Introducing the eMCC™: A Validated Taxonomy to Advance Targeted Application of Mindfulness Skills

Ruth Q. Wolever, Joel A. Kahn, Jennifer Davis, Denise Shields & Poppy L. A. Schoenberg
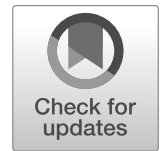
ONLINE FIRST

🐴 Springer

Springer

ORIGINAL PAPER

Introducing the eMCC™: A Validated Taxonomy to Advance Targeted Application of Mindfulness Skills

Ruth Q. Wolever [1,2] • Joel A. Kahn [2,3] • Jennifer Davis [2,4] • Denise Shields [2] • Poppy L. A. Schoenberg [1]

Abstract

Objective Describe the two-phase validation process for a taxonomy of skills learned through mindfulness practice.

Methods Phase I (development) utilized 11 subject matter experts (SMEs) over 5 months. Phase II (judgment) enrolled 60 international SMEs from 116 invited through snowball sampling. They were mostly white (80%) or Asian (15%) women (70%) with longstanding personal mindfulness practices ($M = 20$ years; $SD = 9.6$) and extensive mindfulness teaching experience ($M = 11$ years; $SD = 6.7$); 59% $\geq$ 50 years; 88% had graduate degrees. SMEs rated relevance and clarity to calculate Individual Content Validity Indices (I-CVIs) for each category per tier and average CVIs (ave-CVIs) for entire tiers. Participation rate was 52% and 42 SMEs rated secondary tiers.

Results I-CVIs ranged from 0.57 to 0.97, suggesting the removal of one category from the primary tier, leaving an ave-CVI for relevance of 0.92 (range 0.73–0.97). Clarity ratings for the primary tier (ave-CVI = 0.75; range of I-CVI = 0.52–0.88) necessitated exploration of the subcategories of Awareness (second tier; $N = 42$) to refine description (ave-CVI = 0.80 for clarity; range 0.64–0.93) while showing excellent content validity for both relevance and fit (ave-CVI = 0.95; range 0.88–1.0 for both).

Conclusions The eMindful Mindfulness Classification Construct™ (eMCC™) is a validated, atheoretical taxonomy of skills learned through mindfulness practice, created to support development of more precise mindfulness-based interventions (MBIs) that target skill deficits associated with clinical conditions. Further research will validate subcategories, associate specific practices per category, and assess MBIs designed to target specific skills from the eMCC™.

Keywords Mindfulness · Mindfulness skills · Taxonomy · eMCC™ · Content validity · Validation study

Mindfulness is a multi-dimensional construct, relatively new in treating psychological disorders, with rapidly accumulating efficacy data (Shapero et al. 2018). Nonetheless,

✉ Ruth Q. Wolever
ruth.wolever@vumc.org

[1] Department of Physical Medicine & Rehabilitation, Osher Center for Integrative Medicine at Vanderbilt, Vanderbilt University Medical Center, 3401 West End Ave, Suite 380:7, Nashville, TN 37203, USA

[2] eMindful Inc., 11315 Corporate Blvd., Suite 210, Orlando, FL 32817, USA

[3] 940 W Canton Ave B338, Winter Park, FL 32789, USA

[4] Duke-National University of Singapore Medical School, 8 College Rd., Singapore 169857, Singapore

most clinical trials do not clarify how mindfulness-based interventions (MBIs) lead to symptom resolution as mechanism research is in its infancy. At this stage, MBIs focus on modifying processes which are transdiagnostic and need better definition (Shapero et al. 2018). The Precision Medicine Model aims to tailor well-defined treatments to subpopulations, allowing more "precision" in care using data, standardization, and taxonomy (Ginsburg and Phillips 2018; Konig et al. 2017). MBIs have yet to be codified to improve their clinical precision.

Despite rapid growth of MBIs in psychiatric outcomes (Shapero et al. 2018) and neurophysiologic research (Marchand 2014; Lomas et al. 2015), the language used for describing MBIs is inconsistent and imprecise (Dahl et al. 2016; Lutz et al. 2008). The multi-leveled structure of mindfulness makes it suitable to code for diagnostic and treatment mechanisms. A validated taxonomy of skills that can be learned from mindfulness practice will allow more precision to address specific skill-deficits in defined clinical conditions.

A targeted, skills-based approach would allow training in specific skills, ascertained from the mindfulness taxonomy, to target particular clinical conditions. To illustrate, it is well-established that unipolar depression is associated with a particular frame of reference in which individuals interpret negative events as global, permanent, and related to self (Yapko 2009, pp. 31–39). For example, someone with depressed mood may interpret a poor job review as, "I'm such a failure at work." The perception of the negative event is global, enduring, and self-referential. Rapidly emerging evidence demonstrates that targeted mindfulness practices can be used to decondition such ingrained cognitive sets and shift attentional biases (Dahl et al. 2015). Practices can train individuals to perceive differently, recognizing thoughts and emotions are "objects" of the mind that are temporary, transient, and changeable. Similarly, mindfulness practices can train one to discriminate "data" from interpretation of data (i.e., thoughts, beliefs, feelings, etc.) with a kind and accepting stance. Such training in more accurate primary perception is also needed in anxiety, where patients overestimate risks and underestimate potential benefits, facilitating avoidant tendencies (Yapko 2012, pp. 427–428; Wermes et al. 2018). Once potential treatment targets are defined, empirical evaluation of training sequences is possible.

Presently, MBIs provide a blanketed, one-size-fits-all approach. Mindfulness is generally perceived as attention training, another indiscriminate term that needs finer granularity. Moving from a generalized "transdiagnostic" approach to a more precise, targeted-skills approach will allow for improved outcomes in clinical conditions.

While numerous mechanistic models (Shapiro et al. 2006; Hölzel et al. 2011; Grabovac et al. 2011) attempt to explain how mindfulness helps individuals, there is no overarching framework that links these models (Lutz et al. 2015). Theoretical models in this emerging field have been limited to fairly broad strokes, typically defined in non-causal applications. The assessment literature has also attempted to outline multiple constructs of mindfulness to inform measurement tools. These measurement models vary depending on the developers' definition of mindfulness, and its theoretical roots (Quaglia et al. 2016). At least eight self-report measures have been developed and for the most part, the individual measures have demonstrated strong internal consistency (Cronbach's alpha ≥ 0.70) for unidimensional scales or subscales (Baer et al. 2019). However, there is a great deal of overlap related to their development processes (Quaglia et al. 2016). Quantitative analyses have shown that the assessments measuring multiple mindfulness constructs have little homogeneity or focus too narrowly on attention (Bergomi et al. 2013).

Taken together, the assessment literature has identified the following constructs proposed to be important in measuring mindfulness: (1) observing experience; (2) acting with awareness; (3) non-judgment and acceptance of experience; (4) self-acceptance; (5) non-avoidance/openness to experience; (6) non-reactivity to experience; (7) non-identification with one's experience; (8) insight; and (9) labeling/describing one's experience (Bergomi et al. 2013). These nine constructs have varying degrees of specificity, with some perhaps representing a subdomain of a broader concept otherwise not defined. Furthermore, since theoretical constructs of mindfulness have informed the development of the assessments, there is a top-down risk that any margin of error in the originating theoretical model of mindfulness becomes amplified into its classification scheme. Even drawing upon the original "model" from Buddhist literature to describe mindfulness may introduce a margin of error if drawn upon purely intellectually as such can leave out the subtle experiential domains of mindfulness grounded in everyday living. In this vein, many in the field have noted the lack of unification among definitions and operationalizations (Bergomi et al. 2013; Chiesa 2013; Quaglia et al. 2016). Despite this lack of consensus in the central construct, new models and assessments of mindfulness often emanate from their predecessors. For example, the Five Facet Mindfulness Questionnaire was derived from a factor analysis of five published measures of dispositional mindfulness (Quaglia et al. 2016). This common, iterative approach in top-down science can be helpful for certain pursuits, but is less useful to develop a comprehensive model with specificity and breadth.

In sum, the field is limited by a lack of clarity on what exactly is learned through mindfulness practice. In order to target the development of specific skills, a taxonomy is needed as a starting point to build specificity of the concept as well as breadth. No such validated taxonomy exists for mindfulness. This paper presents the first step in the development of a skills-based template: an examination and breakdown of the multi-faceted architecture of skills associated with mindfulness practice. Using data from highly experienced subject matter experts (SMEs), the intent of this paper is to describe the "bottom up," atheoretical development and validation of a pragmatic categorization of the skills and attitudes learned through practicing mindfulness meditation: the eMindful Mindfulness Classification Construct™ (eMCC™). Creating a validated taxonomy is vital for consistent communication regarding mindfulness training and will allow for more precise application of mindfulness practices to build specific skills lacking in particular conditions.

Methods

Participants

SME characteristics (Table 1) are shown for the taxonomy development and judgment phases, with the latter obtaining a participation rate of 52%. This non-probability, targeted SME

Table 1 Characteristics of subject matter expert samples

Sample (N)	SMEs who created the taxonomy (N=11)	SMEs who validated Major Categories (N=60)	SMEs who Validated All Subcategories as well (N=42)
Years experience of personal mindfulness practice: Mean (SD)	18.5 (11.86)	20.4 (9.64)	20.3 (9.56)
Years experience teaching mindfulness: Mean (SD)	Mean: 9 SD: 9.15	Mean: 10.9 SD: 6.58	Mean: 11.6 SD: 6.71
Estimated hours of mindfulness training delivered annually: Percent (frequency)	<61 hrs: 45.5% (5) 61-130 hrs: 9.0% (1) >130 hrs: 45.5% (5)	<61 hrs: 36.7% (22) 61-130 hrs: 30.0% (18) >130 hrs: 33.3% (20)	<61 hrs: 38.1% (16) 61-130 hrs: 31.0% (13) >130 hrs: 31.0% (13)
Number of mindfulness teachers: Percent (frequency)**	72.7% (8)	100% (60)	100% (42)
Number of mindfulness researchers: Percent (frequency)**	36% (4)	43% (26)	43% (18)
Age: Percent (frequency)	21-39: 18.2% (2) 40 - 60: 54.5% (6) 61 - 80: 27.3% (3)	21-39: 11.7% (7) 40 - 60: 50.0% (30) 61 - 80: 38.3% (23)	21-39: 11.9% (5) 40 - 60: 47.6% (20) 61 - 80: 40.5% (17)
Sex: Percent (frequency)	Female: 45.5% (5) Male: 36.4% (4) Prefer Not to Say 18.8% (2)	Female: 70% (42) Male: 28% (17) Prefer Not to Say 2% (1)	Female: 69% (29) Male: 29% (12) Prefer Not to Say 2% (1)
Highest level of education completed: Percent (frequency)	Graduate school: 73% (8) College 18% (2) 1 year of college 9% (1)	Finished Grad School 88%(53) Some Grad school 5%(3) College grad 7%(4)	Finished Grad School 88%(37) Some Grad school 5%(2) College grad 7%(3)
Racial minority: Percent (frequency)	9% (1)	20% (12)	24% (10)
Hispanic: Percent (frequency)	0% (0)	5% (3)	7% (3)
Geographic locales: Locale (percent, frequency)	7 States (91%, 10) Europe (0%, 0) Asia (9%, 1) Canada/Mexico (0%, 0)	17 States (73%, 44) Europe (7%, 4) Asia (17%, 10) Canada/Mexico (3%, 2)	17 States (73%, 31) Europe (5%, 2) Asia (17%, 7) Canada/Mexico (5%, 2)

sampling was calculated using the American Association for Public Opinion Research guidelines (American Association for Public Opinion Research 2016). Of the 116 unique SMEs invited, 60 completed the entire survey; 42 partially completed the survey, providing essential ratings for the main tier categories only; 5 answered only demographic questions and gave no ratings; 7 refused (i.e., opened the survey but did not begin it); and 44 did not respond. The international validation sample ($N = 60$) of mindfulness teachers was mostly female (70%), white (80%) or Asian (15%), and non-Hispanic (95%), with 59% $\geq$ 50 years of age, and 88% holding graduate degrees. Mean mindfulness teaching experience was 11 years (SD = 6.6); personal meditation practice averaged 21 years (SD = 9.5); and 43% also characterized themselves as mindfulness researchers. Forty-two of the 60 SMEs completed the entire survey, also rating the more granular subcategories.
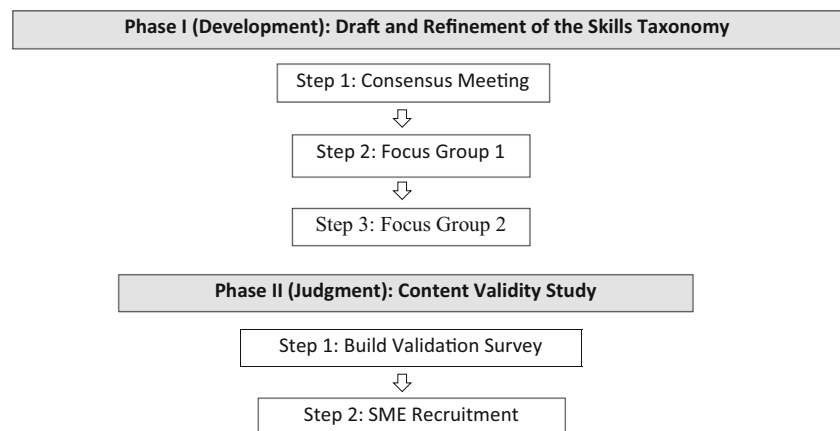
Procedure

A well-established, two-stage process was used to create a mindfulness taxonomy with strong content validity:

development of the classification and judgment by SMEs (DeVon et al. 2007; Lynn 1986; Zamanzadeh et al. 2014) (Fig. 1).

Phase I (Development): Draft and Refinement of the Mindfulness Skills Classification

Step 1 Five SMEs met biweekly over 3 months to draft, iteratively discuss, refine, and organize a list of the skills learned through mindfulness practice. To ensure multiple perspectives, SMEs included two intermediate meditators and three whose mindfulness practice experience averaged 29.7 years and teaching experience averaged 19.0 years, one of whom is also a mindfulness researcher. Full consensus of all five was required at each step. The list aimed to improve academic understanding of mindfulness, independent of meditation lineages, to better target skill development. After creating the list, the SMEs applied the categorization to three recorded mindfulness practice sessions to identify which skills were targeted during a given practice. SMEs processed their ratings together and further refined the master list.

Fig. 1 Two-phase process for development and validation of the taxonomy

Phase I (Development): Draft and Refinement of the Skills Taxonomy

Step 1: Consensus Meeting
⇩
Step 2: Focus Group 1
⇩
Step 3: Focus Group 2

Phase II (Judgment): Content Validity Study

Step 1: Build Validation Survey
⇩
Step 2: SME Recruitment

Step 2 The categorization was then discussed in sequential focus groups, held 1 month apart. The first was through video conference with two new SMEs (one mindfulness teacher and one researcher) and the second was in-person with four new SMEs (two experienced teachers and two beginning meditators to ensure lay perspectives) (Zamanzadeh et al. 2014). In each group, SMEs were asked to comment on the accuracy of the categorization, potential misclassifications, skill definitions, and anything missing. The taxonomy was revised after each group and the final version approved by all five original SMEs.

Phase II (Judgment): Validation

Step 1: Survey Development Using traditional procedures (DeVon et al. 2007; Lynn 1986; Zamanzadeh et al. 2014; Polit et al. 2007), questions assessed relevance and clarity for 8 main categories (see Table 2). SMEs were also invited to comment.

Following the main categories, the same two questions were used for six sets of subcategories. Also using a 4-point ordinal scale ("1 = not at all" to "4 = extremely") a third question pertinent to subcategories assessed fit: "How well does this skill fit into the assigned category called (name)?" The survey was formatted as an online questionnaire thru SurveyMonkey™.

Step 2: SME Recruitment SMEs were targeted based on expertise in teaching mindfulness. Given their unique qualifications, a snowball sampling procedure was utilized. The research team identified an initial base of participants and asked them to refer others "outside of the eMindful community" to "collect wisdom from a broad range of teachers." Potential SMEs received an email inviting participation and allowing survey access. All invitees were asked to recommend additional mindfulness teachers with at least 3 years of experience, whose skills they were confident in, and who might be willing to participate. The invitation noted the opportunity to

contribute to a deeper understanding of the skills trained in mindfulness practice and indicated that the survey would take 30–40 min.

The first phase of recruitment included invitations to 35 mindfulness teachers contracting with the mindfulness training corporation that supported the study. These teachers met mindfulness teacher training and certification standards, including the six domains of competence outlined in the Mindfulness-Based Intervention Teaching Assessment Criteria (MBI-TAC) (Crane and Kuyken 2019). They provided contacts of similarly experienced mindfulness professionals, who then provided additional contacts. Another 76 individuals were invited through email in the next phase of recruitment, for a total of 116 unique invitations. SurveyMonkey™ sent non-completers an automated reminder 4 days after the initial invitation. Additional email was sent to all non-completers before the survey closed. If recipients were not willing to complete the full survey (all subcategories), they were asked to rate only the primary eight categories. The survey ran December 4, 2018, thru February 20, 2019. The first 50 completers received a $20 gift card.

Measures

Relevance For the primary and secondary categories, SMEs were asked, "To what degree does the following category relate to practicing mindfulness?" This assessment of relevance to the overall construct of mindfulness practice used a 4-point ordinal scale (1 = not at all related; 2 = somewhat related; 3 = very much related; 4 = extremely related).

Description Clarity For the primary and secondary categories, SMEs were asked, "To what degree is the following category well described?" They again responded using an ordinal scale from "1 = not at all" to "4 = extremely well-described."

Category Fit Also using a 4-point ordinal scale ("1 = not at all" to "4 = extremely"), a third question pertinent only to

Table 2 Percentages and frequencies of SME main category ratings ($N = 60$)

Percentages & Frequencies of SME Main Category Ratings	How related to practicing mindfulness?				How well described?			
Categories and their descriptions	Not at all or Somewhat		Very Much or Extremely		Not at all or Somewhat		Very Much or Extremely	
Awareness: The ability to notice various components of experience, choiceless awareness, and meta-awareness (awareness of awareness)	3%	2	97%	58	38%	23	62%	37
Focus: The ability to hone in on something, sustain attention to it, or release attention to it as desired.	5%	3	95%	57	12%	7	88%	53
Cognitive Flexibility: The ability to intentionally shift attention from one target to another, as well as expand, narrow or change one's perspective	5%	3	95%	57	20%	12	80%	48
Curious Observation: The ability to watch one's experience from a helpful distance without judgment, without reactivity and with discernment of what is habitual versus intentional	3%	2	97%	58	23%	14	77%	46
Turning Toward: Willingness to explore, cultivate curiosity, tolerate distress in order to be able to learn something or work on something; Particularly, regarding difficult emotions, unpleasant experiences or pain; courage to lean into something	3%	2	97%	58	17%	10	83%	50
Attitudes of Mindfulness: The willingness and ability to cultivate various attitudes or states including beginner's mind, patience, acceptance, non-striving, kindness, compassion, connectedness, and gratitude	7%	4	93%	56	17%	10	83%	50
Accessing Wise Mind: The ability to simultaneously integrate sensory information from the perceptual information processing system ("bottom up") and information, intentions and goals using the conceptual/cognitive information processing systems ("top down") to access deeper knowing, wisdom, values, and intuition	27%	16	73%	44	48%	29	52%	31
Relaxation: The ability to develop mental calm and activate the relaxation response	43%	26	57%	34	33%	20	67%	40

subcategories assessed fit: "How well does this skill fit into the assigned category called (name)?"

Data Analyses De-identified SME data was provided to the senior author. Descriptive statistics characterize the SMEs and the validation findings. Content Validity Indices (CVIs) were calculated at the Item Level for individual categories in each tier, and average CVI (ave-CVI) was calculated for the major categories taken together. Per tradition, excellent content validity for relevance was defined for individual categories as I-CVI $\geq$ 0.79, a need for revision if I-CVI was 0.70 to 0.79, and a need to eliminate the category when I-CVI < 0.70 (Zamanzadeh et al. 2014). For the overall taxonomy, excellent content validity was defined as ave-CVI $\geq$ 0.80 (Lynn 1986; Polit et al. 2007; Zamanzadeh et al. 2014), a rigorous cutoff given the target of 50 SMEs (Lynn 1986; Polit and Beck 2006). Inferential statistics (IBM SPSS Statistics version 24)

assessed potential interactions between length of teaching and practicing mindfulness, on the one hand, and validity ratings on the other.

Results

Organization of the Classification

The earliest skills list included 30 terms, which the 5 original SMEs created and organized into two tiers: primary categories, and secondary or subcategories. In addition, SMEs separated skills learned from attitudinal components trained in mindfulness practice. This paper presents the major categories and one set of subcategories, needed to clarify descriptors for a main category.

Relevance of Main Categories to Mindfulness Practice

Per Table 2, at least 93% of the SMEs rated six of the main categories as "very much" (3) or "extremely" (4) related to practicing mindfulness, with Item-Level CVIs (I-CVI) for relevance ranging from 0.93 to 0.97. Accessing Wise Mind had an I-CVI of 0.73 and Relaxation received an I-CVI of 0.57. The latter two categories also elicited more disagreement regarding relevance. Given the low I-CVI associated with Relaxation, that category was dropped, and ave-CVI was calculated at 0.92 for the eMCC™.

Description Quality of Main Categories

More than 75% of the SMEs rated five of the eight categories as "very much" or "extremely" well described. Awareness and Relaxation received favorable ratings by 62% and 67% respectively, and Accessing Wise Mind received favorable ratings by 52%. See SME comments online (eTable 3).

Relationship of Years Teaching/Practicing Mindfulness to Main Category Ratings

Per Table 3, Pearson chi-square tests of independence revealed interactions between relevance ratings and number of years

teaching mindfulness in five categories, and interactions between relevance ratings and years of personal practice in three categories.

Per Table 4, Pearson chi-square tests of independence uncovered interactions between clarity ratings and years of teaching mindfulness for three categories. No interactions were found between clarity ratings and length of personal mindfulness practice.

Relevance of Awareness Subcategories to Mindfulness Practice

Per Table 5, ave-CVI for relevance for all Awareness subcategories combined was 0.95 with individual subcategory I-CVIs ranging from 0.88 to 1.00. Similarly, ave-CVI for fit for all Awareness subcategories was 0.95 (range 0.88–1.0 for individual subcategories).

Description Quality for Awareness Subcategories

Five of the seven Awareness subcategories were rated as well described, with the two remaining subcategories falling short: Non-Directed Awareness (64%) and Meta-Awareness (71%) (see eTable 7 online for SME comments).

Table 3 Relationship between years of teaching/practicing mindfulness and how related the main categories are to mindfulness practice

Skill Component	Not at all	Somewhat	Very much	Extremely	Chi²
Years Teaching Mindfulness					
Awareness	0.0%	3.3%	16.7%	80.0%	p=.016
Focus	0.0%	5.0%	41.7%	53.3%	p=.017
Cognitive Flexibility	0.0%	5.0%	56.7%	38.3%	p=.700
Curious Observation	0.0%	3.3%	35.0%	61.7%	p=.006
Turning Toward	1.7%	1.7%	35.0%	61.7%	p<.0001
Attitudes of Mindfulness	0.0%	6.7%	36.7%	56.7%	p=.394
Accessing Wise Mind	3.3%	23.3%	40.0%	33.3%	p=.012
Relaxation	3.3%	40.0%	31.7%	25.0%	p=.484
Years Personal Practice					
Awareness	0.0%	3.3%	16.7%	80.0%	p=.614
Focus	0.0%	5.0%	41.7%	53.3%	p=.179
Cognitive Flexibility	0.0%	5.0%	56.7%	38.3%	p=.054
Curious Observation	0.0%	3.3%	35.0%	61.7%	p=.710
Turning Toward	1.7%	1.7%	35.0%	61.7%	p=.002
Attitudes of Mindfulness	0.0%	6.7%	36.7%	56.7%	p=.634
Accessing Wise Mind	3.3%	23.3%	40.0%	33.3%	p=.053
Relaxation	3.3%	40.0%	31.7%	25.0%	p=.516

Table 4 Relationship between years of teaching/practicing mindfulness and quality of main category descriptions

Skill Component	Not at all	Somewhat	Very much	Extremely	Chi^2
Years Teaching Mindfulness					
Awareness	1.7%	36.7%	33.3%	28.3%	p=.002
Focus	0.0%	11.7%	56.7%	31.7%	p=.630
Cognitive Flexibility	1.7%	18.3%	50.0%	30.0%	p=.629
Curious Observation	0.0%	23.3%	43.3%	33.3%	p=.386
Turning Toward	1.7%	15.0%	51.7%	31.7%	p=.002
Attitudes of Mindfulness	0.0%	16.7%	48.3%	35.0%	p=.147
Accessing Wise Mind	1.7%	46.7%	36.7%	15.0%	p=.001
Relaxation	0.0%	33.3%	40.0%	26.7%	p=.419
Years Personal Practice					
Awareness	1.7%	36.7%	33.3%	28.3%	p=.167
Focus	0.0%	11.7%	56.7%	31.7%	p=.239
Cognitive Flexibility	1.7%	18.3%	50.0%	30.0%	p=.834
Curious Observation	0.0%	23.3%	43.3%	33.3%	p=.418
Turning Toward	1.7%	15.0%	51.7%	31.7%	p=.311
Attitudes of Mindfulness	0.0%	16.7%	48.3%	35.0%	p=.302
Accessing Wise Mind	1.7%	46.7%	36.7%	15.0%	p=.230
Relaxation	0.0%	33.3%	40.0%	26.7%	p=.301

Discussion

This paper presents eMCC™, a validated taxonomy of the skills learned through mindfulness practice. Per best-practices (Lynn 1986; Polit and Beck 2006) the main category tier in the overall taxonomy has excellent content validity (ave-CVI = 0.92), with the following six individual categories also showing extremely high validity: Awareness, Focus, Cognitive Flexibility, Curious Observation, Turning Toward, and Attitudes of Mindfulness. A seventh main category, Accessing Wise Mind, has a marginal level of validity and needs semantic work. The eighth main category, Relaxation, was not rated highly enough to include in the classification.

Category 1: Awareness

Rated as the most pertinent skill of mindfulness, 97% of SMEs rated Awareness as related to mindfulness, yet only 62% thought it was well described. Improvements become more obvious when exploring the seven subcategories of Awareness. While all seven demonstrated a high degree of both relevance and good fit (ave-CVI = 0.95; range 0.88–1.00 for both), two subcategories of Awareness were rated lower for clarity: "Meta-Awareness" (I-CVI = 0.64) and "Non-Directed Awareness" (I-CVI = 0.71). Future work

needs to refine these two definitions. In the interim, we propose an amended definition of the main category of Awareness that does not include these terms and simply reads, "the ability to notice various components of experience."

This dichotomy of being highly relevant yet not well described may be due to how various lineages frame mindfulness and the varying semantics used to describe awareness. A number of SMEs specifically underlined differences in language used to train those naive to mindfulness, and those with a steady practice. Interactions between SME ratings and teaching experience support this. While our intention was to rely on highly experienced SMEs for validation, we failed to clarify in the survey that the language was not intended for lay meditators, but for advanced trainers and clinicians to further develop MBIs.

One SME suggested that "Meta-Awareness" did not belong in Awareness, perhaps due to its cognitively "higher-order" nature. "Meta" implies spaciousness or distance within the mind from the experience, distinct from direct perceptual awareness cultivated in mindfulness that "gets closer to" the experience. In addition, SME's various trainings may have contributed to disagreement. While most use one or more forms of concentration or focused attention practice, there are subtle differences (Gunaratana 2019).

Table 5 Ratings for subcategories of awareness

Subcategories of Awareness (n=42)	Relate to practice				Fit within				Well-described				
	Not at all or somewhat	N	Very much or extremely	N	Not at all or somewhat	N	Very much or extremely	N	Not at all or somewhat	N	Very much or extremely	N	Total
Bare Awareness: Also referred to as "Bare Attention," the ability to experience sensory information without elaboration; an early stage of perception without reactivity, without evaluation or labeling, without habitual patterns of mind; "the clear and single-minded awareness of actually what happens in us and to us in successive moments of perception."	0%	0	100%	42	5%	2	95%	40	21%	9	79%	33	42
Meta-awareness: A cognitive term that refers to being aware of awareness itself; Not to be confused with awareness of thoughts; e.g., "I hear a sound, and I know I hear a sound."	12%	5	88%	37	12%	5	88%	37	36%	15	64%	27	42
Awareness of Thought: The ability to see the nature of thought - a mental event that arises and falls; to understand the human tendency to create stories to make meaning; to recognize the power of narratives, especially false narratives; to discern observed "data" from interpretation or elaboration of what is observed - in other words, to discern fact from not fact; to uncouple identity from thought; to reappraise situations.	5%	2	95%	40	7%	3	93%	39	19%	8	81%	34	42
Awareness of Emotion: The ability to observe when emotion is occurring; to sense one's emotions physiologically as well as through context; to discern emotion from other mental or physical events	2%	1	98%	41	2%	1	98%	41	14%	6	86%	36	42
Awareness of Body Sensations: The ability to notice body sensations; to distinguish them from other components of experience, such as thought, emotion or urges to act.	2%	1	98%	41	0%	0	100%	42	7%	3	93%	39	42
Awareness of Urges to Act: The ability to notice indications of the beginning of an action, whether instinctual or habitual. This subcategory includes urge surfing, which is noticing the urge to do something but not immediately enacting the behavior. Urge surfing also includes the ability to tolerate distress rather than immediately act.	5%	2	95%	40	5%	2	95%	40	14%	6	86%	36	42
Non-Directed Awareness: Also called Choiceless Awareness or Open Monitoring; The ability to hold a broad or full field of awareness while components of experience arise.	7%	3	93%	39	7%	3	93%	39	29%	12	71%	30	42

Since schools of training emphasize different intentions, "Non-Directed Awareness," "Choiceless Awareness," and "Open-Monitoring" may have different connotations. Secular Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn 1990), traditional Vipassana (from Theravada Buddhism), Zen (from Mahayana Buddhism) and Indo-Tibetan schools of Mahayana Buddhism practicing Dzogchen all use similar words with nuanced meaning. To move the atheoretical taxonomy forward, it will be fruitful to focus on phenomenological qualities of practice independent of lineages, e.g., concentration or unified compassion (Schoenberg and Vago 2019). Delineation of these dimensions can be classified using our approach. Future attempts to create an understandable, shared lay lexicon will also be useful. First however, conceptual agreement among highly experienced practitioners is warranted to progress the taxonomy in more secular contexts.

Category 2: Focus

Focus was widely accepted as highly relevant and clear. It includes the ability to direct focus at will and to sustain attention. This ability may be central to many psychiatric interventions (e.g., attention bias in social anxiety that avoids threatening social stimuli (Wermes et al. 2018) alongside enhanced self-focus (Boehme et al. 2014). Mindfulness practice improves qualities of attention, including stability, control, and efficiency (Good et al. 2016), supporting the interdependence of skills to cultivate greater awareness. Fixed-focused (attention) versus open monitoring (awareness) practices appear to be driven by discrete neurophysiology and may be trained separately (Schoenberg et al. 2014).

Category 3: Cognitive Flexibility

Cognitive Flexibility was rated as highly relevant and clear. One SME noted overlap with Focus, possibly due to the multi-leveled nature of attention training within current practice. Rather than dilute attention as one overarching category, we dissected attention into facets. The relevance of Cognitive Flexibility as a mindfulness skill is supported by behavioral (Moore and Malinowski 2009) and neuroscientific (Kozasa et al. 2012) evidence showing increased cognitive flexibility (i.e., attentional switching) during Stroop tasks. Empirical studies also describe top-down inhibitory control as a mechanism of cognitive and affective flexibility cultivated by mindfulness (Hazlett-Stevens 2017; Oberle et al. 2012; Schoenberg et al. 2014). Inhibitory control may be more relevant to Focus in our classification, suggesting some incongruence between how SMEs experience/conceptualize mindfulness and how neuroscience examines it. Per two SMEs, creativity would also be included here.

Category 4: Curious Observation

Curious Observation was seen as highly relevant and adequately described. The start of this definition could be seen as Meta-Awareness. Pertinent empirical work is rapidly expanding and appears to be seminal for therapeutic uses of mindfulness (Dunne et al. 2019; Shapero et al. 2018). Future investigation would benefit from separating other components of Curious Observation from an over focus on attention. Per one SME, the description would benefit from shifting "without" to "while noticing" to read "The ability to watch one's experience from a helpful distance *while noticing* judgment

and reactivity, and with discernment of what is habitual versus intentional."

Category 5: Turning toward

Turning Toward was widely accepted as highly related to practicing mindfulness and well defined. One SME suggested noting the intent of the skill to cause no harm, fearing that students could misinterpret instructions to mean "tolerate" even if experiencing traumatic triggers or intense distress. The relative progression of skill development between Curious Observation and Turning Toward is worthy of investigation.

Category 6: Attitudes of Mindfulness

Attitudes of Mindfulness was viewed as highly related and well described, though "very un-nuanced" on the first tier. It is intentionally broad, and its components interwoven throughout all categories. One SME noted overlap between Tuning Toward and Attitudes of Mindfulness, but there are more overlaps. Secular applications of mindfulness place emphasis on training the attitudinal qualities to deal with challenges in daily life. From Buddhist perspectives, these are characteristics cultivated to advance "enlightenment," and practices promote their development concurrent to other skills. Attitudes of Mindfulness may be conceptualized as the compass by which all other skills unfold, are directed or developed. Empirical studies examining compassion, gratitude, and other prosocial behaviors are accumulating (Condon 2017). Nuanced subcategories will be highly important.

Category 7: Accessing Wise Mind

The content validity of Accessing Wise Mind category suggests the need for revision due to significant disagreement with the description. SME comments noted that this category need not propose a cognitive model but might simply be defined as "maintaining ongoing access to one's values and intentions." Another SME noted that with practice, "one can access their true/higher self rather than the ego self" and "actually live more from that space." A third noted that wisdom might be considered as recognition of the "emergence of *novel* perspectives or insights." Several SMEs underlined intuition as an important component. A revised description to be further tested for relevance and clarity is "maintaining ongoing access to one's values and intentions, intuition and deeper wisdom, including the ability to notice the emergence of novel perspectives or insights that allow one to access their true/higher self rather than the ego self."

Category 8: Relaxation

Relaxation will be removed due to low ratings. While relaxed attention is often trained in mindfulness schools, practitioners are generally advised against striving for relaxation as that may create distraction and tension. Perhaps relaxation is a necessary neurointegrative step for more advanced mindfulness practice, while not necessarily a learned mindfulness skill (Schoenberg and Vago 2019). In traditional Indo-Tibetan perspectives, yoga-based practices were used to "relax" (or ground) the body to allow more rigorous mind work (meditation) (Schoenberg and Vago 2019).

Synthesis

This initial endeavor to classify and define mindfulness skills contributes to the description, differentiation, and understanding of specific domains that mindfulness practices enhance. With an agreed upon taxonomy, mindfulness professionals can improve precision in care by prescribing particular mindfulness practices to ameliorate skills-based deficits characterizing specific conditions. With greater precision, adherence to mindfulness training and MBIs may improve along with outcomes. This paper presents a significant step forward in providing an initial, atheoretical validated taxonomy. Next steps include refining the taxonomy, validating subcategories and categorizing specific practices that train each skill noted.

Limitations and Future Research

Validation of the eMCC™ relies on the SMEs who responded to the study invitation. While we tried to reach a broad group of highly experienced mindfulness teachers in multiple countries, other SMEs may provide different ratings. Further validation studies are warranted, and in particular, further studies that fine-tune lingering areas of disagreement, such as the inclusion of a category akin to relaxation and the proposed new description of Accessing Wise Mind. Moreover, while clearly too much material for a single paper or presentation, further analysis of all subcategories (i.e., for the remaining six major categories) will be necessary to thoughtfully employ the eMCC™.

Effective usage of the eMCC™ to target psychiatric concerns will require validated and practical assessment tools to identify apparent deficits in specific mindfulness domains. Fortunately, an NIH trial (COMMENCE 2018, Accessed 7/31/19) is well underway to develop such for multiple mindfulness domains. The trial uses PROMIS methodologies to construct improved, clinically relevant mindfulness measures to be administered as Computerized Adaptive Tests (CATs) or fixed short forms. These new measures should allow greater utilization of the eMCC™ to develop and rigorously test targeted MBIs. To respond to Insel's "humble realization that

we do not know enough to develop a precision medicine approach to mental disorders" (Insel 2014), we propose the eMCC™ to categorize mindfulness skills. Use of this validated, atheoretical classification scheme will allow MBIs to move from blanketed transdiagnostic interventions to more precise interventions that can target specific skill deficits associated with particular conditions.

Compliance with Ethical Standards

Conflict of Interest RQW serves as Chief Science Officer to eMindful, receives consultant fees, and has an ownership interest and equity in the company (< 2%). JAK, JD, and DS worked for eMindful during a major portion of the study and received salary support. PLAS has no conflicts of interest.

Research Involving Human Participants and Informed Consent This manuscript does not contain clinical studies or patient data. Content validation studies using Subject Matter Experts (SMEs) are typically not considered Human Subjects Research since the humans involved are not the subject of investigation. Rather, the measure being validated (taxonomy in this case) is the object of investigation.

References

Baer, R., Gu, J., Cavanagh, K., & Strauss, C. (2019). Differential sensitivity of mindfulness questionnaires to change with treatment: a systematic review and meta-analysis (vol 31, pg 1247, 2019). *Psychological Assessment, 31*(10), 1263–1263.

Bergomi, C., Tschacher, W., & Kupper, Z. (2013). The assessment of mindfulness with self-report measures: existing scales and open issues. *Mindfulness, 4*, 191–202.

Boehme, S., Miltner, W. H., & Straube, T. (2014). Neural correlates of self-focused attention in social anxiety. *Social Cognitive and Affective Neuroscience, 10*(6), 856–862.

Chiesa, A. (2013). The difficulty of defining mindfulness: current thought and critical issues. *Mindfulness, 4*(3), 255–268.

COMMENCE. (2018). Creating and Optimizing Mindfulness Measures to Enhance and Normalize Clinical Evaluation. https://clinicaltrials.gov/ct2/show/NCT03510117. Accessed 7/31/19.

Condon, P. (2017). Mindfulness, compassion, and prosocial behaviour. In Karremans J. C., & Papies E. E. (Eds). *Mindfulness in social psychology*, (pp. 132–146). London: Routledge.

Crane, R. S., & Kuyken, W. (2019). The mindfulness-based interventions: teaching assessment criteria (MBI:TAC): reflections on implementation and development. *Current Opinion in Psychology, 28*, 6–10. https://doi.org/10.1016/j.copsyc.2018.10.004.

Dahl, C. J., Lutz, A., & Davidson, R. J. (2015). Reconstructing and deconstructing the self: cognitive mechanisms in meditation practice. *Trends in Cognitive Sciences, 19*(9), 515–523. https://doi.org/10.1016/j.tics.2015.07.001.

Dahl, C. J., Lutz, A., & Davidson, R. J. (2016). Cognitive processes are central in compassion meditation. *Trends in Cognitive Sciences, 20*(3), 161–162. https://doi.org/10.1016/j.tics.2015.12.005.

DeVon, H. A., Block, M. E., Moyle-Wright, P., Ernst, D. M., Hayden, S. J., Lazzara, D. J., et al. (2007). A psychometric toolbox for testing validity and reliability. *Journal of Nursing Scholarship, 39*(2), 155–164.

Dunne, J. D., Thompson, E., & Schooler, J. (2019). Mindful Meta-Awareness: sustained and non-propositional. *Current Opinion in Psychology, 28*, 307–311. https://doi.org/10.1016/j.copsyc.2019.07.003.

Ginsburg, G. S., & Phillips, K. A. (2018). Precision medicine: from science to value. *Health Affairs, 37*(5), 694–701. https://doi.org/10.1377/hlthaff.2017.1624.

Good, D. J., Lyddy, C. J., Glomb, T. M., Bono, J. E., Brown, K. W., Duffy, M. K., et al. (2016). Contemplating mindfulness at work: an integrative review. *Journal of Management, 42*(1), 114–142. https://doi.org/10.1177/0149206315617003.

Grabovac, A. D., Lau, M. A., & Willett, B. R. (2011). Mechanisms of mindfulness: a buddhist psychological model. *Mindfulness, 293*, 154–166.

Gunaratana, B. H. (2019). *What exactly is vipassana meditation?* Tricycle Magazine. Retrieved from https://tricycle.org/magazine/vipassana-meditation/. Accessed 31 Jul 2019.

Hazlett-Stevens, H. (2017). Dispositional mindfulness and neural correlates of affect regulation. *Archives of Neuroscience, 4*(3), e57682. https://doi.org/10.5812/archneurosci.57682.

Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science, 6*(6), 537–559.

Insel, T. R. (2014). The NIMH research domain criteria (RDoC) project: precision medicine for psychiatry. *American Journal of Psychiatry, 171*(4), 395–397.

Kabat-Zinn, J. (1990). *Full catastrophe living: using the wisdom of your body and mind to face stress, pain, and illness*. New York: Bantam Books.

Konig, I. R., Fuchs, O., Hansen, G., von Mutius, E., & Kopp, M. V. (2017). What is precision medicine? *The European Respiratory Journal, 50*(4). https://doi.org/10.1183/13993003.00391-2017.Print2017Oct.

Kozasa, E. H., Sato, J. R., Lacerda, S. S., Barreiros, M. A., Radvany, J., Russell, T. A., et al. (2012). Meditation training increases brain

efficiency in an attention task. *NeuroImage, 59*(1), 745–749. https://doi.org/10.1016/j.concog.2008.12.008.

Lomas, T., Ivtzan, I., & Fu, C. H. (2015). A systematic review of the neurophysiology of mindfulness on EEG oscillations. *Neuroscience & Biobehavioral Reviews, 57*, 401–410. https://doi.org/10.1016/j.neubiorev.2015.09.018.

Lutz, A., Slagter, H. A., Dunne, J. D., & Davidson, R. J. (2008). Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences, 12*(4), 163–169. https://doi.org/10.1016/j.tics.2008.01.005.

Lutz, A., Jha, A. P., Dunne, J. D., & Saron, C. D. (2015). Investigating the phenomenological matrix of mindfulness-related practices from a neurocognitive perspective. *American Psychologist, 70*(7), 632–658. https://doi.org/10.1037/a0039585.

Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research, 35*(6), 382–385.

Marchand, W. R. (2014). Neural mechanisms of mindfulness and meditation: evidence from neuroimaging studies. *World Journal of Radiology, 6*(7), 471–479. https://doi.org/10.4329/wjr.v6.i7.471.

Moore, A., & Malinowski, P. (2009). Meditation, mindfulness and cognitive flexibility. *Consciousness and Cognition, 18*(1), 176–186. https://doi.org/10.1016/j.concog.2008.12.008.

Oberle, E., Schonert-Reichl, K. A., Lawlor, M. S., & Thomson, K. C. (2012). Mindfulness and inhibitory control in early adolescence. *The Journal of Early Adolescence, 32*(4), 565–588.

Polit, D. F., & Beck, C. T. (2006). The content validity index: are you sure you know what's being reported? Critique and recommendations. *Research in Nursing & Health, 29*(5), 489–497.

Polit, D. F., Beck, C. T., & Owen, S. V. (2007). Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Research in Nursing & Health, 30*(4), 459–467.

Quaglia, J. T., Braun, S. E., Freeman, S. P., McDaniel, M. A., & Brown, K. W. (2016). Meta-analytic evidence for effects of mindfulness training on dimensions of self-reported dispositional mindfulness. *Psychological Assessment, 28*(7), 803–818.

Schoenberg, P. L., & Vago, D. R. (2019). Mapping meditative states and stages with electrophysiology: concepts, classifications, and methods. *Current Opinion in Psychology, 28*, 211–217. https://doi.org/10.1016/j.copsyc.2019.01.007.

Schoenberg, P. L., Hepark, S., Kan, C. C., Barendregt, H. P., Buitelaar, J. K., & Speckens, A. E. (2014). Effects of mindfulness-based cognitive therapy on neurophysiological correlates of performance monitoring in adult attention-deficit/hyperactivity disorder. *Clinical Neurophysiology, 125*(7), 1407–1416. https://doi.org/10.1016/j.clinph.2013.11.031.

Shapero, B. G., Greenberg, J., Pedrelli, P., de Jong, M., & Desbordes, G. (2018). Mindfulness-based interventions in psychiatry. *Focus, 16*(1), 32–39. https://doi.org/10.1176/appi.focus.20170039.

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*(3), 373–386.

The American Association for Public Opinion Research. (2016). *Standard definitions: final dispositions of case codes and outcome rates for surveys* (9th edition). Lenexa, KS: Author. https://www.aapor.org/Publications-Media/AAPOR-Journals/Standard-Definitions.aspx. Accessed 31 Jul 2019.

Wermes, R., Lincoln, T. M., & Helbig-Lang, S. (2018). Attentional biases to threat in social anxiety disorder: time to focus our attention elsewhere? *Anxiety, Stress, & Coping, 31*(5), 555–570.

Yapko, M. (2009). *Depression is contagious: how the most common mood disorder is spreading around the world and how to stop it.* New York: Simon and Schuster.

Yapko, M. D. (2012). *Trancework: an introduction to the practice of clinical hypnosis* (4th ed.). New York: Routledge.

Zamanzadeh, V., Rassouli, M., Abbaszadeh, A., Majd, H. A., Nikanfar, A., & Ghahramanian, A. (2014). Details of content validity and objectifying it in instrument development. *Nursing Practice Today, 1*(3), 163–171.