et al. 2014). Furthermore, meditations in religious contexts may have very different aims than those in clinical interventions (Davidson and Dahl 2018) and are often intended to directly investigate or apply the philosophical perspectives presented in their respective traditions (Dahl and Davidson 2019). The departure from traditional contextual factors of meditation was intentional in the development of mindfulness-based programs in order to gain broader acceptance in mainstream medicine and be accessible to people of all faiths (Crane 2017; Kabat-Zinn 2011). Nevertheless, leading researchers have pointed to the need for context to be considered in mindfulness and meditation research (Dahl et al. 2015; Josipovic and Baars 2015; Vieten et al. 2018).

Research on meditation-based interventions has also been hindered by inconsistencies in research design quality and reporting. Recent systematic reviews of mindfulness-based (Kreplin et al. 2018), kindness-based (Galante et al. 2014), and mantra (Lynch et al. 2018) meditation intervention studies have largely found them to be of poor or weak methodological quality. Comparison or control conditions tend to be absent, inadequate, or not active (Davidson and Kasniak 2015; Heckenberg et al. 2018; Katterman et al. 2014; Van Dam et al. 2018), and random assignment of participants is often not practiced or reported (Galante et al. 2014; Heckenberg et al. 2018; Kreplin et al. 2018; Lynch et al. 2018). Study quality has also suffered from a lack of follow-up assessments (Heckenberg et al. 2018; Hilton et al. 2017; Katterman et al. 2014), small sample sizes (Galante et al. 2014; Katterman et al. 2014), and a lack of consideration for potential biases, such as demand characteristics, participant expectancies, and experimenter bias (Kreplin et al. 2018).

In addition, meditation-based intervention studies tend to inconsistently or inadequately report important study design features, an issue that exists across social and psychological intervention studies (Montgomery et al. 2018). There is a lack of assessment and reporting of treatment dose (i.e., frequency and duration of practices; Davidson and Dahl 2018; Goyal et al. 2014), instructor background information (Davidson

and Kasniak 2015), harms or adverse effects (Davidson and Kasniak 2015), and participant treatment compliance or engagement (Heckenberg et al. 2018; Katterman et al. 2014). These issues undermine empirical support for the effectiveness of meditation-based interventions, creating the potential to exaggerate treatment effects and mislead research consumers (Moher et al. 2010a).

Furthermore, numerous researchers of mindfulness and meditation have highlighted the insufficiency of detail provided in publications about the interventions being studied (Davidson and Kasniak 2015; Lutz et al. 2007; Nash et al. 2013; Ospina et al. 2007; Van Dam et al. 2018). Given the heterogeneity and multidimensionality of meditation practices, and the variety of methods and instructions even for the same types of practices, it is critical for studies to provide clear and comprehensive descriptions of their interventions. Insufficient descriptions of interventions limit valid comparisons and generalizations, replication, identification of mechanisms of therapeutic change, and employment in real-world settings (Davidson and Kasniak 2015; Montgomery et al. 2018; Nash et al. 2013; Van Dam et al. 2018).

A number of established guidelines exist for reporting various types of research studies (see <https://www.equator-network.org/reporting-guidelines>). The CONSORT (Consolidated Standards of Reporting Trials) statement was developed to guide reporting of randomized trials but is applicable to a wider class of study designs, and it has been endorsed by over 600 journals and editorial groups since its publication in 1996 (Moher et al. 2010a). The CONSORT-SPI 2018 Extension is a version of the guidelines developed specifically for social and psychological interventions (Montgomery et al. 2018). Use of the CONSORT-SPI 2018 Extension in meditation-based intervention studies would greatly improve the quality and transparency of research in this field.

In regard to describing the interventions themselves, the CONSORT-SPI 2018 Extension does not provide guidance specific to meditation-based interventions. The need for such a guideline has been emphasized by researchers in the field (Hilton et al. 2017; Nash et al. 2013; Van Dam et al. 2018), but one has yet to be established. Reporting guidelines, such as the CONSORT statement, are commonly developed using the Delphi method, which involves synthesizing opinions from a panel of experts. Prior to that process, it is important to first clarify the extent of the issue by seeking evidence on the quality of reporting in published research articles (Moher et al. 2010b). As mentioned, a number of researchers, in reviews of the field, have noted a tendency for meditation-based intervention studies to inadequately describe the interventions being studied. However, what actually has been reported in regard to intervention descriptions has yet to be formally analyzed and remains unknown. According to Moher et al. (2010b), evidence of the quality of reporting provides “an initial and important insight into the items to consider for

inclusion in an eventual checklist” (p. 3). Therefore, an evaluation of the contents of reporting would clarify the extent of underreporting and allow for common elements of meditation practices and programs to be identified, as an initial step to systematically develop a reporting guideline. Additionally, identification of features that may meaningfully differentiate and influence the effects of meditation practices and programs has the potential to more broadly benefit scientific research, as well as the public’s understanding of meditation (see “Discussion”).

Given the state of meditation research, the objective of this study was to clarify and organize the features of meditation-based interventions reported in study publications, in order to develop a comprehensive framework and guideline for reporting and differentiating essential features of these interventions.

Methods

The study employed a qualitative content analysis method, which is a systematic method for attaining a broad and condensed description of complex phenomena by identifying and categorizing meanings within texts (Drisko and Maschi 2015; Elo and Kyngas 2008). The units of analysis were peer-reviewed journal publications of meditation-based interventions for adult populations. Given the many existing theoretical conceptualizations of meditations and their features, a *directed* or *deductive* approach was used. Deductive content analysis uses existing theories and prior research to provide predictions about the variables of interest and their relations, and to help determine the initial coding categories (Elo and Kyngas 2008; Hsieh and Shannon 2005).

Search Strategy and Study Selection

Given that studies of meditation-based interventions across populations, settings, treatment outcomes, and types of meditation are far too numerous to all be included (over 800 identified prior to 2006; Ospina et al. 2007), a sample that represents a wide range of studies was sought. Ideally, a sample would be derived from all such interventions identified via a systematic review process; however, the extensive efforts required by that approach (a similar search in 2005 yielded over 11,000 citations; Ospina et al. 2007) was not necessary to achieve the aims of the study. Instead, published systematic reviews of meditation-based intervention studies were used to generate a broad sample of studies. Systematic reviews were identified by searching PubMed, PsychNet, SCOPUS, and Web of Science databases for “meditation” and “systematic review” in the title (as of Jan. 2019), which yielded 46 unique publications. Publications were excluded for the following: (a) being protocols or reviews of systematic reviews ($n = 2$), (b)

not involving interventions ($n = 2$), (c) involving the same type of meditation and population or outcome of a more recent review ($n = 4$), (d) full texts not being available ($n = 2$), and (e) involving children or youth ($n = 4$). Systematic reviews were also excluded if (f) they consisted of studies that are all (or more than two thirds) MBSR, mindfulness-based cognitive therapy (MBCT), transcendental meditation (TM), or interventions where meditation is not a main component (e.g., acceptance and commitment therapy [ACT], dialectical behavior therapy [DBT]; $n = 14$). After exclusions, 18 systematic reviews remained (see [Supplemental File](#)), consisting of 368 studies. A total of 253 studies were excluded for being (a) MBSR ($n = 87$), TM ($n = 44$), or MBCT ($n = 23$), (b) not intervention studies ($n = 24$), (c) studies where meditation is not a main component ($n = 16$), (d) not available ($n = 9$), dissertations ($n = 8$) or not in a peer-reviewed journal ($n = 4$), (e) studies of children or youth ($n = 3$), and (f) duplicates ($n = 35$).

Due to the numerous studies of MBSR, MBCT, and TM, systematic reviews and studies of these programs (or “modified” versions) were excluded. Instead, these programs were captured by adding one representative publication of each to the content analysis. For MBSR and MBCT, these were their initial journal publications (i.e., Kabat-Zinn 1982; Teasdale et al. 2000) because they provided the most comprehensive descriptions of their interventions. For TM, initial works were not journal publications (e.g., Mahesh Yogi 1963), so one was chosen out of a few commonly cited journal publications based on the amount of detail it provided (i.e., Kam-Tim and Orme-Johnson 2001). All other studies of MBSR, MBCT, and TM were part of the exclusions, but not interventions “based on” or “adapted from” them.

The remaining 118 studies (see [Supplemental File](#)) involved a wide range of populations, including teachers, police officers, college students, healthcare professionals, VA staff, incarcerated individuals, veterans, older adults, and cancer survivors, as well as adults with a variety of medical issues (e.g., diabetes, fibromyalgia, arthritis, multiple sclerosis, obesity, heart disease, asthma, inflammatory bowel disease, epilepsy, HIV/AIDS, dementia) and mental health issues (e.g., anxiety, psycho-somatization, depression, substance use disorders, addiction). Additionally, studies targeted a wide variety of treatment outcomes, including psychosocial (e.g., quality of life, pro-sociality, compassion, connectedness, emotion regulation, mind wandering, mindfulness, worry/rumination, anxiety, stress, depression, burnout, self-concept), cognitive (e.g., memory, attention), behavioral (e.g., smoking cessation, sleep, exercise, substance use), and physiological (e.g., weight loss, pain, lung function, blood pressure, stress response, inflammation).

Content Analysis Procedure

Features of meditation-based interventions relate to either (1) the structure or design of the programs or (2) the methods or

techniques involved in the practices or activities within them. Thus, the intention of the content analysis was to identify and categorize (i.e., code) features related to program structure and meditation practice methods.

Meditation Methods Several theories exist on how to define, classify, or differentiate meditation practices (e.g., Bond et al. 2009; Dahl et al. 2015; Lutz et al. 2015; Travis and Shear 2010). These theories suggest numerous features of meditations, but do not explicitly distinguish the *method* (i.e., the instructed procedures or techniques employed) from the overall experience, or focus on aspects other than method (e.g., cognitive mechanisms) and therefore were not used to develop coding categories. Ospina et al. (2007) conducted a broad review of the scientific research of meditation and summarized main features of meditation techniques: (1) breathing, (2) mantra, (3) relaxation, (4) attention and its object, (5) spirituality and belief, (6) training, and (7) criteria of successful meditation practice. One concern was the inclusion of movement-based practices (i.e., Yoga, Tai Chi, Qi Gong) in this review, which were excluded from this content analysis (except for some forms of Yoga) based on narrower conceptualizations of meditation. However, it appears that none of the features relate solely to these types of practices, so they were used to develop initial coding categories.

Nash et al. (2013) proposed a theoretical framework for describing and differentiating meditation methods, which is situated in a broader explanatory model of the process of meditation (i.e., stages, methods, and states). The proposed framework includes the following: (1) cognitive strategies, (2) objects of attention, (3) beliefs or special knowledge suggested or required, (4) eyes closed or open, (5) static (stationary) or kinetic (movements) process, (6) silent or auditory process or both, (7) postural position, (8) intrinsic (self-reliant/independent) or extrinsic (dependent on an outside person) process, and (9) type or control of breathing. This framework was also used to develop initial coding categories.

Van Dam et al. (2018) proposed a non-exhaustive list of defining features of meditation practices. One concern is that the list appears to, at least in part, draw upon a theoretical proposal by Lutz et al. (2015) of a framework describing the phenomenology, or features of experience, when one is engaged in mindfulness meditation. In that proposal, it is stated that the framework is not intended to describe the variety of meditation *methods* in these practices. However, the list constructed by Van Dam et al. (2018) appears to focus on some aspects of method, and therefore was also used to develop initial codes. The features include the following: (1) arousal, (2) orientation of attention, (3) spatial dynamic of attention, (4) temporal dynamic of attention, (5) object of attention, (6) aperture of attention, (7) effort, (8) complementary activity, (9) affective valence, (10) emotional intention, (11) motivation/goal, (12) proficiency required, and (13) posture.

Program Structure Van Dam et al. (2018) also proposed a non-exhaustive list of study design features for mindfulness-based interventions. Some of these features are not related to the interventions themselves, nor are they unique to meditation-based interventions and so were excluded from the content analysis. The excluded study design features are already part of the CONSORT-SPI 2018 checklist and include the following: (a) teacher/deliverer information, (b) setting, (c) instructor adherence, (d) control group used, (e) randomization, (f) adverse effects or harms, (g) participant eligibility criteria, and (h) conflicts of interest (Montgomery, et al. 2018). Proposed features specific to meditation-based interventions and used as the basis for coding categories include the following: (1) time frame, (2) types of formal practice, (3) types of informal practice, and (4) delivery-related features (e.g., logs maintained, practice reviewed in session, guided, types of materials used). *Participant prior meditation experience* was also included, although it is a *study* rather than *intervention* design feature, because it is specific to meditation-based interventions.

Implementing the Coding Process Features from the three theories were converted into coding categories and operationalized into a codebook (see [Supplemental File](#)). Structure-related codes included the following: (1) participant prior meditation experience, (2) meditation practices (a) formal practices; (b) informal practices), (3) time frame (a) program duration; (b) duration per practice), and (4) means of delivery of instructions. Method-related codes included: (5) physical orientation (a) posture; (b) movement), (6) direction of mental faculties (a) direction of attention/observation; (b) direction of mental contents [e.g., visualization, phrases]), (7) object (a) degree of localization; (b) fixed vs. changing), (8) beliefs (a) metaphysical/theoretical/philosophical; (b) spiritual/religious; (c) ethical/moral), (9) state, (10), aim, (11) control of breathing, and (12) complementary activities.

Consensus coding was conducted by a team of six researchers, in which each intervention study was coded by one researcher, reviewed by a second researcher who noted any mistakes or disagreements, and reviewed by a third researcher (if necessary) who resolved any discrepancies. Studies were randomly assigned to each researcher in each stage. The coding process involved: (1) locating content that described the intervention (typically in “[Methods](#)”), (2) highlighting and coding content using the codebook, and (3) adding comments on (a) potential new features not captured by the coding scheme, (b) relations among codes, and (c) questions or uncertainties.

Results

The 118 studies included in the content analysis consisted of the following types of meditations: (1) mindfulness-based (incl. MBSR, MBCT; $n = 41$), (2) mantra (incl. TM; $n = 14$),

(3) kindness-based (compassion [$n = 13$]; loving-kindness [$n = 7$]), (4) yogic (Sahaja yoga [$n = 4$]; Kirtan Kriya yoga [$n = 3$]; Sudarshan Kriya yoga [$n = 2$]; Pranayama yoga [$n = 1$]; Patanjali yoga [$n = 1$]), (5) Vipassana ($n = 11$) or Samatha ($n = 3$), and (6) other practices ($n = 4$), unspecified ($n = 4$), or a combination ($n = 10$). Studies were published between 1973 and 2018, with 75% dating after 2008. Across the 118 studies, a total of 2048 codes were applied to 1068 text excerpts (17.5 avg. codes per study; 9.1 avg. excerpts per study). Early in the coding process, four new categories were identified and added: (1) attitude, (2) application (of method) in daily life, (3) aim of program (sub-code of aim), and (4) aim of specific practice (sub-code of aim).

While different coders consistently agreed upon most code applications, a few codes presented repeated disagreements or uncertainties, indicating a need to clarify their meaning and utility. These included the following: (1) Practices and activities: A wide variety were reported across interventions, and for some, it was unclear whether they should be categorized as *formal*, *informal*, or *complementary*. (2) Program aim: The aim of the *program* or *intervention* was sometimes confused with, or not clearly distinguished from, the aim of the *study*, and it was often reported in a separate section (e.g., “Introduction”) than the program details (e.g., “[Methods](#)”). (3) Beliefs: The sub-codes, *metaphysical/theoretical/philosophical*, and *spiritual/religious* proved not useful for differentiating types of beliefs or perspectives.

Code Prevalence

The frequency of reporting for each code was assessed for each study individually, in aggregate, and for each type of meditation program (see [Table 1](#)), providing an indication of the extent to which intervention features were specified in publications. Note that code prevalence does not necessarily suggest that a feature is actually prevalent in or across program types. For the 12 initial code categories and two added codes (sub-codes excluded), a given study reported 51% of the codes on average, with the bottom quartile of studies containing 7–36% of codes, the middle half containing 36–64% of codes, and the upper quartile containing 64–86% of codes. The frequency of codes did not differ when analyzed by date of publication.

Concerning structure-related codes, description of *meditation-based practices* was found in 86% of studies. Those that did not provide any details about meditation practices (formal or informal; $n = 17$) reflects poor reporting and not that the programs are something other than meditation-based. *Complementary activities* was reported in 59% of studies, with the highest frequency in mindfulness-based (78%) and mantra (71%) programs. *Program time frame* and *practice time frame* both were found in 73% of studies, and *means of*

Table 1 Code prevalence by type of meditation program. Percentage of studies with each code, in total and for each type of meditation program

	Total	Mindfulness - based	Mantra	Kindness - based	Yogic	Vipassana / Samatha	Other	Standard Deviation	
# of studies	118	41	14	20	11	14	18		
Prior meditation experience	27%	17%	43%	20%	27%	57%	22%	0.14	
STRUCTURE CODES	Program duration	73%	78%	64%	80%	73%	64%	67%	0.06
	Practice duration	73%	68%	86%	90%	82%	57%	61%	0.13
	Meditation practices	86%	93%	100%	80%	91%	71%	78%	0.10
	Complementary activities	59%	78%	71%	55%	45%	36%	39%	0.16
	Means of delivery	69%	73%	79%	90%	55%	43%	61%	0.16
	Aim	72%	83%	64%	70%	45%	71%	72%	0.11
METHOD CODES	Program aim	36%	46%	36%	25%	9%	43%	33%	0.12
	Practice aim	55%	68%	43%	50%	45%	36%	61%	0.11
	Direction of mental faculty	75%	63%	86%	75%	73%	86%	83%	0.08
	Direction of attention	59%	59%	71%	30%	55%	79%	72%	0.16
	Direction of mental contents	42%	29%	43%	60%	45%	29%	56%	0.12
	Object	59%	54%	71%	60%	64%	50%	67%	0.07
	Localization	22%	20%	29%	15%	18%	29%	28%	0.06
	Fixed vs Changing	20%	20%	14%	25%	18%	21%	22%	0.03
	Attitude	42%	54%	29%	50%	9%	43%	33%	0.15
	Application in daily life	33%	39%	50%	40%	0%	14%	33%	0.17
	Beliefs	25%	24%	14%	35%	9%	29%	33%	0.10
	Control of breathing	24%	15%	36%	5%	64%	7%	44%	0.21
	State	23%	20%	7%	25%	45%	36%	17%	0.13
Posture	20%	10%	14%	10%	55%	7%	50%	0.20	
Movement	20%	29%	7%	5%	36%	14%	22%	0.11	

Green & Red data represent +/- one standard deviation from the category total (Other program categories excluded)

delivery of instructions in 69%, while program aim was clearly defined in only 36% of studies. Vipassana/Samatha programs were notable for providing the least frequent reporting for structure-related codes. In addition, participant prior meditation experience was reported in only 27% of studies. This feature was excluded from further analysis because it is a

study rather than intervention design feature, however the results illustrate just how infrequently it is reported.

Method-related codes tended to be reported less frequently and more variably. The most prevalent code was direction of mental faculties, found in 75% of studies. While all types of programs included direction of attention/observation and

direction of mental contents, certain programs favored one or the other. Mindfulness-based programs reported *direction of attention/observation* twice as much as *direction of mental contents* (59% vs. 29%), whereas the opposite was found for kindness-based programs (30% vs. 60%). *Practice aim* was reported in 55% of studies and *object* in 59%. *Attitude* (42%) was commonly specified in mindfulness-based (54%) and kindness-based (50%) programs, but only in 9% of yogic programs. *Application (of method) in daily life* was found in 33% of studies, most frequently in mantra programs (50%), but not at all in yogic programs, and only in 14% of Vipassana/Samatha programs. Less prevalent codes included *beliefs* (25%), *control of breathing* (24%), *posture* (22%), *movement* (20%), and *state* (23%), although yogic programs tended to include these more often.

Insufficiency in the extent of reporting on meditation-based interventions, as suggested by researchers in reviews of the field, is most directly supported by the absence of descriptions of *meditation-based practices* in 14% of studies, *program time frame* in 27%, *practice time frame* in 27%, *aim* in 28%, and *means of delivery* in 31%, as these features are most clearly relevant to all meditation-based interventions. *Complementary activities* and method-related features may not apply to every intervention, and therefore their low or mixed prevalence of reporting does not necessarily indicate that they are underspecified. However, the presence of every feature (except *application in daily life*) in at least one program of every type of meditation suggests that they are relevant across program types and may be considered common features of meditation-based interventions. As such, the variability of reporting suggests that many studies may have underreported important features of their interventions. This is further supported by the fact that 25% of studies did not specify nine or more features out of 14. Nevertheless, these findings clearly indicate *inconsistency* in the features reported.

Code Co-occurrence

When a given text excerpt (e.g., a sentence) was coded for multiple features, those codes co-occurred or overlapped. This provided a quantitative indicator of potentially meaningful relations among features (see Fig. 1), which informed their relative placement within the reporting framework being developed. For reference, method-related codes co-occurred 4.9 times across all 118 studies, on average.

Direction of attention/observation frequently overlapped with other directive actions. Across all studies, it co-occurred 23 times with *direction of mental contents*, 13 times with *control of breathing*, and 13 times with *movement*. In contrast, *direction of mental contents*, *breathing*, and *movement* rarely overlapped. This indicates that there may be more than one directive action in a given meditation practice, and when there is, *direction of attention/observation* is

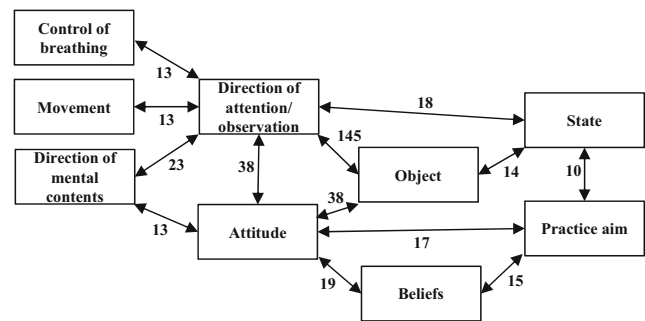


Fig. 1 Code Co-occurrence. Number of times method-related components were coded in the same text excerpt

typically involved. *Object* routinely co-occurred with *direction of attention/observation* ($n = 145$), and to a lesser extent, *attitude* ($n = 38$). This is a function of the definition of *object* in this context, in that it is considered where or to what attention is directed. In addition to overlap with *object*, *attitude* co-occurred with *direction of attention/observation* ($n = 38$) and, to a lesser extent, *beliefs* ($n = 19$), *practice aim* ($n = 17$), and *direction of mental contents* ($n = 13$). *State* significantly overlapped with *direction of attention/observation* ($n = 18$), *object* ($n = 14$), and *practice aim* ($n = 10$). *Beliefs*, in addition to overlapping with *attitude*, co-occurred with *practice aim* ($n = 15$).

Thematic analysis of coded text excerpts containing these co-occurrences (see Table 2) led to the *meditation-based practices* component of the reporting framework to consist of (1) *practice aim(s)*, which may include *state* (mental, emotional, or physiological) and *beliefs* (i.e., insight into), and (2) *directive actions*, which involves direction, regulation, or control of (a) *attention/observation*, (b) *mental contents*, (c) *breathing*, and/or (d) *movement*. *Object* was placed within *direction of attention/observation*. *Attitude* was found to be either (1) a practice aim, (2) a general feature of meditation-based practices, (3) related to the object of attention/observation, or (4) related to distractions from the object.

Clarifying and Expanding Features

In order to clarify and better define features, coded text excerpts for each feature were analyzed to identify important themes (see Table 3). Themes were defined based on commonalities in the specific language used and were found for every feature except *program aim*, *breathing*, and *movement*. *Program time frame* consistently included overall duration (e.g., number of weeks), session frequency (e.g., times per week), and session duration (e.g., hours per session), and *practice time frame* included frequency (e.g., days per week) and duration (e.g., minutes). *Meditation-based practices*, which could not be clearly distinguished as *formal* or *informal*, were differentiated from *complementary activities* by involving a mental training technique (i.e., directive action) and were found to include both sitting meditations and

Table 2 Relations among method-related codes: Examples from studies

Category/sub-category	Text excerpt	Type of program	Study (first author, year, pg. no.)
Practice aim			
State (mental/emotional/-physiological)	<p>“<i>The primary purpose of LKM is to use an affective technique to cultivate positive emotions</i>”</p> <p>“<i>The foundation of the RR-MBI used in this trial is elicitation of the relaxation response (RR), which has been described as a “wakeful hypometabolic” state</i>”</p> <p>“<i>Deploying meditative concentration to the purposeful cultivation of specific mind states</i>”</p> <p>“<i>The mental silence meditation (MSM) group was taught to elicit a state of mental silence or “thoughtless awareness”.</i>”</p>	<p>Loving-kindness</p> <p>Mantra</p> <p>Other</p> <p>Sahaja yoga</p>	<p>Leppma 2016, p. 298</p> <p>Kuo 2015, p. 3</p> <p>Desbordes 2012, p. 5</p> <p>Manocha 2011, p. 3</p>
Attitude (cultivation of)	<p>“<i>The self-compassion recordings consisted of meditations focused on cultivating kindness and acceptance toward the self, and to a lesser extent, toward others.</i>”</p> <p>“<i>Formal meditation practices are also taught including loving-kindness meditation (LKM), an ancient Buddhist practice designed to increase good will for oneself and others</i>”</p> <p>“<i>Metta meditation, designed to cultivate loving-kindness and forgiveness toward oneself and all living beings, encouraging connection and relation</i>”</p>	<p>Compassion</p> <p>Compassion</p> <p>Loving-kindness</p>	<p>Arch 2014, p. 51</p> <p>Neff 2013, p. 33</p> <p>Williams 2005, p. 940</p>
Awareness (enhancing)	<p>“<i>The practices... focus on enhancing awareness of one’s own suffering and the suffering of others...</i>”</p>	Compassion	Jazaieri 2014, p. 26
Concentration	<p>“<i>The goal, they were told, was not to stop thinking, but rather to pay attention to an object for a sustained period of time.</i>”</p>	Other	May 2012, p. 250
Insight (into beliefs/philosophy)	<p>“<i>The aim... is creating participants’ insight about their cravings and be able to realize the law of impermanence and non-self</i>”</p> <p>“<i>Mindfulness is used to investigate the mind from moment to moment to achieve insight into the characteristics of existence described by the Buddha as impermanence, unsatisfactoriness and not-self.</i>”</p>	Other	<p>Rungreangkulkij 2011, p. 197</p> <p>Vipassana</p> <p>Falkenstrom 2010, p. 306</p>
Directive actions (interrelations)			
Attention and mental contents	<p>“<i>Ss were instructed to count their breaths (on the exhalation) from I to IO. while focusing on air movement sensations at the tip of the nose.</i>”</p> <p>“<i>Participants practiced bringing attention to the process of thinking. Rather than identifying with the content of thoughts, they were instructed to view them as leaves floating down a stream, observing them as they float in and out of awareness.</i>”</p> <p>“<i>Participants in the LKM group were asked to bring their awareness to their heart area, and imagine that as they inhaled, they inhaled into their heart, and as they exhaled, they exhaled from their heart.</i>”</p>	<p>Mantra</p> <p>Mindfulness-based</p> <p>Other</p>	<p>Lehrer 1983, p. 654</p> <p>Bowen 2012, p. 9</p> <p>May 2012, p. 251</p>
Attention and movement	<p>“<i>With the six-part walking meditation technique, patients were instructed to focus their attention on each movement of the foot as they took a step forward.</i>”</p> <p>“<i>[Qigong and tai chi] awareness and concentration are placed on breathing and specific movements of the body.</i>”</p> <p>“<i>In Dynamic Meditation, mindfulness is associated with the ongoing, rhythmic movement of the hands while the subject’s eyes remain open and aware of the body’s motions</i>”</p>	<p>Other</p> <p>Other</p> <p>Other</p>	<p>Tavee 2011, p. 167</p> <p>Tavee 2011, p. 167</p> <p>Rungreangkulkij 2011, p. 199</p>
Breathing and mental contents	<p>“<i>[Mindful hatha yoga] These techniques include breathing exercises and imagery that is associated with breathing (e.g., imagining that the lungs are two balloons being filled with air).</i>”</p>	Other	Butler 2008, p. 811
Attitude			
General	<p>“<i>This is done with an attitude of willingness and curiosity without holding onto, pushing away, or denying any aspect of one’s present moment experience.</i>”</p> <p>“<i>Non-goal orientation. Since the practice of mindfulness meditation is fundamentally one of awareness in each moment, the appropriate attitude to cultivate is one of non-striving.</i>”</p>	<p>Compassion</p> <p>MBSR</p> <p>Mindfulness-based</p>	<p>Jazaieri 2014, p. 26</p> <p>Kabat-Zinn 1982, p. 37</p> <p>Brewer 2011, p. 74</p>

Table 2 (continued)

Category/sub-category	Text excerpt	Type of program	Study (first author, year, pg. no.)
Toward object	“The overarching theme of momentary awareness and <i>acceptance of cravings and affect...</i> was introduced and reinforced in complementary ways throughout the training”	Mindfulness-based	Courbasson 2011, p. 22
	“In mindfulness practice, participants were <i>encouraged to adopt a non-judgmental and non-striving stance.</i> ”	Mantra (TM)	Kam Tim 2001, p. 423
	“Students are given an appropriate mantra and taught how to use it properly, i.e., to use it mentally <i>without effort.</i> ”	Mindfulness-based	Singh 2014, p. 159
Toward distractions from object	“Now focus on your mind. Observe your thoughts arising, lingering, and departing one after another... <i>Do not try to stop the thoughts.</i> Just observe the play of the thoughts in your mind.”	Mindfulness-based	Singh 2014, p. 159
	“Participants are guided to become aware of physical sensations especially those associated with the process of breathing and to observe them <i>without the intention of altering them.</i> ”	Other	Feldman 2010, p. 1005
	“They were instructed that <i>if they noticed that their mind had wandered</i> during the meditation, they should notice where their attention had gone and then <i>gently return their attention to the breath or body, without judging themselves.</i> ”	Loving-kindness	Crane 2010, p. 210
	“Implementation involves... (1) mentally repeating the word and (2) <i>passively disregarding any other thoughts that intrude</i> ”	Mantra	Bormann 2006, p. 219
	“Participants are asked to notice <i>in an accepting, non-judgmental manner when their minds wander</i> to something other than the exercise and to gently return focus to the sensations of breathing when this occurs.”	Other	Feldman 2010, p. 1005
	“Each time a thought, emotion, or body sensation <i>distracted from attention to the breath, participants were to nonjudgmentally (e.g., without criticizing themselves as being bad meditators) acknowledge the distraction</i> and to return their attention to the breath.”	Vipassana	Ostafin 2006, p. 193

See [Supplemental File](#) for a complete list of studies in the content analysis

movement-based practices (e.g., Qigong, Tai Chi, mindful walking). *Delivery* (of meditation-based practices) consisted of (a) guided vs. self-directed, (b) sequence or progression, (c) materials, and/or (d) customization to participant needs. *Practice aims* varied, but primarily related to the cultivation of a specific mental, emotional, or physical state (e.g., mental silence, thoughtless awareness, positive emotions, hypometabolic state), an attitude (e.g., kindness, acceptance, good will, forgiveness, compassion), insight (into the beliefs taught), awareness, or concentration.

For attention- or observation-based practices, the *object* (i.e., localization of attention) was found to be specific (e.g., mantra, breath, body [or certain parts]), non-specific (e.g., “present moment”, “all facets of experience”, “awareness itself”), or changing (e.g., body scanning). This theme combines the original sub-codes, *degree of localization* and *fixed vs changing*. Practices involving *direction of mental contents* consisted of phrases, visualization, wishing, and reflection (on a specific topic). Phrases, although often repeated similarly to a mantra, differ in the focus on their conceptual meaning, as well as being sequential in many practices. *Attitude*, in addition to being a practice aim, may be a general meditation practice feature (e.g., curiosity, openness, acceptance, slowing

down, non-striving), related to the object of attention (e.g., non-manipulation, effortlessness), or related to distractions from attending to the object (e.g., non-judgment, non-engagement). *Posture* (i.e., body or eye position) was also confirmed as a sub-feature of meditation practices. *Complementary activities* fit into six categories: (a) lecture or didactic presentations, (b) group discussion or Q&A, (c) personal instruction, (d) physical activity, (e) diary or journaling, and (f) readings. In addition, a common aim of many of these activities was *learning how to apply the method in daily life*.

Beliefs was re-termed *philosophy* to be more inclusive and consisted of (a) etiological, (b) phenomenological, (c) axiological, (d) ontological or relational, and (e) ethical or moral positions or perspectives. Phenomenological, axiological, and ontological/relational positions commonly related to thoughts (e.g., “thoughts and feelings are transient” [Butler et al. 2008, p. 811]; “Treat all thoughts as equal in value” [Kabat-Zinn 1982, p. 36]; “They were taught that they were not their thoughts” [Singh et al. 2014, p. 158]). Related axiological positions were valuing experience over knowledge, and the present moment over past/future conceptualization (e.g., “Emphasis was placed on... learning to live in the present moment, and letting go of worries about

Table 3 Clarifying and expanding framework components: Examples from studies

Category/sub-category	Text excerpt	Type of program	Study (first author, year, pg. no.)
Delivery			
Guided vs. self-directed	“Participants were asked to meditate at least three times per week using <i>audio recordings of guided meditations</i> ”	Compassion	Dodds 2015, p. 3601
	“Homework included daily meditation, <i>either on tape or self-guided</i> , and mindful-eating exercises.”	Mindfulness-based	Kristeller 1999, p. 361
Sequence/progression	“subjects were guided through an RR <i>sequence</i> , including diaphragmatic breathing, body scan, mantra repetition, and mindfulness meditation”	Mantra	Bhasin 2013, p. 2
	“CCT begins with stabilizing focused mental attention and <i>progressing through a sequence</i> of focused loving-kindness and compassion practices for oneself and others.”	Compassion	Jazaieri 2016, p. 39
Materials	“Intervention sessions were supplemented with <i>written materials and audiotapes</i> .”	Loving-kindness	Carson 2005, p. 290
Customization	“Asana techniques were <i>modified to accommodate the level of performance of the subjects</i> with COPD.”	Other	Fulambarker 2012
Object/localization of attention			
Specific object			
Mantra (silent)	“One-pointed attention is defined as focused concentration <i>on the mantram in the mind</i> ”	Mantra	Bormann 2006, p. 219
Mantra (chanted)	“The participant <i>chanted the mantra</i> ... essential instruction was that one attempts to be fully attentive to the chanting.”	Mantra	Wolf 2003, p. 34
Breathing	“In the guided breathing meditation, participants were invited to focus their attention on <i>the sensations of their breathing</i> ”	Loving-kindness	Crane 2010, p. 210
Body part	“This was followed by silent meditation by concentrating over <i>the region in between the eyebrows</i> .”	Other	Rajesh 2006, p. 368
	“They were instructed to breathe normally and observe <i>the movements of the abdomen</i> with each inhalation and exhalation.”	Other	Tavee 2011, p. 168
Non-specific object			
Present moment	“When you notice that the mind has drifted into thought, revery, and so forth, bring it back to awareness of <i>the present moment</i> , to the observation of what is dominant in that moment.”	MBSR	Kabat-Zinn 1982, p. 36
All experience	“Open-monitoring meditation, in which one learns to practice “bare attention” with regard to moment-to-moment awareness of <i>all facets of experience</i> without becoming emotionally reactive.”	Mindfulness-based	Roeser 2013, p. 790
Awareness	“Main meditative techniques are taught... awareness of awareness (in which <i>awareness itself becomes the focus of meditation</i> , without a specific object, so that one is simply aware of being aware).”	Other	Desbordes 2012, p. 4
Changing localization			
Body scan	“Sweeping: a <i>gradual sweeping through the body from feet to head</i> with the attentional faculty, focusing on proprioception, and with periodic suggestions of breath awareness and relaxation.”	MBSR	Kabat-Zinn 1982, p. 36
	“Both groups then started with a progressive <i>body scan</i> . Beginning with their feet, participants slowly <i>brought their awareness up through their body</i> , noting and releasing any tension.”	Other	May 2012, p. 250
Mental contents			
Phrases	“This meditation strategy involves using <i>silent mental phrases</i> to direct feelings of love and kindness toward a loved one, toward oneself, toward a neutral person, toward someone who has caused you harm, and last, toward all living beings.”	Loving-kindness	Carson 2005, p. 288
	“The second stage included <i>mental repetition of the word “peace,”</i> gently trying to keep away any other thoughts.”	Other	Curiati 2005, p. 466
Visualization	“Meditation practice is completed with deep breathing and the <i>visualization of light</i> .”	Kirtan kriya yoga	Black 2013, p. 351
	“ <i>Imagine your mind as the sky</i> , with clouds rolling by in the blue sky. When you observe a thought arising, <i>imagine the thought as a cloud passing by</i> .”	Mindfulness-based	Singh 2014, p. 159
Wishing	“For the forgiveness meditation... <i>forgiveness intentions</i> of approximately 4 min each focusing on ways in which one has harmed oneself, others, and the way others have harmed the listener.”	Loving-kindness	Williams 2005, p. 941
		Samatha	Jacobs 2011, p. 668

Table 3 (continued)

Category/sub-category	Text excerpt	Type of program	Study (first author, year, pg. no.)
Reflection	“Loving-kindness practices arouse a <i>heartfelt wish that self and others may experience happiness</i> and its true causes... Compassion practices arouse a <i>heartfelt wish that self and others may be free from suffering</i> and its true causes.”		
	“Participants were guided through an exercise in which they were asked to <i>focus on a close relationship</i> in their life, and <i>bring awareness to ways they tend to communicate</i> in this relationship... They were asked to <i>contemplate</i> the notion that their peers in the room, like themselves, all have had happiness, sorrows, failures...”	Mindfulness-based	Bowen 2012, p. 10
	“Kindly awareness: Firstly spending time becoming aware of the unpleasant and the pleasant aspects of experience in the present moment. Then, broadening to include other people and developing empathy by <i>reflecting on what is shared by all</i> ”	Mindfulness-based	Brown 2013, p. 234
Complementary activities			
Lecture/didactic presentation	“Each workshop session included... 20 min for a <i>didactic presentation</i> about features of the meditation and how to integrate concepts from the workshop into one’s daily life.”	Loving-kindness	Fredrickson 2008, p. 1049
	“Preparatory <i>lecture</i> on the mechanics of the technique, its relation to other techniques, its background, and how it is learned”	Mantra (TM)	Kam Tim 2001, p. 423
Group discussion/Q&A	“The course includes brief lectures on related topics, <i>group discussion</i> , and small group exercises”	Compassion	Jazaieri 2016, p. 39
	“The second session was devoted mostly to <i>questions and answers</i> regarding Ss’ practice during the week.”	Mantra	Lehrer 1983, p. 654
Personal instruction	“Step 4 - <i>personal instruction</i> in the TM technique by a qualified teacher that takes approximately 2 h.”	Mantra (TM)	Kam Tim 2001, p. 423
	“Participants also <i>met individually</i> with Alan Wallace on a weekly basis for <i>clarification or guidance</i> .”	Samatha	Jacobs 2011, p. 669
Physical activity	“The second hour of the group included the teaching of specific coping skills, <i>physical activities</i> , and mindfulness techniques.”	Mindfulness-based	Courbasson 2011, p. 22
	“The first two days they practiced SK&P which includes <i>gentle stretches (yoga postures)</i> ”	Sudarshan kriya yoga	Qu 2013, p. 2
Diary/journal	“Participants had to keep a weeklong “ <i>self-compassion journal</i> ” that contained instructions on how to reprocess difficult experiences with a sense of kindness, common humanity, and mindfulness.”	Compassion	Smeets 2014, p. 799
	“[Participants] are invited to keep a mindful emotion <i>diary</i> for one week, in which they document their emotions, “emotional triggers,” and ways of coping”	Mindfulness-based	Roeser 2013, p. 790
Readings	“Participants were given The Mantram Hand-book...with <i>weekly reading</i> , a course manual with exercises, and a list of recommended mantrams representing various spiritual traditions.”	Mantra	Bormann 2006, p. 363
	“Two <i>texts were used as a source of assigned readings</i> and recommended meditation passages”	Other	Oman 2010, p. 135
Aim of complementary activities			
Learning to apply method in daily life	“Homework assignments encouraged the patients to <i>bring mindfulness to stressful situations in their daily lives</i> .”	MBSR	Kabat-Zinn 1982, p. 37
	“Each workshop session included... 20 min for a didactic presentation about features of the meditation and how to <i>integrate concepts from the workshop into one’s daily life</i> .”	Loving-kindness	Fredrickson 2008, p. 1049
	“A considerable amount of time was spent <i>explaining the potential applications of these practices in everyday life</i> .”	Other	Desbordes 2012, p. 5
Philosophy			
Etiological	“participants learned to be mindful of <i>cultural pressures that promote problematic eating and substance use</i> such as striving for an unrealistic body shape.”	Mindfulness-based	Courbasson 2011, p. 22
	“ <i>Fantasies about smoking can lead to feelings of anger</i> about being deprived of cigarettes. <i>Engaging in these thoughts can easily escalate craving</i> such that it becomes more difficult to enact a purposeful, adaptive response.”	Mindfulness-based	Vidrine 2016, p. 828
Phenomenological		MBCT	Teasdale 2000, p. 618

Table 3 (continued)

Category/sub-category	Text excerpt	Type of program	Study (first author, year, pg. no.)
Axiological	“Participants are helped to... develop a <i>decentered perspective on thoughts and feelings, in which these are viewed as passing events in the mind</i> ”	Other	Wallmark 2013, p. 227
	“Lecture: introducing <i>the relative nature and impermanence of phenomena, noticing and letting go of judgments/opinions, likes/dislikes</i> ”	Other	Butler 2008, p. 811
	“This approach [surrender] encourages practitioners to recognize that <i>thoughts and feelings are transient</i> ”	Vipassana	Bowen 2006, p. 343
	“Participants are taught to observe <i>experiences (e.g., craving) as impermanent events</i> not necessarily requiring action (e.g., substance use), allowing the meditator to “let go” of compulsive thought patterns.”	Mantra	Sumter 2009, p. 50
	“ <i>Emphasis was placed on enhancing an inner calm, learning to live in the present moment, and letting go of worries about the future or regret about the past.</i> ”	MBSR	Kabat-Zinn 1982, p. 36
	“Avoid becoming involved in the content of individual thoughts. Observe them as impermanent mind events and not necessarily accurate. <i>Treat all thoughts as equal in value</i> and neither pursue them nor reject them.”	Mindfulness-based	Dalen 2010, p. 261
	“ <i>Emphasis was repeatedly placed on direct experiences during the meditation rather than fund of knowledge.</i> ”	Other	Rungreangkulkij 2011, p. 199
Ontological/relational	“This phase <i>emphasized teaching the members not to dwell on past events but rather to focus on the present</i> and to be self-aware of their ruminative thought patterns, as this awareness is a catalyst for mindfulness meditation.”	MBCT	Teasdale 2000, p. 618
	“It is designed to teach patients... to become more aware of, and to <i>relate differently to, their thoughts, feelings, and bodily sensations (e.g. relating to thoughts and feelings as passing events in the mind rather than identifying with them</i> or treating them as necessarily accurate readouts on reality).”	Mindfulness-based	Singh 2014, p. 158
	“They were taught that <i>they were not their thoughts</i> and that desire to smoke was merely a thought, so they could observe their “desire” thoughts and let them go.”	Other	Rosenberg 2015, p. 778
Ethical/moral	“These FI practices are rooted in empathy, which requires the cognitive basis of <i>recognizing others as persons basically the same as oneself</i> , who also wish for happiness and for freedom from suffering.”	Vipassana	Perelman 2012, p. 183
	“VM retreats rigorously follow several major precepts; all VM students must agree to <i>refrain from killing, stealing, sexual activity, speaking lies, and using intoxicants (including tobacco).</i> ”	Other	Rungreangkulkij 2011, p. 199
Etiological and ontological	“[Buddhist group therapy] The group leaders explained the <i>Universal Natural Laws (Suffering, Impermanence, and Selflessness)</i> and discussed “ <i>how suffering comes from the members’ cravings for things that are impermanent, and the members’ inability to accept things that have happened</i> ”.”	Vipassana	Ostafin 2006, p. 193
	“Participants also attended daily hour-long videotaped lectures on Buddhist principles (e.g., <i>the role of aversion and attachment in suffering; the nature of the impermanence of self.</i> ”		

See Supplemental File for a complete list of studies in the content analysis

the future or regret about the past” [Sumter et al. 2009, p. 50]; “Emphasis was repeatedly placed on direct experiences during the meditation rather than fund of knowledge” [Dalen et al. 2010, p. 261]).

Structuring the Framework and Reporting Checklist

The analysis of code prevalence and co-occurrences, and identification of themes in text excerpts, informed the initial construction of the Meditation-based Intervention Design (MInD) framework (see Fig. 2), which delineates intervention-related features reported in study publications and can inform the development of a reporting guideline. The MInD framework includes the following: (1) program aim, (2) program time frame

(with three themes), (3) meditation-based practices (incl. (3a) practice aims [with four themes]; (3b) practice time frames [with two themes]; (3c) delivery [with four themes]; (3d) directive actions [with four categories and nine themes]; (3e) attitude; (3f) posture), (4) complementary activities (incl. aims and seven themes), and (5) philosophy (with six themes). A preliminary version of a reporting checklist (see Table 4) was also developed to exemplify guidance for researchers, which is intended to supplement the CONSORT-SPI 2018 guideline for reporting overall study design features of social and psychological interventions, although a Delphi method study is necessary to finalize this checklist. The items of the checklist reflect the main features of the MInD framework, and the definitions of those items utilize the sub-features and themes.

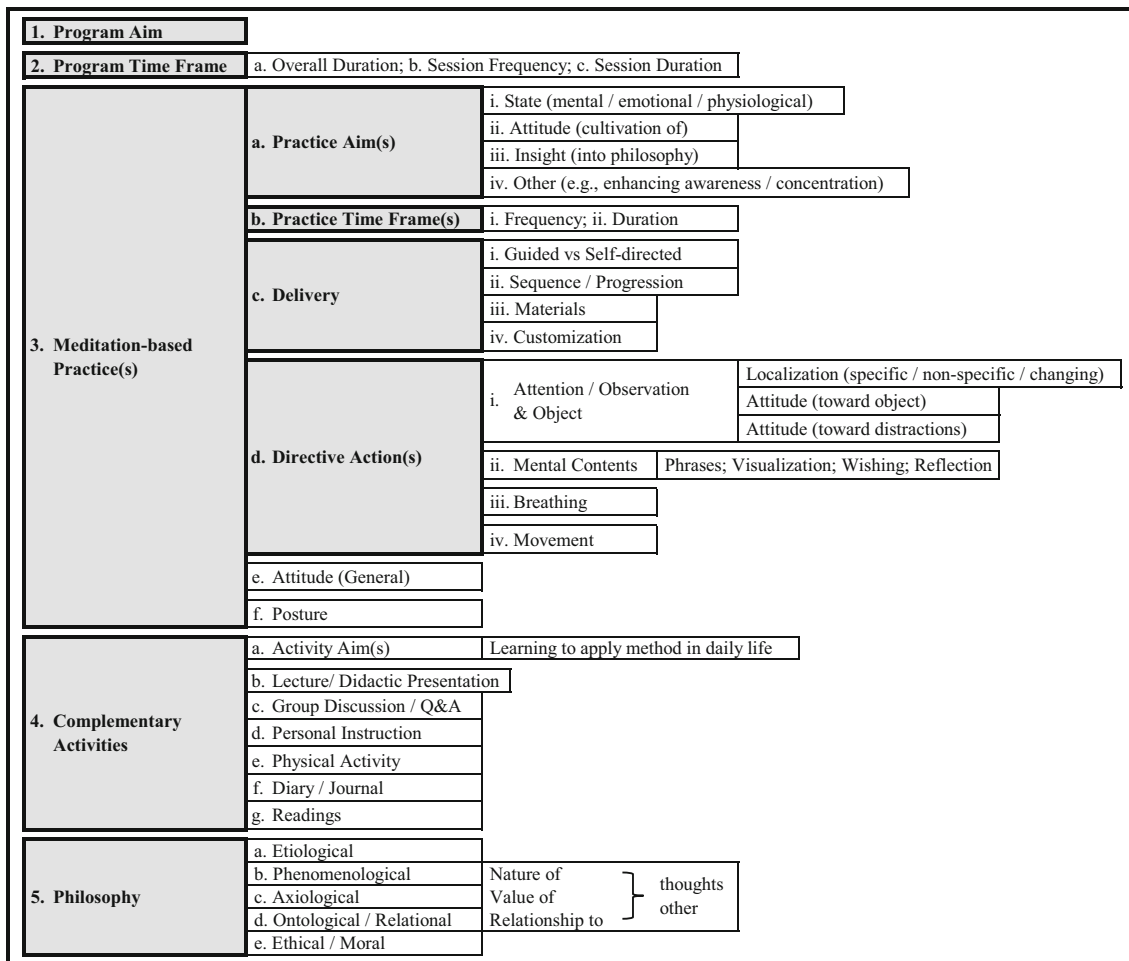


Fig. 2 Meditation-based Intervention Design (MInD) framework

Discussion

The primary aim of this study was to identify features of meditation-based interventions reported in study publications and clarify the extent of underreporting, as a foundational step toward systematically developing a guideline for reporting those features. The content analysis revealed significant variability and inconsistency in the features reported, suggesting that many studies to date have inadequately specified important features of their interventions and supporting the need for a reporting guideline. Five features, 11 sub-features, and 35 themes were identified and organized into a preliminary framework and reporting checklist. These features and themes reflect what researchers consider important to specify in publications, given that they were directly identified in the publications themselves and incorporate previous theoretical research. Therefore, the MInD framework is a robust resource for informing a Delphi method study to solidify items to include in a reporting guideline. The establishment of a reporting guideline for meditation- and mindfulness-based interventions would improve the quality of research in the field and promote more valid comparisons and generalizations.

Limitations and Future Research

The content analysis had a few notable strengths and limitations. The deductive or directive approach, which involved the use of previous research and theory to inform the development of initial codes, uncovered many features that proved meaningful across types of meditation programs. The consensus coding process, in which each study was coded and reviewed by a team of researchers, was also beneficial in ensuring a high degree of reliability, although it could not be measured. In addition, the large number of studies included allowed for a wide variety of meditation practices and programs to be represented. However, studies were not selected via a random or probabilistic sampling process, so the results cannot not be interpreted as fully representative of all meditation-based intervention study publications. This limitation applies to code prevalence data in particular, given that MBSR and MBCT, which comprise a large portion of meditation-based intervention studies, were each represented by only one study. Furthermore, the study search and selection strategy relied on a subset of available systematic reviews ($n = 18$), which may have restricted the range of types of meditation programs and practices included.

Table 4 Meditation-based Intervention Design (MInD) reporting checklist

1	Program aim	The goal or purpose of the program.
2	Program time frame	The (a) overall duration (i.e., number of weeks or months), (b) session frequency (i.e., times per week), and (c) session duration (i.e., hours per session).
3	Meditation-based practice(s)	Description of each practice or activity (in session and at home) that incorporates a meditation (i.e., mental training) technique, including:
3a	Practice aim(s)	(a) The state (mental, emotional, or physical), or other aim(s) (e.g., attitude; insight; concentration; awareness) intended to be cultivated.
3b	Practice time frame(s)	(b) The duration (minutes) and frequency (times per week).
3c	Delivery	(c) How the instructions are delivered (e.g., guided vs. self-directed; in a sequence or progression; materials used; customization to participant needs).
3d	Directive action(s)	(d) The direction, regulation, or control of (i) attention or observation (incl. The object(s)), (ii) mental contents, (iii) breathing, and/or (iv) movement.
3e	Other	(e) Any other key features (e.g., attitude(s); posture(s)).
4	Complementary activities	Description of (a) the topics of any didactic presentations (i.e., lectures) and/or group discussions, (b) any other activities performed (e.g., physical activity, journaling, readings), and (c) the aim or purpose of each.
5	Philosophy	The etiological, phenomenological, axiological, ontological/relational, and/or ethical/moral positions or perspectives explicitly taught or emphasized.

A related limitation was the absence of several meditation practices found in spiritual traditions, including Centering Prayer (Christianity), Muraqaba (Sufism), analytical meditation (Tibetan Buddhism), Dzogchen/Mahamudra (Tibetan Buddhism), Shikantaza (Zen Buddhism), and self-inquiry (Advaita Vedanta). While this may be partly a consequence of the limited study selection process, it also appears to reflect the field of meditation research to date, which has been limited in the range of practices under investigation (Dahl et al. 2015). Thus, the use of published intervention studies as the basis for a reporting guideline creates the risk that features specific to practices not yet studied would not be captured. This limitation supports the need for input from a wide range of meditation experts, including those from religious and spiritual traditions, as part of the Delphi process.

In addition to informing the development of a reporting guideline, the MInD framework has the potential to more broadly benefit scientific research. Specifically, it can aid in identifying variables of meditation practices and their contexts that are responsible for or influence treatment outcomes (i.e., mediators and moderators). Knowledge of these variables is critical to be able to maximize the effectiveness of interventions, customize them to specific populations, and determine their applicability in real-world settings (Kazdin 2007). Research on mediating variables to date has largely consisted of cognitive processes (e.g., reactivity, rumination) in MBSR and MBCT (Gu et al. 2015), the attitude of acceptance (Lindsay et al. 2018; Rahl et al. 2017), the degree of localization of attention (Ainsworth et al. 2013; Perelman et al. 2010), and specific meditation practices in mindfulness-based programs (Kropp and Sedlmeier 2019; Sauer-Zavala et al. 2013). The MInD framework suggests other potentially significant meditation techniques (i.e., directive actions), objects of attention, and attitudes to further expand this research.

As mentioned, contextual factors of meditation have received limited research attention, although the potential significance of such factors have been emphasized by many leading researchers (Dahl et al. 2015; Josipovic and Baars 2015; Vieten et al. 2018). The MInD framework highlights potentially meaningful contextual features that may be moderators of meditation practices, including program and practice time frames, means of delivery (e.g., guided vs. self-directed), complementary activities, and philosophies. Of these, only time frames of mindfulness-based programs were found to have received much study, in which meta-analyses have indicated contradictory, but typically weak moderating effects of treatment and home practice duration (Khoury et al. 2013; Khoury et al. 2015).

The philosophy that frames some meditation practices may be a particularly important contextual variable, given that meditation in spiritual traditions often reflects and reinforces specific philosophical positions (Dahl and Davidson 2019). For meditation-based interventions that have included explicit philosophies, perspectives on thoughts was a common theme that may be of particular significance, given that thoughts are prominently involved in most meditation techniques and experiences. Further, meta-awareness (i.e., clear awareness of mental processes), which is theorized to be an important aspect of mental health, has been linked to having a perspective of thought content as dis-identified or separate from one's self (Bernstein et al. 2015; Dahl et al. 2015). Similarly, "dysfunctional" metacognitive beliefs (e.g., thoughts as dangerous; need to control thoughts) have been associated with a range of mental disorders (Sun et al. 2017). Further research is needed to determine what specific philosophical positions, how they are delivered (e.g., language used), and what degree of emphasis are most appropriate and beneficial for different clinical settings and

populations. The philosophy categories of the MInD framework can help organize this research.

While the MInD framework provides suggestions of many potentially important mediator and moderator variables, the process by which it was developed limits it for this purpose. The framework reflects limitations in the range of meditation practices that have been studied and inconsistencies in the reporting of intervention features. In order to identify a more complete set of meditation practice and contextual features, other resources would have to be utilized, including meditation-based program manuals, source texts describing meditations in religious contexts, and meditation experts from research, academia, and various religious and spiritual traditions. Additionally, contextual variables beyond those that are features of interventions, such as the setting and participants' beliefs, motivations, and prior meditation experience, should not be overlooked.

More broadly, the effort to improve the reporting quality of meditation-based intervention research, and by extension illuminate critical differences and important features of those interventions, may contribute to advancing the public's understanding of meditation and mindfulness practices. The initial version of the MInD framework provides a foundation from which researchers may make connections within and across fields, bridge the gap between research and practice, and ultimately, advance the public's knowledge, in service of those who would benefit most from meditation in its manifold forms.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

Ethical Approval The manuscript does not contain clinical studies, participants, or patient data.

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