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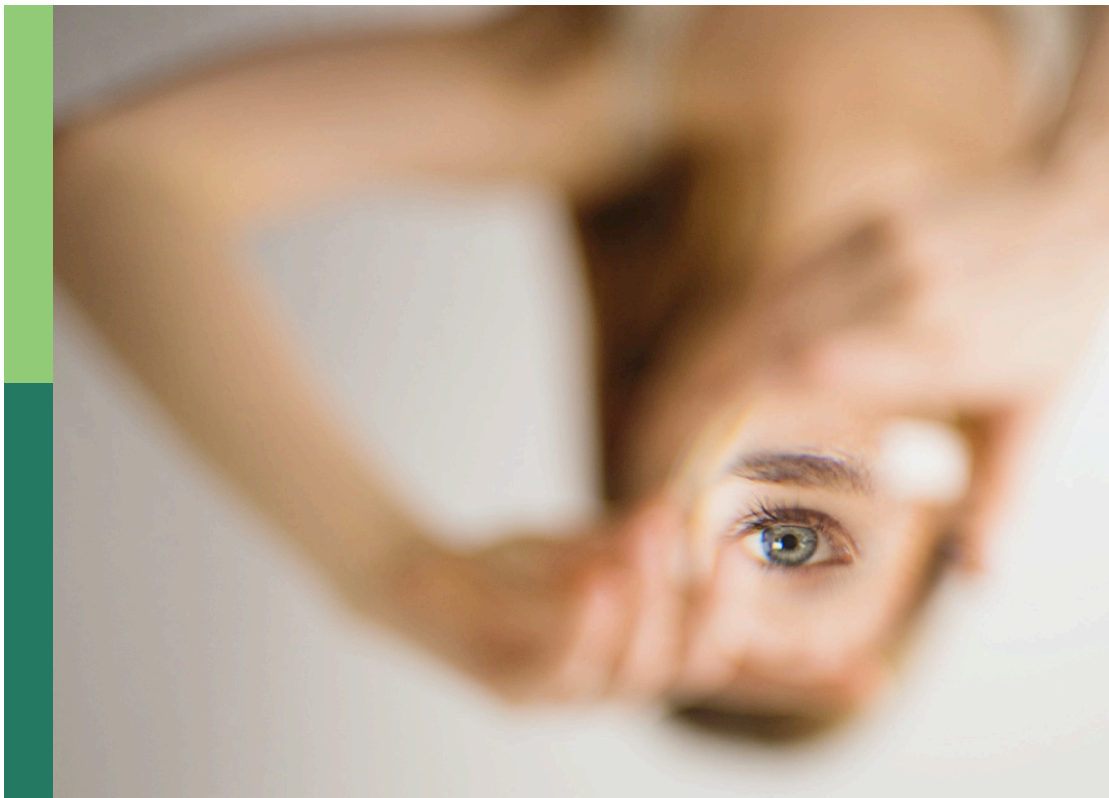
The varieties of contemplative experiences and practices

Edited by
Sucharit Katyal, Sisir Roy, Philippe R. Goldin and Anna-Lena Lumma

Published in
Frontiers in Psychology



ISSN 1664-8714
ISBN 978-2-8325-2900-3
DOI 10.3389/978-2-8325-2900-3

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The varieties of contemplative experiences and practices

Topic editors

Sucharit Katyal — University College London, United Kingdom
Sisir Roy — National Institute of Advanced Studies, India
Philippe R. Goldin — University of California, Davis, United States
Anna-Lena Lumma — University of Witten/Herdecke, Germany

Citation

Katyal, S., Roy, S., Goldin, P. R., Lumma, A.-L., eds. (2023). *The varieties of contemplative experiences and practices*. Lausanne: Frontiers Media SA. doi: 10.3389/978-2-8325-2900-3

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest

Table of contents

frontiers | Frontiers in Psychology

TYPE Editorial
PUBLISHED 20 June 2023
DOI 10.3389/fpsyg.2023.1232999

OPEN ACCESS

EDITED AND REVIEWED BY
Antonino Raffone,
Sapienza University of Rome, Italy

*CORRESPONDENCE
Sucharit Katyal
✉ s.katyal@ucl.ac.uk
Anna-Lena Lumma
✉ anna-lena.lumma@uni-wh.de

RECEIVED 01 June 2023
ACCEPTED 09 June 2023
PUBLISHED 20 June 2023

CITATION
Katyal S, Lumma A-L, Goldin PR and Roy S (2023) Editorial: The varieties of contemplative experiences and practices.
Front. Psychol. 14:1232999.
doi: 10.3389/fpsyg.2023.1232999

Editorial: The varieties of contemplative experiences and practices

Sucharit Katyal[1]*, Anna-Lena Lumma[2]*, Philipp R. Goldin[3] and Sisir Roy[4]

[1]Max Planck UCL Centre for Computational Psychiatry and Ageing Research, University College London, London, United Kingdom, [2]Department of Psychology and Psychotherapy, Witten/Herdecke University, Witten, Germany, [3]Betty Irene Moore School of Nursing, University of California Davis Medical Center, Sacramento, CA, United States, [4]Consciousness Studies Programme, National Institute of Advanced Studies (NIAS), Bengaluru, India

KEYWORDS

meditation, consciousness, mindfulness, altered state of awareness, phenomenology (of religion), contemplative practices, spiritual experiences

Editorial on the Research Topic
The varieties of contemplative experiences and practices

Introduction

While diverse contemplative techniques are employed across a plethora of traditions around the world, contemplative research over the years has not reflected this variety. Despite exponential growth in contemplative research in recent decades, it has largely been dominated within a relatively narrow and inadequately-defined construct of contemplative practice (CP) under the umbrella term "mindfulness." The aim of this Research Topic was to provide an avenue for understanding CP from a more diverse and inclusive perspective. We envisioned this could be done by (1) studying common systems of practice (like mindfulness) in novel settings, (2) studying a wider variety of contemplative traditions and practices, and finally, (3) drawing on psychological/phenomenological/neurobiological similarities and differences between the varieties of practices and experiences to arrive at theoretical abstractions that provide novel insight into contemplation, and more generally, human mind and consciousness. We received several articles in line with these objectives.

Two papers studied mindfulness practices in novel settings. Mortlock et al. developed the idea of "team mindfulness" training and implemented it in a high-stress military setting. They found that this approach was effective in raising individual and collective stress management skills, and contributed to an understanding of the interdependence between collective and individual mindfulness capacity development. Filipe et al. conducted a systematic review of the effects of mindfulness meditation practices on cognitive and socio-emotional skills of children 6–12 years of age and observed a "reasonably strong" effect. Future work can extend these questions to other types of CPs.

Several papers in this Research Topic reported on empirical work (qualitative, cognitive, and neuroimaging) on previously understudied contemplative practice systems. Matko et al. tested incremental effects of different components of yoga-based practices on novice participants over the course of 8 weeks. Participants were assigned to one of four conditions: mantra meditation alone, meditation plus physical yoga, meditation with yoga plus ethical education, and meditation plus ethical education. They found that wellbeing generally increased over time. However, this increase was strongest for combined interventions, particularly ones including ethical education.

Ekman et al. examined qualitative changes produced by the "Feeding Your Demons" meditation process—a secular adaptation of the traditional Tibetan Buddhist meditation practice known as Chöd or "Severance." The findings suggest that the creative process of transforming adversity and suffering into an ally allows emotional preparation for entering objectless pristine awareness. It also leads to psychological changes such as enhanced sense of self-worth and confidence, empathy for the rejected parts of oneself, increased self-awareness, and self-compassion. On the theme of compassion, Mascaro et al. studied qualitative outcomes of Cognitively-Based Compassion Training in meditation-naive Christian healthcare chaplains. They found not only that the experience of compassion is malleable but there are a number of individual ways of practicing compassion, thus yielding novel insights about how individuals actually learn and enact compassion meditation. Understanding these processes further can provide a more refined basis for designing compassion training and integration of compassion into daily life.

Two studies undertook neurocognitive study of underexplored CPs. Examination of conscience is a CP that involves prospective (for the upcoming day) and retrospective (for the day passed) examination of daily actions. Pisapia and Dall'Avanzi investigated a 2-week digital-application-based intervention using this practice on metamemory but did not find any effects that differed from an active control group. An fMRI study investigated the effect of an 8-day Samyama meditation program—derived from the Isha Yoga system of meditation—on resting-state brain functional connectivity (Vishnubhotla et al.). They reported increased functional connectivity between the salience network and the default mode network consistent with previous work on other meditation practices (though the sample-size and demographics of their control group limit the interpretations of their findings).

Two studies investigated the Ananda Marga Tantric Yoga (AMTY) system of practices on subjective experience. Tantric Yoga practices evolved in South Asia over several millennia, developing epistemic frameworks to characterize experiential changes accompanying the practices. One such framework is that of Kundalini—an otherwise latent "energy" activatable through CPs, engendering transformative experiences. While past work has investigated Kundalini from a psychopathological perspective, Maxwell and Katyal characterize Kundalini experiences in a healthy and positive transformative contemplative setting. More generally, AMTY combines a number of different physical and mental practices that support the cultivation of a holistic goal of "self-realization." Building on a phenomenological interpretation of Samkhya philosophy originally presented by the twentieth century philosopher and polymath Prabhat Rainjan Sarkar, Katyal develops the idea of self-realization as gradual experiential reduction of three "structures" of consciousness—the mental object, an individuality-inducing mental act, and a transpersonal/non-dual existential awareness—ultimately leading to the first-person deduction of a transcendental essence from which consciousness in its experiential form is derived. Such a framework may serve as a general basis for understanding not only how CPs provide first-person insight into consciousness but also their soteriological/spiritual objectives. A part of this framework is corroborated by Chattopadhyay who develops a Buddhist account of contemplation embedded in its broader socio-spiritual context, concluding that it culminates in transforming the experience of an (individual) "I" to a (transpersonal) "we."

In addition to Katyal and Chattopadhyay, several other papers addressed our broader aim of expanding the scope of theoretical constructs through which to understand CPs and how they relate to consciousness. A critical lacuna we identified when initiating this Research Topic was the lack of clarity in defining the term mindfulness. Levit-Binnun et al. fill this void by proposing a "Mindfulness Map" spanning two axes: (1) specific mindfulness practices and instructions, and (2) intentions to cultivate certain experiential understandings. In their framework, intentions moderate the effect of mindfulness practices on experiential understandings. This map offers a starting point for examining the role of, among other things, contextual factors in outcomes related to mindfulness practices. Relatedly, Lundh proposes that from the lens of experimental phenomenology, contemplative practices can be regarded as an "informal" phenomenological practice derived by variations of experience and its observation. In this regard, they can be extended to more targeted development of experiential manipulation toward specific objectives. Sparby and Sacchet offer yet another broad outlook at CPs by proposing a phenomenologically-derived method for classifying meditation techniques, more generally, based on the specific set of activities and objects involved in them. Even while considering the diversity contemplative practices and systems, they suggest that meditative activities can be generalized to observing, producing and being aware—ultimately leading to a broader goal of cultivating "awareness of awareness," namely, meta-awareness. In this regard, Meling develops the idea of awareness of awareness or "non-dual knowing" in an enactive cognition framework, with a focus on the Mahamudra tradition of Tibetan Buddhism.

Broader implications for meditation and consciousness research

One theme underlying many papers published in this Research Topic is the importance of considering the wider ethical, intentional and philosophical/spiritual context within which CPs are practiced to understand their outcomes (Chattopadhyay; Katyal; Levit-Binnun et al.; Mascaro et al.; Matko et al.; Maxwell and Katyal; Sparby and Sacchet). The importance of these contexts has gained traction in contemplative research in recent years, and these papers address this timely issue. A second theme observed across the articles is that CPs are fundamentally phenomenological exercises, and by providing systematic ways to manipulate conscious experience can offer valuable progress in our understanding of consciousness, more generally (Katyal; Levit-Binnun et al.; Lundh; Meling; Sparby and Sacchet). The second theme also relates to the folk psychological notion that most contemplative/spiritual paths lead to a common goal. As proposed by some articles in this Research Topic, this goal may pertain to a transformative experience where consciousness is experienced in a unitary- or meta-state within which all worldly experiences/dualities are constituted or dissolved. Going forward, one can envision that the field of contemplative research would need to handle the interaction of the diversity in practices, contexts and experiences on the one hand with phenomenological features

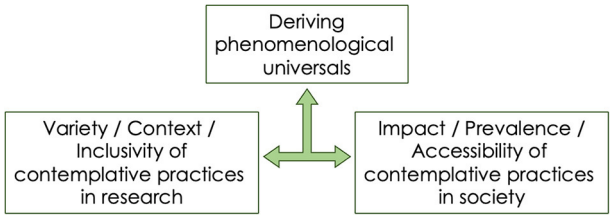

FIGURE 1
Having context, variety and inclusivity in contemplative practices will allow them to be accessible by a much wider audience. At the same time, there is better need to understand the diversity of contemplative practices prevalent already in society worldwide. Together these two can allow us to understand phenomenological universals that underlie the states attained by these practices.

that are proposed to underlie contemplative practice as universals (non-duality, existential aspects of consciousness) on the other (Figure 1). Whereas, taking context into account will enable a wider audience embedded in diverse social settings to access CPs and their benefits, the phenomenological features proposed to be inherent to the practices can ensure targeted outcomes and experiences. At the same time, the diversity and context in CPs would provide a natural tool for testing if proposed phenomenological features are indeed phenomenological universals, as articles in this Research Topic have proposed. An ambitious interpretation of the amalgamation of the diversity and unity in contemplative practices is that it could serve as a holistic framework for a global pan-contemplative and interfaith dialogue. It is however worth noting that most articles in this Research Topic were either exploratory empirical studies or theoretical in nature. Further work is needed to build on this foundation to test more planned and theoretically-grounded empirical hypotheses.

While the output of this Research Topic fulfilled some of our originally-conceived goals of understanding "*The varieties of contemplative experiences and practices*," it is also worth mentioning that there are many contemplative systems worldwide whose understanding eludes us. A number of contemplative and mystical traditions that are widely practiced in public are acutely underrepresented in contemplative research (e.g., Sufism, Kabbalah, Taoism, and native American practices). Practically, some researchers were unable to submit articles to this Research Topic due to the high article processing charges, which may not be affordable by researchers not having research funding for open access publications—an issue that may more severely impact contemplative research due to the limited research funding available in the field.

The study of different CPs may also be relevant to broader societal issues. The use of mindfulness-based practices is well-established in areas such as health care and education. However, further research on CPs may show that certain CPs are particularly suited for specific purposes in a variety of application areas. In addition, we live in fast-paced times that will being increasingly influenced by artificial intelligence in the future, which could benefit from people becoming more aware of themselves and their relationship to the world. Future studies could for instance whether certain CPs could help people to differentiate fake content from real content and enable people to make more profound decisions. Overall, the study of CPs could also shed new light on how people can find meaning in their life despite challenges and identify sustainable solutions for individual, but also global challenges.

Author contributions

SK contributed the summary model and figure. A-LL contributed the concluding section. All authors contributed to writing about studies in this Research Topic. All authors contributed to the article and approved the submitted version.

Acknowledgments

We thank the reviewers and guest editors that helped ensure the success of this Research Topic.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

frontiers in Psychology

ORIGINAL RESEARCH
published: 05 August 2021
doi: 10.3389/fpsyg.2021.672301

Differential Effects of Ethical Education, Physical Hatha Yoga, and Mantra Meditation on Well-Being and Stress in Healthy Participants—An Experimental Single-Case Study

Karin Matko[1]*, *Peter Sedlmeier*[1] and *Holger C. Bringmann*[2,3]

[1] Department of Psychology, Chemnitz University of Technology, Chemnitz, Germany, [2] Institute for Social Medicine, Epidemiology and Health Economics, Charité-Universitätsmedizin, Corporate Member of Freie Universität Berlin, Humboldt-Universität zu Berlin and Berlin Institute of Health, Berlin, Germany, [3] Department of Psychiatry, Psychosomatics and Psychotherapy, Diakoniekliniken Zschadrass, Colditz, Germany

OPEN ACCESS

Edited by:
Anna-Lena Lumma, University of Witten/Herdecke, Germany

Reviewed by:
David Shannahoff-Khalsa, University of California, San Diego, United States
Holger Cramer, University of Duisburg-Essen, Germany
Rumen Manolov, University of Barcelona, Spain

***Correspondence:**
Karin Matko
karin.matko@psychologie.tu-chemnitz.de

Specialty section:
This article was submitted to Health Psychology, a section of the journal Frontiers in Psychology

Received: 25 February 2021
Accepted: 28 June 2021
Published: 05 August 2021

Citation:
Matko K, Sedlmeier P and Bringmann HC (2021) Differential Effects of Ethical Education, Physical Hatha Yoga, and Mantra Meditation on Well-Being and Stress in Healthy Participants—An Experimental Single-Case Study. Front. Psychol. 12:672301. doi: 10.3389/fpsyg.2021.672301

Traditionally, yoga is a multicomponent practice consisting of postures, breathing techniques, meditation, mantras, and ethics. To date, only a few studies have tried to dismantle the effects of each of these components and their combinations. To fill this gap, we examined the incremental effects of ethical education and physical Hatha yoga on mantra meditation using a single-case multiple-baseline design. This study was part of a project evaluating the new mind–body program *Meditation-Based Lifestyle Modification*. Fifty-seven healthy participants with no regular yoga or meditation practice were randomly assigned to three baselines (7, 14, and 21 days) and four conditions using a random number generator. The conditions were mantra meditation alone (MA), meditation plus physical yoga (MY), meditation plus ethical education (ME), and meditation plus yoga and ethical education (MYE). All the interventions lasted for 8 weeks and were run consecutively according to baseline length. During the baseline and treatment phases, participants received daily questionnaires measuring their well-being (WHO-5 Well-Being Index), stress (Perceived Stress Scale), and subjective experiences. Forty-two participants completed the treatment and were entered in the analyses. We analyzed our data using visual inspection, effect size estimation (Tau-*U*), and multilevel modeling. Almost all participants showed a longitudinal increase in well-being. Regarding between-group differences, participants who received ethical education exhibited the largest increases in well-being (Tau-$U = 0.30/0.23$ for ME/MYE), followed by participants in the MY condition (Tau-$U = 0.12$). Conversely, participants in the MA condition showed no change (Tau-$U = 0.07$). There was a tendency for the combined treatments to decrease stress. This tendency was strongest in the MY condition (Tau-$U = -0.40$) and reversed in the MA condition (Tau-$U = 0.17$). These results emphasize the incremental and differential effects of practicing meditation in combination with other practices from the eight-fold yoga path. This approach is valuable for better understanding the multifaceted practice of yoga.

Clinical Trial Registration: www.ClinicalTrials.gov, identifier: NCT04252976.

Keywords: yoga components, mantra meditation, ethical education, differential effects, incremental effects, single-case research, multilevel modeling, mixed-method

INTRODUCTION

Yoga originates from a rich and ancient spiritual tradition that encompasses a variety of diverse practices, such as physical postures, breathing techniques, meditation techniques, mantras, and ethical teachings (Feuerstein, 2012; Telles and Singh, 2013). These practices are designed to promote personal and spiritual growth with the ultimate aim of gaining access to pure consciousness and reaching "enlightenment" (Sedlmeier and Srinivas, 2019). A growing number of studies are acknowledging the positive effects of yoga on alleviating psychological disorders and stress-related diseases (Cramer et al., 2013; Pascoe et al., 2017; Breedvelt et al., 2019) as well as promoting mental and physical health (Büssing et al., 2012; Gothe and McAuley, 2015; Hendriks et al., 2017). However, high heterogeneity among yoga practices and poor methodological quality have limited the generalizability of these findings. Apart from this, previous yoga research has exhibited two major shortcomings. First, yoga incorporates diverse components, which have only insufficiently been investigated and differentiated in the past (Gard et al., 2014; Schmalzl et al., 2015). We know neither how each single component of yoga works nor what impact specific combinations of these components have. Second, the ethical component of yoga has frequently been neglected in the past. In a bibliometric analysis, only 10% of yoga studies explicitly incorporated lectures on yoga philosophy or ethics (Cramer et al., 2014). Yet, traditional yoga experts have advocated that yoga should be practiced in its entirety, including its ethical aspects (Varambally and Gangadhar, 2016).

Traditional yoga dates back over 5,000 years and was originally understood in a much broader sense than is common in Western contemporary settings. Indeed, classical, or *raja* yoga, as outlined by Patanjali (author of the Yoga Sutras; Bryant, 2015), was primarily a system of meditation. Patanjali described the aim of yoga as the stilling of the fluctuations and changing states of the mind that cause suffering ("Yogah chitta vrtti nirodhah," Yoga Sutras, Chapter 1, Verse 2; Patanjali between 600 BC and 200 AC; Bryant, 2015). The aspiring practitioner could reach this still state through the practice of the eight limbs of yoga, also referred to as the eight-fold yoga path (*ashtanga* yoga). This path comprises the following practices: *yamas* (universal ethics), *niyamas* (individual ethics), *asana* (physical posture), *pranayama* (breath control), *pratyahara* (withdrawal of the senses), *dharana* (concentration), *dhyana* (meditation), and *samadhi* (full meditative absorption; Feuerstein, 2012; Bryant, 2015).

Recent theoretical proposals have taken into account this multitude of yoga practices (Gard et al., 2014; Schmalzl et al., 2015; Sullivan et al., 2017). All of these proposals strongly encourage the empirical investigation of the specific components of yoga and suggest conducting longitudinal, comparative, or dismantling studies. Yet, the multitude of possible "active ingredients" in yoga makes the investigation of its components challenging. Modern styles of yoga have diverted considerably from the "classic" eight-fold yoga path and often reduced its inherent multifariousness. Many styles focus primarily on postures and breathing practices, for example, Ashtanga, Iyengar, or Hatha Yoga in general. There are also yoga styles that comprise mainly breathing practices (e.g., Surdashan Kriya), or meditation (e.g., Sahaja Yoga). Some place particular attention to include mantras, chanting and music (e.g., Kundalini Yoga). For an overview on different yoga styles, see McCrary (2013). Just as multifaceted as yoga styles are scientifically investigated yoga interventions. Cramer et al. (2016) reviewed studies investigating 52 different yoga styles and concluded that the proportion of positive outcomes did not vary across styles. However, this analysis did not dismantle the different components of yoga styles.

A recent review summarized comparative studies and meta-analyses of the effects of yoga components (Matko et al., 2021a). The authors concluded that although most of the treatments compared were equal in length, outcomes were better for those that combined several elements of yoga practice. Frequently, combining yoga postures with breathing practices, meditation, or ethical education enhanced the effectiveness of the intervention. This finding was also reported in several meta-analyses (e.g., Gong et al., 2015; Wu et al., 2019). But these studies were very heterogeneous and many findings were inconclusive. Even if combined interventions were mostly more effective, it is not known which specific benefit could be attributed to which component of these interventions.

Often, studies compared rather complex interventions with each other without isolating specific parts of the interventions. For example, Quach et al. (2016) compared a physical yoga program to a mindfulness meditation program, but both programs included breathing exercises and group discussions. Granath et al. (2006) contrasted a physical yoga intervention with a cognitive behavioral therapy program; however, both interventions included psychoeducation and relaxation. Gorvine et al. (2019) compared physical yoga to a meditation program composed of different meditation techniques. Yet, as we know, different meditation techniques produce different effects (Fox et al., 2016; Kropp and Sedlmeier, 2019). Employing such study designs definitely yields interesting insights but makes it hard to uncover how each specific component of these complex programs works. In addition, we found only one study that explicitly examined the effects of adding an ethical education component to a complex yoga intervention (Smith et al., 2011).

Thus, it seems advisable for yoga research to evaluate yoga in its entirety and investigate the specific mechanisms and benefits of each yoga component. There have been repeated calls in this regard to fully understand the underlying mechanisms of yoga (Sherman, 2012; McCall, 2013; Riley and Park, 2015). The investigation of yoga components would facilitate the development of more targeted and efficient programs tailored to the specific needs of respective clinical or healthy populations (Gard et al., 2012; Schmalzl et al., 2015). To date, there have been only a few investigations into this matter. One particularly under researched area of interest is the incorporation of yoga ethics into intervention studies. Furthermore, it remains unclear whether there are specific combinations of yoga practices that yield better effects than others do. Hence, the present study was aimed at bridging this gap. Employing a single-case multiple-baseline design, we compared the relative benefits of adding

ethical education and/or physical postures to a simple mantra meditation intervention.

Almost all meta-analyses and theoretical proposals on yoga criticize the lack of methodological accuracy in previous yoga studies. Longitudinal and dismantling studies have been proposed as an effective means to (1) study mechanisms of mind–body practices/yoga, and (2) provide optimal control groups (Kinser and Robins, 2013). In addition, conventional research designs reach their limits in yoga and meditation research as there is no overarching theory that would guide systematic investigations, group comparisons cannot capture specific changes over time or individual differences properly, and purely quantitative approaches are limited with regard to participants' individual perceptions of change (Schmalzl et al., 2015; Sedlmeier et al., 2016; Lundh, 2020). Consequently, employing mixed-methods or repeated-measures designs might be more helpful in this respect. Recently, there has been a rise in elaborate studies using daily assessments before, during, and/or after an intervention in experience sampling or single-case research designs (May et al., 2014; Shoham et al., 2017; Lindsay et al., 2018; Singh et al., 2019; Bai et al., 2020). The present study is in line with these research efforts.

In experimental single-case research designs (Barlow et al., 2009) dependent variables are measured very frequently over extended periods of time. Accordingly, they allow for a more detailed examination of individual responses and processes of change and are, thus, more suitable for explorative research questions such as ours. Several authors have suggested that individual differences might tremendously influence the effects of meditation and yoga (Hölzel et al., 2011; Gard et al., 2014; Lippelt et al., 2014). Furthermore, participants are often treated as collaborators rather than "subjects" enabling a closer cooperation and quantitative as well as qualitative insights facilitating a mixed-methods approach. Hence, single-case research does not necessarily require participant blinding. Multiple-baseline designs consist of an A phase (baseline) and a B phase (treatment), but the length of the A phase is varied across different participants creating a staggered introduction of the intervention and making possible horizontal and vertical comparisons (Ferron et al., 2014). In this design, randomization happens over time instead over people producing strong internal validity. If there is a strong contingency between the treatment and a certain effect, irrespective of when the treatment starts, this will be a solid argument for the causal role and effectiveness of the treatment.

This study was part of a project evaluating a new mind–body program called Meditation-Based Lifestyle Modification (MBLM; Bringmann et al., 2020). This holistic program encourages and empowers participants to adopt a beneficial lifestyle in order to experience sustained eudaemonic well-being, mental health, and human flourishing. Meditation-Based Lifestyle Modification is based on the eight-fold yoga path and covers three main domains that correspond, in short, to (1) yoga's ethical education, (2) postures and breathing practices, and (3) meditation. We describe them in more detail in the Method section. The type of meditation taught is mantra meditation. Previous reviews and meta-analyses substantiated the positive effects of mantra meditation (Sedlmeier et al., 2012; Lynch et al., 2018). However, they also criticized the poor methodological quality of most studies on mantra meditation and recommended conducting higher quality research into this topic.

We employed MBLM as a test bed for our research. We dismantled the MBLM program and investigated different combinations of its components. At the same time, we evaluated MBLM's efficacy in a healthy population. Although it has been designed as a mind–body therapy for patients with mental disorders, it might be beneficial for preventive purposes, too. Comparable preventive effects have been observed for Mindfulness-Based Stress Reduction (MBSR), which was originally developed for patients suffering from chronic pain (Kabat-Zinn, 1982). Meanwhile, it has become a widespread and widely researched intervention for all kinds of conditions (Grossman et al., 2004). Moreover, yoga was initially designed as a spiritual path for healthy individuals (Feuerstein, 2012). Therefore, we would expect positive outcomes for an intervention that incorporates as many yoga components as MBLM.

Both yoga theory and research literature suggest that combined interventions should be more effective than simple interventions. Yet, research findings were inconclusive on determining what specific combinations were best for what purpose (Matko et al., 2021a). Consequently, we chose an additive design and designed four conditions (see below). From theory, we would expect a small effect for the meditation alone condition, a larger effect for the two conditions including meditation and another component, and the largest effect for the full MBLM program. Conversely, it might be equally reasonable to expect a specific combination of components to be more effective than the full program. The investigation of the ethical component in this study is of particular relevance, as it might have an even bigger impact on participants than physical yoga (Smith et al., 2011). To our knowledge, no other study has contrasted all of these combinations in a comparative study. Moreover, no other study has employed a multiple-baseline design for this purpose. As this field of investigation is relatively new, we combined quantitative and qualitative methods to explore inter-individual differences and differences between conditions.

The present study is part of a larger project in which we measured a wide range of dependent variables commonly associated with the effects of yoga and meditation. Selection of variables was based on theoretical considerations and suggestions found in existing literature (Hölzel et al., 2011; Gard et al., 2014). For this paper, we decided to focus on the most commonly investigated outcomes in the yoga literature: well-being, stress, and life satisfaction. Findings on these variables were not always unequivocal, especially for stress and life satisfaction. Following our considerations above, we would expect favorable effects on all outcome variables, but specifically for the combined conditions. Nevertheless, the present study is exploratory in nature. Thus, we refrained from formulating predefined hypotheses and focused on two central research questions instead. First, what are the incremental effects of ethical education and physical yoga on mantra meditation? Second, what

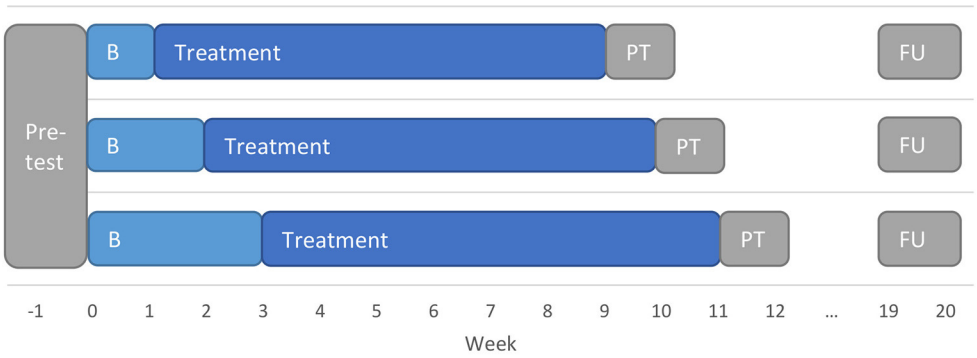

FIGURE 1 | Multiple-baseline design employed in the present study. B, baseline; FU, follow-up; PT, Posttest.

combinations of components are particularly effective? Is more or is less more?

METHODS

Procedure

This study employed a multiple-baseline design with a priori determined phase lengths. During baseline, participants engaged in their usual daily activities and received no treatment. We randomized participants across three baseline lengths (7, 14, or 21 days) and four treatment conditions. The conditions were mantra meditation alone (MA), mantra meditation plus physical yoga (MY), mantra meditation plus ethical education (ME), and mantra meditation plus physical yoga and ethical education (MYE). Each treatment lasted 8 weeks and participants started according to their baseline condition. The overall study duration varied across participants, ranging from 9 to 11 weeks. Treatments were run on Thursdays (MYE 9:00 to 12:00 a.m.; MA 1:00 to 2:00 p.m.) and Fridays (ME 9:00 to 11:15 a.m.; MY 12:15 a.m. to 2:00 p.m.).

All measurements were taken online. Participants completed an extensive battery of questionnaires (see **Supplementary Material A—Table A1**) during pretest in the week before the baseline measurements commenced. All participants started their baseline measurements on the same day and received daily online questionnaires throughout their entire baseline and treatment phases. After the treatment had ended, participants completed another battery of questionnaires during posttest. Follow-up measures were taken 8 weeks and 12 months after posttest. **Figure 1** depicts the study design.

Participants

We recruited participants via the central experiment server and the university sport mailing list of the Dresden University of Technology and through flyers and handbills distributed in Dresden. All those interested had to complete a short online screening survey. Two hundred thirty-six people completed the screening survey, of whom 128 did not meet our inclusion/exclusion criteria and 51 declined to participate. Participants had to be older than 18 years and had to ensure they had daily access to web-enabled devices. Exclusion criteria were pre-existing psychiatric conditions, acute psychological issues, or a regular yoga or meditation practice during the last 6 months. Those meeting our criteria were invited to an information event, which was led by KM and HCB. During this event, we fully disclosed the nature of the study to participants, but emphasized that this study was exploratory and we did not know what effects the different conditions might have. Participation was voluntarily and all participants provided written consent to participate in the study. They received no financial or other compensation for their participation in the study, but they had the opportunity to win one of ten €50 gift coupons at the completion of the study. The institutional review board of the Chemnitz University of Technology approved the experimental protocol.

Fifty-seven meditation-naïve participants were randomized to one of 12 subgroups employing simple random sampling without replacement in Excel. Prior to randomization, each subgroup received a number and participants were allowed to indicate a preferred day (Thursday/Friday) without knowing which treatment took place on which day. We used these indications to split the sample into two equal blocks (Thursday/Friday), tossing a coin if participants had not indicated a preferred day. Then, we generated random numbers for each participant within each block and assigned them to one subgroup in ascending order. Their treatment condition was revealed to them directly after randomization, but were not allowed to switch to another group. Seven participants dropped out during the baseline phase before the intervention started and provided no reason for dropping out (see **Figure 2**). Eight participants dropped out during the intervention, mostly because of time issues. Although there was some attrition toward the end of the data collection period (see below), but not during posttest or follow-up, we decided to include all remaining participants in our analysis. Single-case research designs allow for a much closer examination of each case and the statistical methods we employed for data analysis are relatively robust against missing data. The final sample consisted of 42 participants (83.3% female, mean age 26.62 years, $SD = 8.37$). Sociodemographic data differed slightly across conditions (see **Table 1**) and was, therefore, statistically controlled in our statistical analyses.

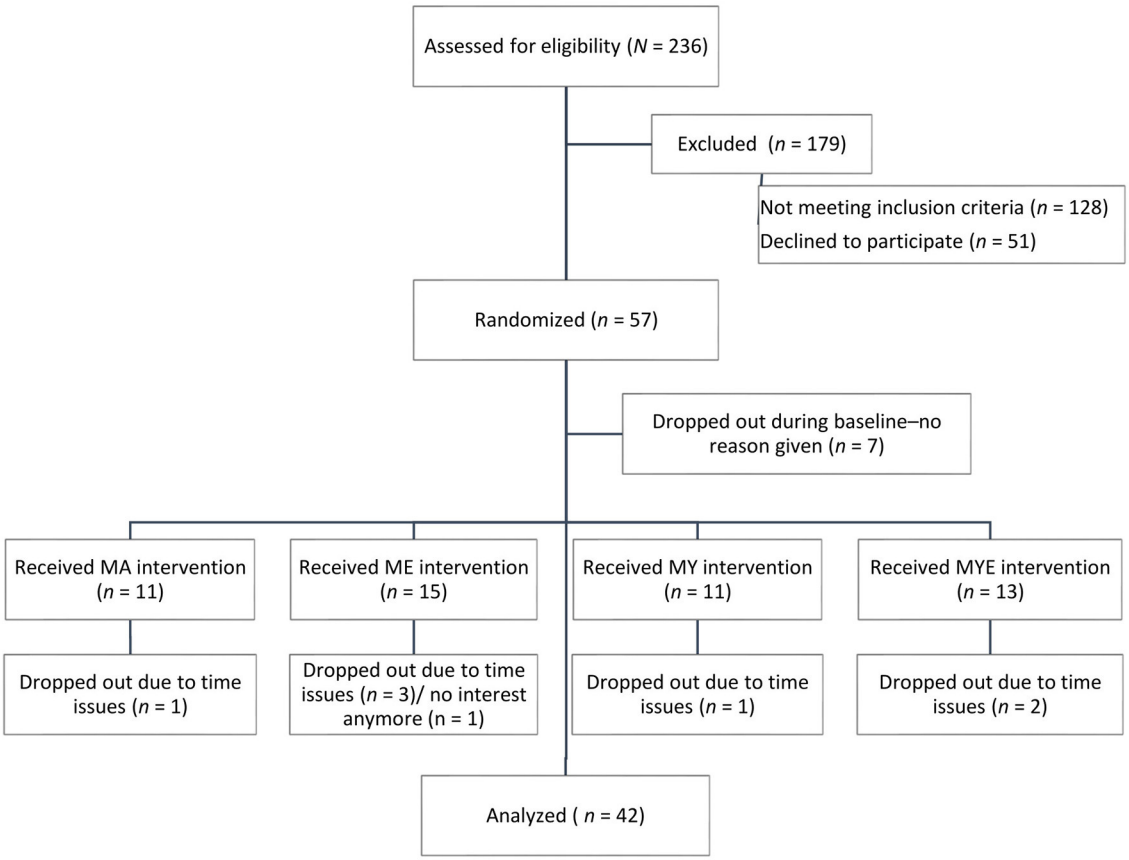

FIGURE 2 | CONSORT flow chart of participants in the study.

TABLE 1 | Sociodemographic data of participants in each condition.

Variable	Condition				Total
	MA	ME	MY	MYE	
n	10	11	10	11	42
Gender (% female)	90.0	72.7	90.0	81.8	83.3
Age (years)					
M (*SD*)	29.00 (10.40)	25.09 (5.74)	27.60 (12.32)	25.09 (2.95)	26.62 (8.37)
Range	22–57	19–36	18–61	19–30	18–61
Occupation					
% students	80.0	72.7	90.0	100.0	85.7
% employed	20.0	27.3	10.0	0.0	14.3

MA, Mantra meditation; ME, meditation and ethical education; MY, meditation and physical yoga; MYE, meditation, physical yoga, and ethical education.

Treatment: MBLM and Its Components

Weekly training sessions were dedicated to practicing together and discussing emergent questions or difficulties. All treatments were jointly led by KM and HCB, who are both experienced meditation teachers. HCB is an accredited psychiatrist and psychotherapist. KM is a psychologist and certified yoga instructor with 700 h of teacher training and 6 years of teaching experience. All treatments took place in the same seminar room that we rented for the study.

The length of the weekly sessions varied across conditions as each component had different time requirements: 25 min for meditation, 50 min for physical yoga, 75 min for ethical education, and at least 20 min for group sharing, plus time for breaks as required. The overall duration for each condition was as follows: MA = 60 min, MY = 105 min,

TABLE 2 | Set of physical yoga and breathing exercises taught in the physical yoga component including their sanskrit names, short descriptions, and proposed health benefits.

Yoga exercise	Sanskrit name	Description and health benefits
Breathing techniques (*pranayama*)		
Deep yogic breathing	Dirgha Pranayama	Deeply inhaling and exhaling into abdomen, chest and clavicular region, learning to use full breathing capacity
Victorious breath	Ujjayi Pranayama	"Ocean breath": Slightly contracting the throat while breathing, learning to inhale and exhale more slowly, more fully, and with more control
Dynamic breathing	Unknown	Standing and taking deep breaths while simultaneously moving the arms and the body in the rhythm of breathing, learning to match movement and breathing, activating effect
Postures (*asana*) and dynamic exercises (*vinyasa*)		
Sun salutation	Surya Namaskar	Set of 12 postures practiced subsequently in the rhythm of breathing; engages and warms up the whole body
Mountain pose	Tadasana	Gain sense of stable and good posture
Tree pose	Vrksasana	Improves balance
Eagle pose	Garudasana	Preparatory exercise: rolling shoulders; stretches area between the shoulders, strengthens legs, improves balance
Warrior pose II	Virabhadrasana II	Strengthens and stretches ankles, calves, and thighs, opens hips
Triangle pose	Trikonasana	Stretches and strengthens sides of the body
Wide-legged forward bend with clasp pose	Prasarita Padottanasana C	Opens shoulders and chest, stretches legs and the spine
Knees-to-chest pose	Apanasana	Relaxes back and neck, improves digestion
Supine spinal twist pose	Supta Matsyendrasana	Stretches abdomen and lower back, relaxes shoulders and back
Legs up the wall pose	Viparita Karani	Mild inversion pose, restorative
Boat pose	Navasana	Strengthens abdominal muscles
Cobra pose	Bhujangasana	Strengthens upper back, improves digestion
Child's pose	Balasana	Relaxes upper back, neck, and arms
Bound Angle Pose	Baddha Konasana	Opens hips
Half-spinal-twist pose	Ardha Matsyendrasana	Relaxes spine and neck, opens chest, tones waist
Deep relaxation in corpse pose	Savasana	Restorative, different relaxation techniques (autosuggestion, body scan)

ME = 135 min, MYE = 180 min. Each training session started with a discussion of participants' experiences and practice at home since the previous session and ended with another group sharing. All three components are explained in more detail in **Supplementary Material A—Section A2**.

All four conditions involved learning to meditate using mantra meditation. The key practice in this form of mantra meditation is silently repeating the chosen mantra while letting all other thoughts pass by and letting the breath flow naturally. Each weekly session in every condition included a 25-min silent (i.e., non-guided) mantra meditation practice. During the physical yoga practice, each class started with approximately 10 min of breathing exercises, followed by 30 min of postures and dynamic exercises, and concluded with a 10-min guided relaxation (see **Table 2**; for more detailed information on yoga practices, see, e.g., Iyengar, 2009; Stephens, 2011).

Ethical education followed the protocol developed for the MBLM mind–body program (Bringmann et al., 2020). Each week, we introduced one of the 10 *yamas* and *niyamas*, with the last three *niyamas* being grouped together for time reasons into one topic called "transcendence." After we introduced each topic, we invited participants to discuss its application and relevance for their daily lives and engage in related mindful living activities (see **Table 3**) during the following week. In the next session, they shared and reflected upon their experiences. Participants received handouts for each treatment component including detailed information and instructions for practicing at home. We asked all participants to practice their respective treatment practices daily, that is, 20 min of mantra meditation, 20 min of yoga exercises, and/or mindful living activities.

Measures

Instruments for daily/weekly measures had to be suited to experimental single-case designs in that they had to be precise, relatively short, and sensitive to changes while not exhibiting floor or ceiling effects. We carried out extensive preparatory work and a pilot study (Quasten, 2019) to test and finalize our selection of instruments. All questionnaires were programmed and implemented with SoSci Survey (Leiner, 2019) and made available to participants on www.soscisurvey.com. Data were collected between 21 March 2019 and 31 July 2019.

Well-Being

Participants' daily well-being was measured with the very short and economical World Health Organization Well-Being Index (WHO-5; World Health Organization, 1998). The WHO-5 is a

psychometrically sound self-report measure with high internal consistency and high convergent validity (Brähler et al., 2007). It consists of five items that were rated on a 6-point Likert scale. High scores represent a high state of well-being. As we collected well-being daily in the present study, we adapted the time frame of this measure to "the last 24 h."

Stress

The Perceived Stress Scale (Cohen and Williamson, 1988) is a widely used self-report measure that we employed weekly in the present study to measure stress. It intends to capture the degree to which people perceive situations in their life as excessively stressful relative to their ability to cope. Respondents rated each of the 10 items on a 5-point Likert scale of 1 (*never*) to 5 (*very often*). It has shown good internal consistency ($\alpha = 0.78$) and moderate convergent validity.

Life Satisfaction

The Satisfaction with Life Scale (SWLS; Diener et al., 1985) has been extensively used as a measure of the life satisfaction component of subjective well-being. We used it in the present study during pre- and post-testing. The SWLS is a very short self-report measure with five items that are rated on a 7-point Likert scale of 1 (*strongly disagree*) to 7 (*strongly agree*). Internal consistency of the scale is high ($\alpha = 0.92$).

Daily Practice

With the beginning of the treatment phase, we asked participants to track their home practice in the daily questionnaire. All participants had to supply information on the length of their daily meditation practice ("How many minutes did you meditate today? Fill in '0' if you did not practice today.") as well as the time of day they practiced. Furthermore, they were asked to rate their experiences with this day's meditation practice on a 5-point polarity profile. They were presented with three items to measure (a) experienced difficulty/ease ("Meditating was very difficult … very easy"), (b) wakefulness ("I was feeling sleepy … awake), and (c) relaxation ("I was feeling very restless … very relaxed"). Participants in conditions including physical yoga practice were asked to provide information on their yoga practice in a similar manner. We added one more item to assess experienced coherence of breath during yoga practice ("The practice and my breath were non-coherent … coherent"). Participants in ethical education conditions were asked only two questions, about (a) engagement in ethical practice ("Did you engage in any of the mindful activities today?") and (b) experienced difficulty of the current topic of ethical education.

Course Satisfaction

The Client Satisfaction Questionnaire (CSQ-8; Attkisson and Zwick, 1982) was developed to assess global client satisfaction along a single dimension in clinical settings. We used it in this study during posttest to determine participants' satisfaction with the course they completed. The CSQ-8 has eight items that are rated using a 4-point Likert scale. It is considered a reliable ($\alpha = 0.92$) and valid instrument.

Adverse Events

The posttest included a list of 70 possible adverse events or extraordinary experiences associated with meditation or yoga practice. We gathered this list from several publications on adverse effects of meditation and yoga (Matsushita and Oka, 2015; Cebolla et al., 2017; Lindahl et al., 2017) and categorized all events and experiences into 10 clusters of related symptoms: neurological, somatic, pain, cognitive, emotional, motivational, changes in necessities, difficulties in life, compulsive meditation, and altered states of consciousness (see **Supplementary Material A—Table A4**). Participants were instructed to mark all events and sensations they had experienced during the treatment phase and to rate their severity (mild, moderate, severe) and duration in days (1–2, 3–6, 7–13, 14–20, $\geq$21), respectively.

Special Occurrences

Participants had the opportunity to describe any special events that occurred throughout their day in a free text item in the daily questionnaires.

Data Analysis

Single-case data are usually analyzed using multiple approaches, the most common being visual inspection of dependent-variable-by-time plots (Gage and Lewis, 2013; Lane and Gast, 2014). There are multiple ways how these data can be analyzed statistically, with multifaceted proposals and ongoing debates concerning this issue (Burns, 2012; Evans et al., 2014; Shadish, 2014; Machalicek and Horner, 2018). Various effect size estimates have been proposed, each with their individual advantages and disadvantages (Parker et al., 2011a; Tarlow, 2017; Pustejovsky, 2019). We analyzed data in three ways—by visual inspection, calculating effect sizes using Tau-*U*, and multilevel modeling. All methods are described below. If all three analyses converged, this would provide strong evidence for our findings. In addition, we enriched our quantitative analyses with qualitative findings, where appropriate, to explore selected single cases and possible reasons for inter-individual differences.

Statistical analyses on the incremental effects of the four conditions were exploratory in nature. We repeated two coding schemes using different dummy variables. To investigate whether there were any general differences between the four conditions, we used three dummy variables to code the four conditions (condition model). We used this model to estimate the overall explanatory power of the dummy variables using the *anova*-function in R. To examine whether there were any differences regarding the inclusion of different program components, we prepared two other dummy variables. These coded the presence vs. absence of ethical education or physical yoga (0 = *without component*, 1 = *with component*) in the respective condition (component model). As our four treatments differed in session length and demographic factors, we included individual practice time, age, gender, occupation, and baseline length in both models to control their influence statistically. To estimate individual practice time, we calculated sum scores of the reported length of each practice participants engaged with at home. For ethical

TABLE 3 | Topics of the ethical education component with corresponding week(s) they were taught in the study, sanskrit names, and sample mindful living exercises.

Week	Topic	Sanskrit name	Sample mindful living exercises
***Yamas*—universal ethics/right living with others**			
1 and 9	Non-violence	Ahimsa	Practice praising instead of criticizing (also of myself) Practice respecting my boundaries (e.g., taking breaks)
2 and 10	Truthfulness	Satya	Write down how I really think and feel Practice being truthful instead of "nice"
3	Non-stealing	Asteya	Recognize inner and outer abundance in my life Practice giving when I receive something
4	Self-restraint	Brahmacharya	Enjoy eating/working/watching TV before excess or inertia sets in
5	Non-hoarding	Aparigraha	Clear things out that I don't need Recognize expectations I have concerning myself and others
***Niyamas*—individual ethics/right living with yourself**			
6	Cleanliness	Sauca	Practice bodily cleansing (e.g., intermittent fasting) Recognize and enjoy moments of purity
7	Contentment	Santosha	Practice being thankful for things that happened today Refrain from chasing or avoiding specific things I like/dislike
8	Transcendence	Tapas (self-discipline) Svadhyaya (self-study) Ishwara pranidana (devotion)	Practice faculty of discrimination ("Is this conductive to my goals?") Read a spiritual text Try to connect to the miracles of life

practice, we multiplied participants' entries (1/0) by 20 min to get a comparable estimate of practice duration. As we expected combined interventions to have stronger effects than the simple meditation intervention, we applied one-tailed tests of significance by dividing the resulting p levels by two. We considered $p < 0.05$ to be statistically significant.

All statistical analyses were performed using R 3.6.3 (R Core Team, 2020). Plots were generated with the statistical packages lattice (Sarkar, 2008) and ggpubr (Kassambara, 2020). Tau-U estimates were calculated and analyzed using the package scan (Wilbert and Lueke, 2019), and multilevel models were conducted using the package nlme (Pinheiro et al., 2020). Proportion of explained variance in multilevel models was calculated using the R-based online application mimosa (Titz, 2020). All scripts and data that support the results can be found at osf.io/n7y64/.

Visual Analysis

We kept our visual analysis relatively simple for pragmatic reasons as our sample was exceptionally large for an experimental single-case study. We used the R packages scan and lattice to generate individual dependent-variable-by-time plots with according level and trend lines. Following common visual analysis standards (Kratochwill et al., 2010), we then assessed whether there were perceivable trends in the baseline or the treatment phase, and whether there were differences between the means and the variability of data in each phase. Furthermore, we analyzed the immediacy of the effect after the onset of the treatment and the consistency of data patterns across individuals. Finally, we compared all individuals in one condition to individuals in the other conditions to see whether the observed patterns differed between conditions.

Tau-*U*

To provide a nuanced measure of phase non-overlap we calculated Tau-*U*. Parker et al. (2011b) initially proposed Tau-*U* as a non-parametric estimate of effect size in single-case research designs that allows controlling trends observed in both phases. Tau-*U* is a family of non-parametric rank correlation indices that, as such, are relatively robust to autocorrelation and have shown good statistical power. In this study, we calculated Tau-*U* coefficients for each participant and each dependent variable. We assumed trends in the data to be theoretically probable, both in response to repeatedly filling out questionnaires in the baseline phase and in the form of a continuous improvement in the treatment phase. Therefore, we corrected trends in both phases if they were statistically significant, larger than 0.40, or visually prominent. Accordingly, we chose and reported corrected effect size estimates for these individuals (Tau-$U_{\text{A vs. B}-\text{Trend A}}$, Tau-$U_{\text{A vs. B}+\text{Trend B}}$, or Tau-$U_{\text{A vs. B}+\text{Trend B}-\text{Trend A}}$). If no trends were evident, we reported Tau-$U_{\text{A vs. B}}$. We applied the interpretative benchmarks provided by Solomon et al. (2015) where an effect size of less than 0.28 indicates a small effect; 0.29–0.47 a moderate effect; 0.48–0.57 a large effect; and 0.58 or above a very large effect.

We explored possible differences between conditions by first generating and comparing boxplots of Tau-*U*s for the four conditions. Second, we conducted two multiple regression analyses predicting Tau-*U* estimates by the different dummy variables described above. Analyzing the effects of condition or component on effect size estimates resembles cross-level interactions in multilevel modeling.

Multilevel Modeling

Multilevel modeling (also known as hierarchical linear modeling) is a powerful tool for modeling correlated data in which observations are nested within individuals and for examining both individual change and group differences (Dedrick et al., 2009; Hox, 2010). It has been proposed as a suitable method for analyzing multiple-baseline data (Ferron et al., 2009). In this study, we modeled changes over time within each

individual on one level and differences between individuals on a second level. Prior to all analyses, we standardized all variables to obtain standardized regression coefficients and reliable interaction terms.

For each dependent variable, we estimated several models with increasing levels of complexity. However, as we were primarily interested in the cross-level interactions, we report only the final models. The full estimation procedure can be found in **Supplementary Material B** (**Tables B1, B2**). We modeled a cross-level interaction between time and dummy variables to determine whether any condition or component had an incremental beneficial effect on participants in this study. The following equation shows the final component model:

$$\begin{aligned} y_{ij} &= \gamma_{00} + \gamma_{01} ethical\ education_j + \gamma_{02} physical\ yoga_j \\ &+ \gamma_{03} age_j + \gamma_{04} gender_j + \gamma_{05} baseline\ length_j + \gamma_{10} time_{ij} \\ &+ \gamma_{11} ethical\ education_j * time_{ij} + \gamma_{12} physical\ yoga_j * time_{ij} \\ &+ u_{0j} + u_{1j} time_{ij} + r_{ij} \end{aligned}$$

where y_{ij} refers to the dependent variable, all γ variables refer to fixed effects, and all u and r variables refer to random effects.

Time was a contrast-coded Level 1 variable representing the expected slope of change that occurred from baseline to treatment phase. It was coded with zero for the baseline phase as we expected no systematic change in this phase, and a logarithmic trend starting at the beginning of the treatment phase. We applied the logarithmic curve as this is a type of growth commonly observed in psychology (Jones et al., 2005), and it provides a better conceptual fit than a linear trend. If we observed substantial variation in individual slopes during visual inspection, we modeled time as a random slope. Furthermore, we applied one-tailed tests of significance to the time variable as we expected all treatments to exert a positive effect on our participants.

Data were screened and corrected for (illegitimate) outliers due to data-entry errors. Other (legitimate) outliers were hard to identify. Hence, we treated them conservatively by not excluding them. Following a proposal of Nakagawa and Schielzeth (2013), we used two effect size estimates to assess the proportion of explained variance in each model, namely, marginal R^2 (variance explained by fixed factors), and conditional R^2 (variance explained by both fixed and random factors). All models were estimated using the restricted maximum likelihood estimation procedure.

Missing Data

Because of the admittedly high response load with daily questionnaires over a period of 71–85 days, we did have some missing data in the present study, specifically toward the end of the data collection period. Some data points were missing because some participants simply forgot to respond to the questionnaire on some days, or because a few participants reported (during class) stressful life events that kept them from responding. Mean amount of missing data across participants was 18.5% (range 2.8–45.9%). We performed all analyses with the data available bearing in mind the limitations of this approach (Peng and Chen, 2021). Only one participant failed to respond at posttest and follow-up and another one failed to respond at follow-up. We excluded these two participants from the analysis of life satisfaction.

RESULTS

In this section, we first report on participants' adherence to our treatment. Then, we present the results on our three main outcome variables: well-being, perceived stress, and life satisfaction. For the two continuously measured variables, we first present individual plots for each participant and report the results of our visual inspection. Second, we report on our statistical analyses of these variables employing Tau-U effect size estimates and multilevel modeling. In the final part of the Results section, we explore possible moderator variables that might help explain the effects found for our main outcomes. These moderator variables are course satisfaction, adverse, or extraordinary events experienced during the treatment, and subjective experiences with the daily practice.

Adherence

First, we looked at whether participants actually engaged in their respective daily home practice. Compared to all other conditions, participants in the meditation-only condition reported significantly higher daily meditation practice durations, $M_{MA} = 18.2$, $SD = 9.7$; $M_{ME} = 14.7$, $SD = 9.3$; $M_{MY} = 14.0$, $SD = 9.8$; $M_{MYE} = 13.1$, $SD = 10.2$; $F_{(3,\ 1,908)} = 23.45$, $p < 0.001$. This might be because, in contrast to the other conditions, this was the only home practice participants were supposed to engage with. We plotted the engagement in all three home practices over time and examined the respective plots (see **Supplementary Material C—Figures C1–C3**). For meditation practice, we observed a decline in practice duration across all conditions toward the end of the study. Remarkably, participants in the MYE condition reported higher average practice duration/frequency in Hatha yoga and mindful living activities, compared to participants in the ME or MY conditions, yoga: $M_{MYE} = 15.7$, $SD = 13.1$; $M_{MY} = 12.6$, $SD = 12.2$; $t_{(959)} = -3.81$, $p < 0.001$, and ethics: $M_{MYE} = 0.74$, $SD = 0.44$; $M_{ME} = 0.68$, $SD = 0.47$; $t_{(1,046)} = -2.18$, $p = 0.030$. However, practice times may be underestimates, as participants may have engaged in home practice on days for which they did not complete the daily questionnaire.

Course adherence was moderate to high. Apart from four participants who attended only one, two, or three group sessions but consistently practiced at home, the majority of participants attended at least six of the eight group sessions. Adherence was a bit higher in conditions that involved ethical education ($M_{ME} = 6.09$; $M_{MYE} = 6.64$) than in the other two conditions ($M_{MA} = 5.50$; $M_{MY} = 5.20$).

Well-Being

Visual Analysis

Figure 3 depicts the well-being scores of each participant over the course of time. It is subdivided into four plots, one for each condition. As can be seen from this figure, well-being scores show strong fluctuation and variation over time

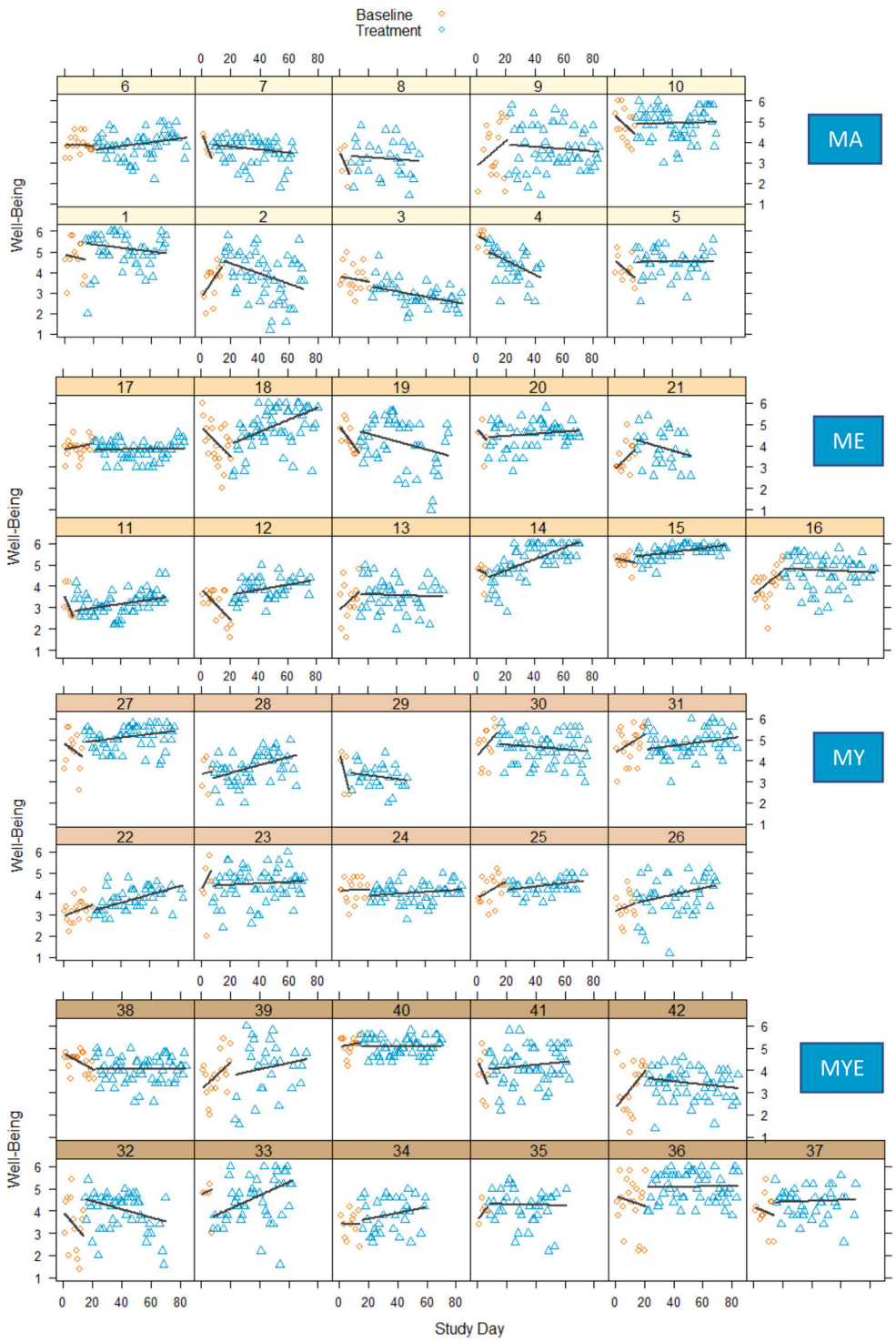

FIGURE 3 | Well-Being scores in four conditions during baseline and treatment phases for each participant with regression lines for each phase. MA, Mantra meditation only; ME, meditation and ethical education; MY, meditation and physical yoga; MYE, meditation, physical yoga, and ethical education.

and the amount of daily fluctuation varies inter-individually. Some points in this figure stand out as days with especially low well-being. Most of these days correspond to life events participants experienced as very challenging, for example, exams, illnesses, or a separation, and reported during the weekly sessions.

For most participants, the baseline phase cannot considered to be stable. Around half of the participants showed a decline in their well-being scores during the baseline phase and a third showed an increase, the reason for this finding being unclear. Comparing both phases, some participants showed no observable changes in level and/or slope (e.g., Participants 9, 23, 31, 40), whereas most profited from the treatment, some more obviously (e.g., Participants 14, 15, 22, 36) than others (e.g., Participants 11, 26, 27, 28). Strong positive effects seem to be present predominantly in the ME condition. On the other hand, some participants exhibited a decline in well-being over the course of time, especially toward the end of the treatment. This might indicate an increasing fatigue with the intervention, which might be particularly true for those participants who prematurely stopped responding to the daily questionnaires (e.g., Participants 4, 21, 29). Yet, the decline was most pronounced in the group of participants who were practicing mantra meditation only (e.g., Participants 1–4).

For most participants, well-being increased gradually either from the beginning of the treatment or after a small delay of 1 or 2 weeks. Quite a few participants reported having mastered the meditation technique after initial difficulties at 2 weeks after the beginning of the treatment. After a few more weeks, however, participants reported getting bored or feeling stuck with meditating. While some of them found ways to revive their motivation or find deeper meaning in meditating, others resigned, or tried to uphold their meditation practice without connecting it to a deeper meaning. We observed the latter more frequently in the MA condition and less frequently in the other conditions. These qualitative findings correspond to our analysis of experienced meditation difficulty over time, which we report at the end of the Results section. Intriguingly, it seems that the experiences during the process of learning meditation were closely related to daily well-being.

Overall, these results strengthen the impression that people respond quite differently to meditation interventions. There seem to be discernible differences between the four treatment conditions, too, indicating a negative effect of the meditation-only intervention. To further explore and validate our visual analysis we conducted two distinct statistical analyses.

Statistical Analysis

Tau-U

The Tau-*U* statistic was calculated to assess the effect size of the intervention for each participant (see **Supplementary Material B—Table B3**). Most effect size estimates ranged from 0.20 to 0.40, indicating a small to moderate improvement of well-being for the majority of participants. We observed the largest positive effect sizes (0.42–0.46) for Participants 14, 15, and 22. Three participants (3, 4, and 38) had a substantially lower well-being following the treatment (−0.30 to −0.51).These results correspond to our visual analysis.

Next, we looked at potential explanations for the strong negative effects. Participant 3 (MA) had an especially hard time trying to learn mantra meditation. She almost always rated her meditations as being very hard. Participant 38 (MYE) deeply appreciated her course but reported having elevated levels of stress due to beginning work on her master's thesis, which coincided with the beginning of the treatment. We had considered excluding Participant 4 (MA) from the analysis as she attended only the first two sessions of her meditation course and stopped responding to the daily questionnaires in Week 5 of the treatment. However, she had meditated very conscientiously at home for 20–30 min nearly every day. Unfortunately, we do not know whether there were other reasons that caused her to drop out of the study. When we contacted our participants after 12 months, she stated that the course had a very positive impact on her and that meditation proved to be a valuable resource in her life. Participant 3 had stopped meditating soon after the course had ended, whereas Participant 38 used meditation and yoga practice regularly as a means to cope with tension or establish mental calm. The latter stated that the topics of ethical education were often present in her mind.

To allow for better comparison, we also looked at the qualitative statements of the three participants with the highest positive effect sizes. For Participants 14 and 15, the participation in the course (both ME) had led to profound changes in perspective. Specifically, the ethical education component had informed their actions and thoughts in their daily lives up to 12 months after the study had ended. They both continued to meditate: Participant 14 meditated daily and Participant 15 once or twice a week. The former also enthusiastically described how the course had inspired her to follow a spiritual path and form a group of like-minded people to regularly meditate and exchange. Participant 22 (MY) described how she had dived into an intensive yoga practice after the course, which she continued up to the present. She did not continue to meditate. Interestingly, Participants 14 and 15 found meditating very easy from the very beginning of the treatment. All three participants reported meditation becoming increasingly easy over the course of time.

After this qualitative evaluation, we grouped all Tau-*U* effect size estimates by condition and generated according box plots (**Figure 4**).

The box plots in **Figure 4** reinforce our impression from visual inspection. On average, the MA condition had no effect on participants' well-being [$Mdn = 0.07$, interquartile range (IQR) = 0.30]. All other conditions, however, enhanced participants' well-being. This was particularly pronounced in the two conditions involving ethical education, ME ($Mdn = 0.30$, IQR = 0.22) and MYE ($Mdn = 0.23$, IQR = 0.22), and less pronounced in the MY condition ($Mdn = 0.12$, IQR = 0.35).

We further statistically explored these differences using multiple regression analysis. We entered the effect size estimates as the dependent variable and the abovementioned dummy and control variables as predictors (see **Supplementary Material B—Table B4** for a correlation matrix of all variables). The aggregated effect of all four conditions was $F_{(3,33)} = 2.78$, $p = 0.028$, pointing to existing differences between them. The condition model indicated a significant effect for the ME condition, $\beta = 0.56$, $p = 0.006$, the MYE condition, $\beta = 0.51$, $p = 0.028$, and, pointed to an effect of the MY condition, $\beta = 0.30$, $p = 0.066$ (see **Supplementary Material B—Table B5** for the full regression table). The component model provided evidence for the effectiveness of the ethical education, but not

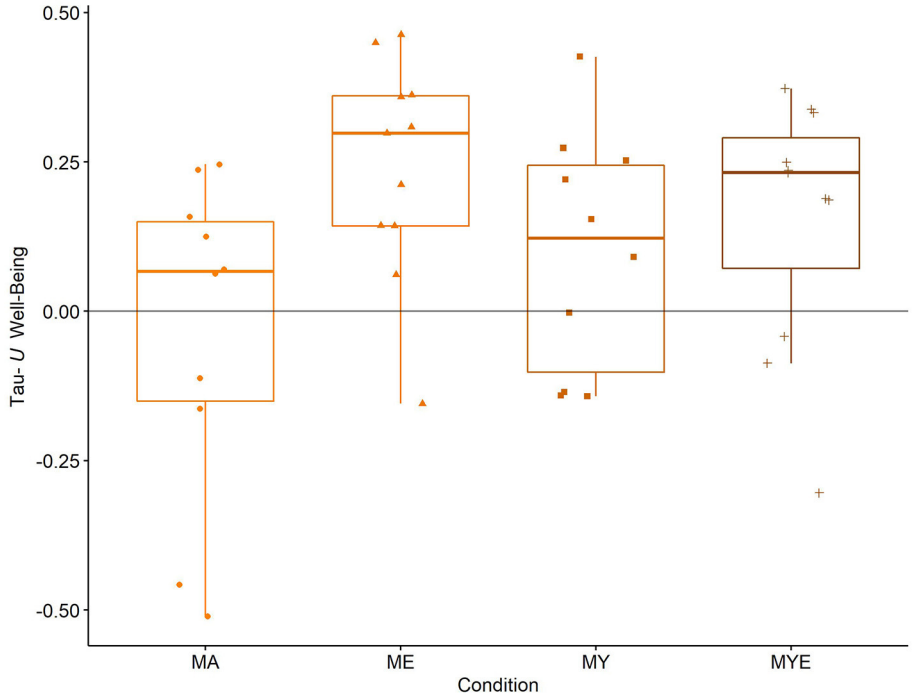

FIGURE 4 | Box plots for averaged Tau-*U* well-being estimates in each condition. Individual well-being estimates are scattered across the box plots. MA, Mantra meditation only; ME, meditation and ethical education; MY, meditation and physical yoga; MYE, meditation, physical yoga, and ethical education. Whiskers represent the largest and lowest values within a distance of 1.5 times the interquartile range.

TABLE 4 | Regression model for Tau-*U* well-being estimates as dependent variable and effective component, age, gender, and baseline length as predictors ($df = 36$).

Variable	*b*	β	*SE*	*t*	*p*
(Intercept)	0.32	0.00	0.21	1.55	0.131
Ethical education (yes/no)	0.20	0.44	0.09	2.33	0.013
Physical yoga (yes/no)	0.08	0.17	0.09	0.93	0.179
Total practice time	0.00	−0.28	0.00	−1.36	0.183
Age	−0.01	−0.24	0.01	−1.12	0.270
Gender	0.03	0.06	0.10	0.36	0.723
Occupation	0.05	0.07	0.14	0.32	0.755
Baseline length	0.00	−0.08	0.01	−0.48	0.635

the physical yoga component in improving subjective well-being (**Table 4**).

Neither practice time, age, gender, occupation nor baseline length significantly predicted changes in well-being over time in any model. The multiple R^2 was 0.22, indicating that there was still unexplained variance in this model. In summary, it seems that the ethical education component had a positive effect on well-being whereas MA or in combination with physical yoga did not. Conversely, yoga seemed to buffer the negative effect of meditation alone.

Multilevel Modeling

We used a similar procedure for multilevel modeling. Time slopes were modeled as random effects. When we estimated the effect of all dummy variables taken together, that is, the effect of the group factor, we found a significant effect of time, $F_{(1,2,492)} = 6.73$, $p = 0.005$, and a significant cross-level interaction between time and condition, $F_{(3,2,492)} = 3.53$, $p = 0.007$. The significant effect of time indicates that well-being did not change during the baseline phase, but gradually increased over the course of the treatment for the majority of participants irrespective of their condition. The significant interaction, on the other hand, suggests differential improvements, such as some conditions yielding stronger improvements than others. In the condition model, there was a significant effect of time, $\beta = 0.08$, $SE = 0.03$, $p = 0.004$, indicating a global improvement across all treatments. However, all three interaction terms were significant, too, ME: $\beta = 0.13$, $SE = 0.04$, $p = 0.001$, MY:

TABLE 5 | Multilevel regression estimates for well-being scores as dependent variable and time, effective component, age, gender, and baseline length as predictors.

Variable	β	*SE*	*df*	*t*	*p*
Time	0.08	0.03	2493	2.45	0.007
Ethical education (yes/no)	−0.01	0.12	34	−0.11	0.912
Physical yoga (yes/no)	−0.07	0.12	34	−0.61	0.547
Total practice time	0.15	0.12	34	1.24	0.222
Age	0.07	0.12	34	0.53	0.600
Gender	0.08	0.10	34	0.84	0.407
Occupation	−0.17	0.13	34	−1.31	0.198
Baseline length	0.00	0.10	34	0.01	0.993
Time * Ethical education	0.07	0.03	2493	2.09	0.018
Time * Physical yoga	0.03	0.03	2493	0.92	0.178

$\beta = 0.09$, $SE = 0.04$, $p = 0.011$, MYE: $\beta = 0.09$, $SE = 0.04$, $p = 0.011$ (see **Supplementary Material—Table B6**). This speaks to the supplementary benefit of all three combined interventions and suggests that well-being scores in the combined conditions, particularly in the ME condition, showed a steeper upward slope in the treatment phase. The component model is depicted in **Table 5**.

There was a significant effect of time as well as a significant interaction between time and ethical education. None of the moderators was a significant predictor of well-being. Thus, it seems that the treatment had an overall positive effect on participants' well-being, but conditions involving ethical education produced stronger enhancements than those that did not. Marginal R^2 of this model was 0.05, and conditional R^2 was 0.45, indicating that only 5% of the variance could be explained by the fixed effects time, components, practice time, age, gender, occupation, and baseline length, whereas 45% was attributable to individual differences.

All three analyses converge, suggesting a generally positive effect of all four treatments on our participants' well-being. Additionally, all analyses show that the combined interventions were more effective than the simple meditation intervention, and that the ethical education component was particularly beneficial in this regard. This effect was independent of the accumulated amount/length of all home practices participants completed. We explore possible explanatory and moderator variables for these findings at the end of the Results section.

Stress

Visual Analysis

Figure 5 displays weekly stress scores for each participant over the course of the study.

Compared to well-being, perceived stress seemed to fluctuate a lot less. Again, there was substantial variation in participants' general stress levels, their weekly fluctuations as well as their response to the treatment. It was hard to make reliable inferences on baseline trends as there were too few data points in the baseline phase. Cautiously comparing both phases, most treatment curves show a slight to considerable downward trend, indicating reduced stress levels. Only a few participants exhibited unchanging stress levels from baseline to treatment phase (e.g., Participants 7, 33, 39). However, corresponding to our analyses of well-being, some participants experienced an increase in perceived stress. This might possibly have been due to the heightened effort required to participate in our indeed quite demanding study. It seems that the treatment was particularly demanding for participants in the most extensive condition MYE as well as for participants in the MA condition. Conversely, most participants in the MY condition exhibited a consistent reduction in perceived stress. This was also true for a large proportion of participants in the ME condition.

Statistical Analysis

Tau-U

We had to rely on far fewer measurements for this calculation of effect sizes. Particularly estimates for participants with a baseline length of 7 days need to be interpreted with care. On average, effect size estimates are markedly larger than effect size estimates of well-being and range from −1.00 to 0.87. Yet, most effect sizes range from −0.74 to 0.40, indicating moderate to very large effects on perceived stress. A reduction of perceived stress was desirable—thus, a negative sign in effect sizes represented a change in the expected direction. Whereas the stress level increased for 16 participants, it decreased for 22 participants. Only three participants had an effect size close to zero. The full Tau-*U* table can be found in **Supplementary Material B** (**Table B7**).

Six participants exhibited large decreases in perceived stress over time, and Participant 41 showed a very large decrease. Three of these received the MY treatment. Indeed, the majority of participants in the MY condition reported decreased levels of stress throughout the treatment, in contrast to most other conditions. Participants 34 and 38 (both MYE condition) showed very large increases in perceived stress over time. The latter had already been identified as experiencing significant decreases in well-being (see above). This was not true for Participant 34, but, she had only very few measurement points in total, indicating an overestimation of the effect. Again, it seems as if the MA condition had the least favorable effect, as half of the participants in this condition exhibited moderate increases and only two moderate decreases in stress. We further explored these apparent

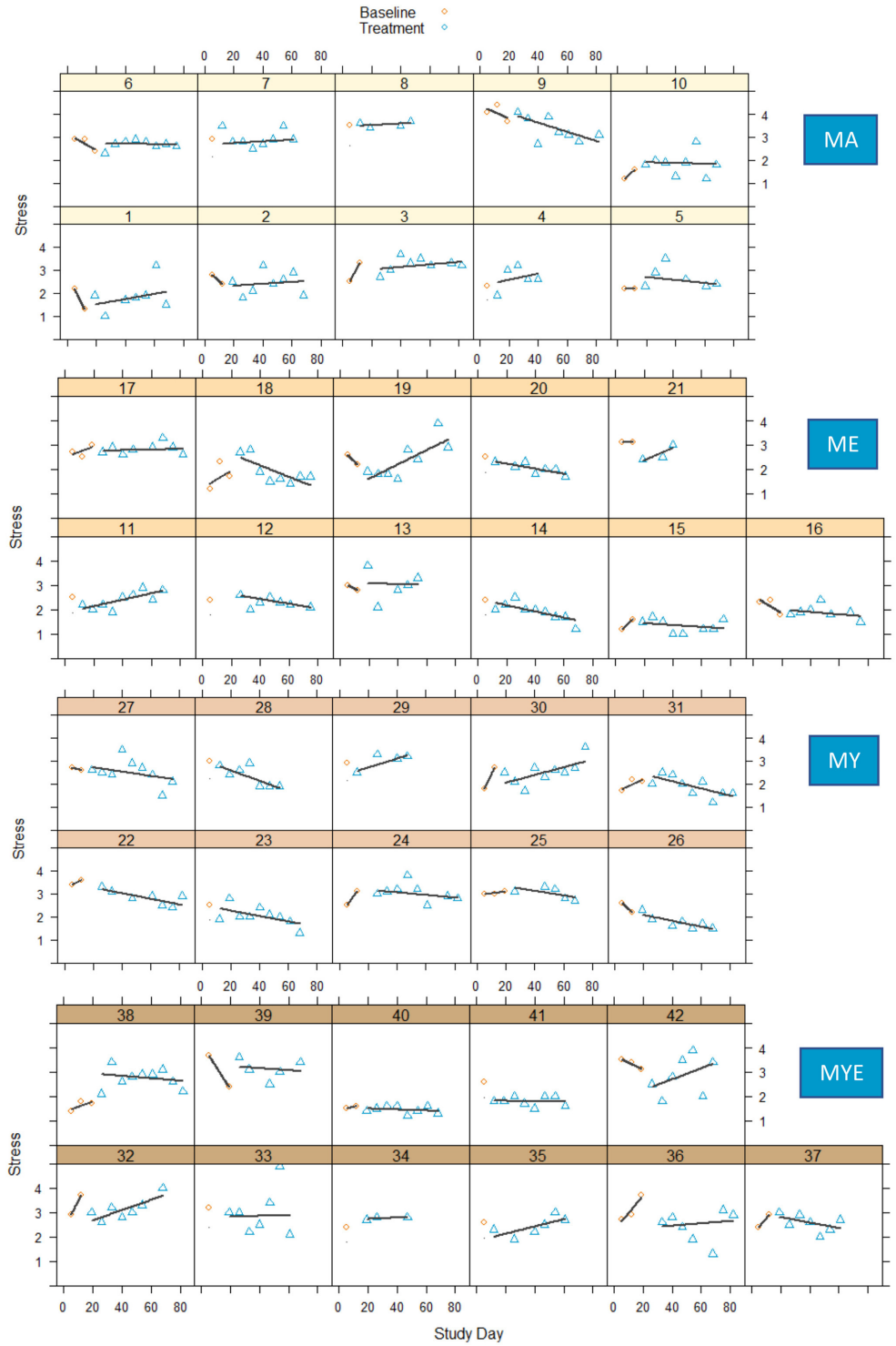

FIGURE 5 | Stress scores during baseline and treatment phases for each participant with regression lines for each phase. MA, Mantra meditation only; ME, meditation and ethical education; MY, meditation and physical yoga; MYE, meditation, physical yoga, and ethical education.

differences between conditions by generating box plots for each condition (**Figure 6**).

The box plots in **Figure 6** underpin our impression from the visual inspection and qualitative evaluation. On average, meditation alone (MA) slightly increased perceived stress ($Mdn = 0.17$, IQR $= 0.38$). In contrast, the treatment helped reduce stress a little in the MYE condition ($Mdn = -0.11$, IQR $= 0.62$) and to a moderate amount in the ME

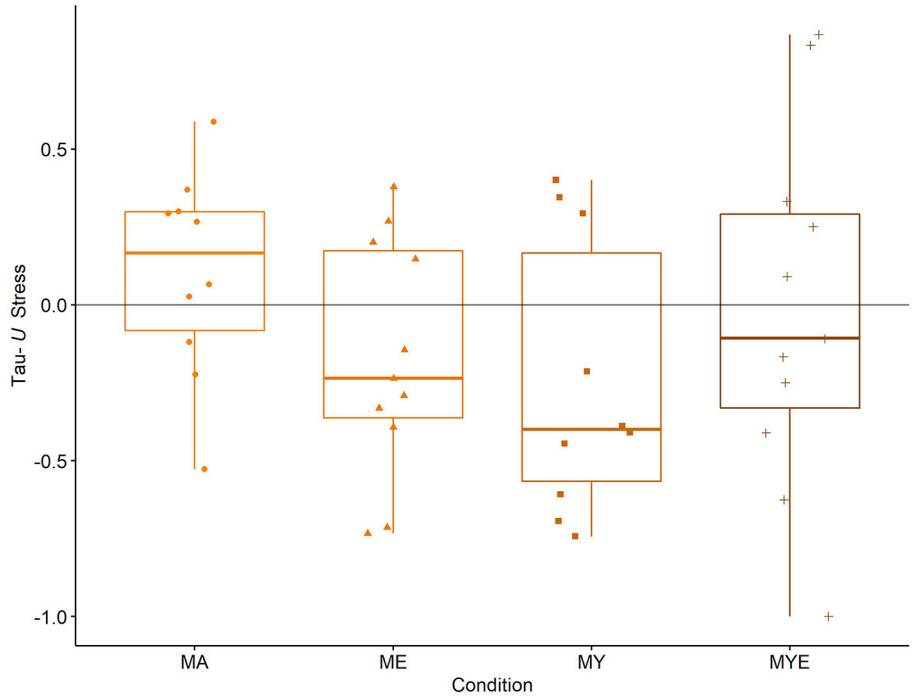

FIGURE 6 | Box Plots for averaged Tau-*U* stress estimates in each condition. Individual stress estimates are scattered across the box plots. MA, Mantra meditation only; ME, meditation and ethical education; MY, meditation and physical yoga; MYE, meditation, physical yoga, and ethical education. Whiskers represent the largest and lowest values within a distance of 1.5 times the interquartile range.

condition ($Mdn = -0.24$, IQR = 0.54) and the MY condition ($Mdn = -0.40$, IQR = 0.73).

Furthermore, we performed the same regression analyses as for well-being. When we estimated the total effect, we found no differences between conditions, $F_{(3, 33)} = 1.20$, $p = 0.161$. This was true also for the condition model (see **Supplementary Material B—Table B8**) and the component model (**Table 6**). Neither practice time, age, gender, occupation nor baseline length significantly predicted perceived stress in either model. Multiple R^2 of the component model was 0.07.

Apparently, the trends we observed during visual analysis were not as substantial. Nevertheless, the slightly negative effect of the MA condition corresponds to the results we found for well-being. As we expected, Tau-*U* estimates of well-being and stress correlated considerably ($r = -0.41$).

Multilevel Modeling

Time was modeled as a random slope. Results differed from those we found with effect size estimates. Overall, there was no significant effect of time, $F_{(3, 331)} = 1.69$, $p = 0.097$, nor a significant cross-level interaction, $F_{(3, 331)} = 0.97$, $p = 0.205$. This also applied to the component model (see **Table 7**).

Interestingly, accumulated practice time was a significant predictor in this model, indicating that the more participants engaged in a regular home practice the more their stress decreased, independent of the condition they were assigned to. Obviously, total practice time was longer in more extensive conditions, but still varied across participants.

In the condition model (see **Supplementary Material B—Table B9**), the cross-level interaction between time and the MY condition was significant, $\beta = -0.09$, $SE = 0.06$, $p = 0.051$, suggesting that this condition led to the greatest reductions in perceived stress. The magnitude of change was comparable to results obtained for well-being. Yet, two variables had an even greater impact on perceived stress. Practice time was, again, a significant predictor of stress reduction, $\beta = -0.42$, $SE = 0.14$, $p = 0.006$, whereas being employed (compared to being a student) significantly predicted an increase of stress, $\beta = 0.37$, $SE = 0.15$, $p = 0.023$. In this model, marginal R^2 was 0.22 and conditional R^2 was 0.64.

In sum, findings on stress are inconclusive. Whereas the visual analysis of the line graphs and box plots indicated a stress-relieving effect of all combined treatments, but especially the MY condition, both types of regression analyses did not uncover a significant effect of time or meaningful differences between conditions. Contrary to well-being, engagement in home practice significantly predicted stress reduction in multilevel modeling. It seems that the total amount of home practice was more relevant for a successful stress reduction than the actual treatment participants completed.

Life Satisfaction

A mixed two-way ANOVA yielded a significant effect of time, $F_{(2, 72)} = 3.46$, $p = 0.037$, with a small effect size, $\eta^2 = 0.01$. The four groups did not differ in their overall life satisfaction, $F_{(3, 36)} = 1.27$, $p = 0.301$; nor was there a significant interaction

TABLE 6 | Regression model for Tau-*U* stress estimates as dependent variable and effective component, age, gender, and baseline length as predictors ($df = 36$).

Variable	*b*	β	*SE*	*t*	*p*
(Intercept)	−0.12	0.00	0.44	−0.27	0.786
Ethical education (yes/no)	0.03	0.04	0.18	0.18	0.430
Physical yoga (yes/no)	−0.02	−0.02	0.18	−0.12	0.452
Total practice time	0.00	−0.15	0.00	−0.66	0.512
Age	0.01	0.10	0.01	0.44	0.664
Gender	0.21	0.18	0.20	1.03	0.310
Occupation	−0.02	−0.02	0.30	−0.07	0.947
Baseline length	0.00	−0.01	0.01	−0.04	0.972

TABLE 7 | Multilevel regression estimates for stress scores as dependent variable and time, effective component, age, gender, and baseline length as predictors.

Variable	β	*SE*	*df*	*t*	*p*
Time	−0.06	0.05	332	−1.19	0.117
Ethical education (yes/no)	0.02	0.14	34	0.13	0.900
Physical yoga (yes/no)	0.30	0.14	34	2.09	0.044
Total practice time	−0.37	0.15	34	−2.45	0.020
Age	−0.19	0.15	34	−1.24	0.224
Gender	−0.09	0.12	34	−0.76	0.453
Occupation	0.29	0.16	34	1.82	0.078
Baseline length	0.07	0.12	34	0.59	0.556
Time * Ethical education	0.01	0.05	332	0.13	0.447
Time * Physical yoga	−0.04	0.05	332	−0.82	0.207

between time and group, $F_{(6, 72)} = 0.51$, $p = 0.796$. The mean life satisfaction across all groups was $M_{pre} = 4.99$ ($SD = 1.16$) before the study, $M_{post} = 5.24$ ($SD = 1.12$) at completion of the study, and $M_{fu} = 5.24$ ($SD = 1.14$) 2 months later. Thus, life satisfaction increased from pre- to posttest for all participants from our study, and this increase remained stable until follow-up. This increase did not depend on the specific treatment they received. Accordingly, learning how to meditate seems to be sufficient to experience increased life satisfaction.

Potential Explanatory Variables

We now explore a few variables that might help explain some of the inter-individual variance we observed in the main analyses. For this analysis, we employed mainly exploratory and descriptive methods, such as figures, correlations, and frequency tables.

Course Satisfaction

Apart from one participant (Case 4) in condition MY who attended class only once and primarily practiced on her own, class ratings were high in all conditions (the maximum rating being 4)—MA: $Mdn = 3.44$; ME: $Mdn = 3.75$; MY: $Mdn = 3.38$; MYE: $Mdn = 3.62$. Participants in the two conditions that involved ethical education reported a somewhat higher satisfaction with their course, $F_{(1,39)} = 3.99$, $p = 0.053$, which might explain the higher course adherence in these two groups.

Adverse or Extraordinary Events

We required participants to mark all symptoms they had experienced throughout the study that were directly related to their practice. These symptoms could be positive (strong positive emotions during meditation), negative (fear, emotional distress), or neutral (feeling hot or cold). Unfortunately, we did not assess whether participants rated their experiences as adverse or not. We transformed duration ratings numerically to resemble comparable intervals. For each cluster of symptoms, we summed up number, severity, and duration ratings to calculate cluster scores. Two participants reported no symptoms, but this could as well represent a lack of diligence. Therefore, we excluded them from the following analyses.

All symptoms were mentioned by at least one participant. The five most common symptoms were exhaustion (54%), impression that something is missing in life (41%), inner tension (39%), strong positive feelings during meditation (33%), and the feeling of oneness with all that is (33%). The six least common symptoms, mentioned by only one participant each, were fainting, redness of the skin, sweating, losing interest in one's surroundings, impression that not meditating is a waste of time, and impression that only people who meditate are valuable people. The most affecting symptoms in terms of number, severity, and duration were reported in the cluster of somatic symptoms (mean affecting score $M = 7.98$), followed by emotional symptoms ($M = 5.92$), and altered states of consciousness ($M = 5.33$). On average, participants reported

experiencing 11.8 symptoms ($SD = 9.57$, range 1–44) with a mild severity ($M = 1.42$, $SD = 0.35$) for around 6.2 days ($SD = 4.26$). No adverse events necessitated referral to a health professional.

Participants in the MYE condition reported the most symptoms (altogether 138), followed by those in the MA condition (127) and the ME condition (117). The fewest symptoms were reported by the MY group (77). We tested all symptom clusters for significant differences between conditions employing one-way ANOVAs. Thereby, we found potentially meaningful differences in the number and severity of emotional symptoms, $F_{(3, 35)} = 2.48$, $p = 0.077$, and $F_{(3, 35)} = 2.81$, $p = 0.054$, respectively, and the duration of neurological symptoms, $F_{(3, 35)} = 2.77$, $p = 0.056$. Pairwise t-tests revealed that participants in the MY and ME conditions experienced significantly fewer emotional symptoms than those in the MA condition, and, furthermore, participants in the MY condition experienced them as less severe. On the other hand, the ME group experienced significantly longer neurological symptoms than the other groups, but, specifically the MY group. A detailed analysis revealed that these neurological symptoms were predominantly a numbness of body regions, a shaking of the body, and involuntary body movements. It seems, thus, that practicing physical yoga prevents some of the possibly adverse symptoms associated with the practice of mantra meditation and ethical education.

Daily Practice

Throughout the treatment, we daily asked participants to rate their experiences with their respective home practice/s. We now present a qualitative review of the changes and differences between conditions that we observed during visual inspection (see **Supplementary Material C—Figures C4–C11**). For all variables, we observed substantial variation between participants as well as strong day-to-day fluctuations within participants.

For perceived *meditation ease*, we detected a clear upward trend over time, indicating that for most participants meditation got easier over the course of the intervention. This trend was most evident in participants in the ME condition. For some participants, meditation ease stayed more or less the same over time. These participants mainly belonged to the MA and MY conditions. Three participants in the MYE condition experienced increased difficulty in meditating toward the end of the treatment. The visual analysis of perceived *relaxation during meditation* revealed a transition from restlessness to a more relaxed state over time for the majority of participants. Still, ratings of perceived relaxation varied strongly from day to day, suggesting that meditation quality strongly depended on mood and daily form. There were no apparent differences between conditions. *Wakefulness during meditation* showed a similar pattern. The majority of participants experienced a shift from being tired during meditation to being more wakeful, particularly participants from the MY condition.

For *yoga experience* variables, there were no perceivable differences between the two conditions that received physical yoga as a treatment. Wakefulness and relaxation during yoga exercises were consistently high to very high for most participants. In contrast, perceived ease of yoga exercises and their coherence with the breath increased over time for most participants. There were no consistent findings regarding perceived *ease of ethical exercises*. This might have been due to the heterogeneity of weekly topics participants were supposed to engage with. During our weekly meetings, participants repeatedly reported that some topics were more challenging for them than others. To test this assumption, we conducted a simple regression analysis with ease of ethical practice as dependent variable and topic of ethical education as predictor. We set the hardest topic as the reference category (truthfulness) and found that only two topics were significant predictors of perceived ease—non-stealing, $b = 0.50$, $SE = 0.14$, $p < 0.001$, and contentment, $b = 0.62$, $SE = 0.16$, $p < 0.001$. Furthermore, we found substantial correlations between the subjective experience variables, indicating that on "good" days participants perceived all of their home exercises as easier and were more relaxed and awake during meditation and/or yoga (for more details see **Supplementary Material A—Section A5**).

Dose–Response and Experience–Response Relations

We evaluated the effects of dosage and subjective experience on the daily fluctuations in our dependent variables during the treatment phase by adding four predictor variables on Level 1 (daily meditation practice duration, perceived meditation ease, relaxation, and wakefulness) to the component models described above. Similar to in other studies (Fredrickson et al., 2017), we used unstandardized values in our models and person-mean centered the meditation variables. In the following, we point out main findings; for full multilevel regression tables see **Supplementary Material B** (**Tables B10, B11**). All of these models take into account only measurement points from the treatment phase. Thus, they do not allow for comparisons between baseline and treatment phases.

For well-being, we found significant positive effects for all subjective meditation experience variables (all $p < 0.02$ to $p < 0.001$), but not for meditation practice duration. This means that participants who experienced meditation as easier and were more relaxed and awake during meditation on a given day, compared to their own typical level of daily experience, reported higher levels of well-being on that day. Surprisingly, this effect was independent of the duration of their meditation practice. Unfortunately, we cannot tell from our data whether participants experienced higher well-being because of their meditation, or whether their meditation was easy because they were feeling well. For stress, only relaxation during meditation predicted lower stress levels on a given day ($p < 0.05$).

We were able to explore the direction of these effects tentatively by considering the time of meditation practice that participants reported. We found that meditating in the morning positively influenced well-being on that day and that participants meditated less on days when they were feeling well and more when they were feeling less stressed (for more details see **Supplementary Material A—Section A6**).

DISCUSSION

The present study provides the first in-depth insights into the incremental impact of ethical education and physical Hatha yoga on mantra meditation in healthy participants. At the same time, it dismantled and investigated diverse combinations of the components of the new MBLM mind–body therapy (Bringmann et al., 2020), which is based on the yoga path. The single-case multiple-baseline design gave detailed access to individual responses and trajectories of change. Participants in all four conditions enjoyed their course and established a regular home practice, indicating that MBLM is a feasible and helpful intervention for a predominantly young and healthy population. Course satisfaction and adherence was a bit higher in conditions that involved ethical education. Ethical education also had the greatest impact on increasing participants' well-being. While results on well-being were quite strong and unambiguous, findings on stress were inconclusive. Overall, the majority of participants experienced an increase in well-being and a decrease in stress over time. However, for both variables, the combined interventions had more positive effects on participants than the simple meditation intervention.

For stress, changes could not be consistently attributed to the inclusion of a specific component. The MY condition was the most efficient in reducing stress, tentatively speaking to a stress-relieving effect of physical yoga. The MA condition was the least effective as some participants showed a decrease in well-being and/or an increase in stress over time. The positive effects of ethical education on well-being were independent of the total amount of home practice participants completed, suggesting a benefit specific to this yoga component. These results provide evidence for the differential effects various combinations of yoga components can elicit.

Interestingly, life satisfaction significantly improved across all conditions from pre- to posttest and had continued to improve when measured at 2 month follow-up. Thus, participating in any of our four interventions, whether simple or complex, seemed to be beneficial for contentment in life. This might be an effect specific to mantra meditation, as all conditions involved this practice. Alternatively, it might be due to unspecific factors common to all conditions, such as group dynamics, social support, or attention from study staff. Yet, the latter might be unlikely as the effect persisted until follow-up. From a eudaemonic perspective, decreased hedonic well-being, as reported above for the MA condition, is not inconsistent with increased life satisfaction (Ryan and Deci, 2001). Even if participants felt more stressed during the treatment, they might have gained profound insights during meditation that significantly affected their perspective and satisfaction with life.

Overall, we observed high inter- as well as intrapersonal variability in responses emphasizing the potential relevance of personality factors in this regard. While some participants benefited strongly from their treatment, others did not change much, and still others experienced a deterioration in their well-being or an increase in perceived stress. Similarly, for some participants meditating was really easy from the beginning, for most it got easier as they practiced, and for some it remained difficult throughout. The different dimensions of subjective experience during home practice were interrelated, suggesting that meditation or yoga exercises were easier when participants felt relaxed and awake. Physical yoga might be helpful in this regard as participants in the MY condition experienced the most prominent increase in wakefulness during meditation. Ethical education, on the other hand, can be quite challenging or unsettling and thus can impair relaxation during meditation. From our observations of the different classes, the transition to meditation was much smoother and quieter in the conditions where meditation was preceded by physical Hatha yoga (MY and MYE) than in the ME condition. Nonetheless, the latter showed the greatest improvement in perceived meditation ease. As this condition also showed the greatest increases in well-being, it appears to have been a very effective combination. The combination of physical yoga and meditation (MY), though, seems to have been particularly beneficial in reducing stress and adverse events associated with the treatment.

Framing Mantra Meditation Enhances Its Effects

It is not easy to compare our findings to results of earlier studies. Although there have been some comparative or dismantling studies (Matko et al., 2021a), no study employed an additive design comparable to ours. Most studies compared rather complex interventions with each other, and only a few actually dismantled or added program components (e.g., Smith et al., 2011; Hunt et al., 2018). Only one study compared a complex Kundalini Yoga program (including meditation, breathing, and some movement) to a meditation program entailing mantra and breathing meditation (Shannahoff-Khalsa et al., 2019) and found that the complex yoga program[1] outperformed the simple meditation program. This is in line with the results of our study. Conversely, it is not quite clear why the mantra meditation condition in our study elicited no changes or even negative effects. Mantra meditation has been shown to have a strong impact on negative emotions, stress, anxiety, and depression, but not necessarily well-being (Sedlmeier et al., 2012; Lynch et al., 2018). However, there are to date only a few investigations into the effects of mantra meditation on healthy participants that are methodologically sound and more research into this matter is needed.

Interestingly, our mantra meditation intervention differed significantly from earlier investigations. The format of teaching mantra meditation might not have been optimal. Participants received only minimal instructions and were then "thrown in at the deep end" with instructions to immediately begin practicing 20–25 min of silent meditation. Research has shown that letting participants engage in a guided meditation practice resulted in greater improvements than letting them engage in silent

[1]We acknowledge that both groups in the respective study were classified as meditation and our labeling might divert from the traditional Kundalini Yoga (as taught by Yogi Bhajan) view. Yet, as the Kundalini Yoga group also entailed breathing and movement practices (contrary to the Relaxation Response) and, thus, more components from the classical yoga path, we decided to label it a "complex yoga program".

meditation (Trivedi et al., 2020). Mantra meditation has been proposed as a suitable practice for both beginners and advanced meditators (Devananda, 1999), and also for patients with mental disorders (Orme-Johnson and Barnes, 2013). Nevertheless, individual factors might influence the liking of and coping with a specific meditation technique and, therefore, its effects (Hölzel et al., 2011). We assessed a multitude of personality factors in the larger project this study belongs to, and will explore possible interactions in future publications. Another factor could have been that participants were fully informed about the experimental procedure and might have been disappointed at receiving only the minimal treatment. Accordingly, comparing equally extensive interventions, for example, diverse meditation techniques, might lead to different effects.

Furthermore, interventions in other mantra meditation studies were embedded in a spiritual framework and enriched by rituals, additional exercises, or a sense of secrecy or sacredness. Most mantra meditation programs follow a specific spiritual teacher or lineage (Kirtan Kriya, Mantram Repetition, Passage Meditation, and Transcendental Meditation). Research has shown that spirituality is a critical ingredient in mantra meditation and can tremendously enhance its effects (Wolf and Abell, 2003; Wachholtz and Pargament, 2005). Although we employed spiritual mantras in this study, we did not provide any additional information on the belief systems or spiritual entities behind these mantras. Thus, our mantra meditation intervention was rather technical and less devotional than other programs. This might have impaired its effectiveness.

Indeed, providing participants with some kind of framework, such as physical yoga or ethical education, reversed the negative effect of mantra meditation in this study. While ethical education provided a philosophical framework to contextualize the practice of mantra meditation as well as experiences made during meditation, physical yoga offered a bodily or embodied framework. Yoga postures and breath work help people calm body and mind and develop a better connection to and understanding of their own bodily processes (Schmalzl et al., 2015; Kishida et al., 2018). Traditionally, postures and breathing were considered preparatory exercises that preceded meditation and helped the yogi reach the "stilling of the changing states of the mind" described in the Yoga Sutras (Bryant, 2015). Likewise, the ethical practice of the *yamas* and *niyamas* was supposed to ground and permeate all other yogic practices, such as postures or meditation (Feuerstein, 2012).

Following these assumptions, the full MBLM program (MYE) should have led to the greatest effects, but this was not the case. It seems, rather, that certain combinations of practices were more helpful than others and effects could not be reduced to simple dosing effects. Indeed, in this sample of healthy adults, a bit more was better than much more as the ME and MY treatments outperformed the MYE treatment. One reason for this finding might be the substantially longer class duration in the MYE condition as well as the larger amount of assigned home practice. Interestingly, in a systematic review, effect sizes did not change in shortened vs. original MBSR treatments, and shorter assigned practice time was associated with larger effect sizes (Carmody and Baer, 2009). In our study, the total amount of home practice participants completed was not related to well-being outcomes, but was related to stress outcomes. This indicates that less extensive interventions are probably easier to integrate into people's lives, but more practice helps to reduce stress more. Furthermore, the eight-fold yoga path was designed as a lifelong journey for spiritual seekers on their way to enlightenment (Feuerstein, 2012). Participants in scientific studies (and meditators in general) are usually motivated to meditate for much more mundane reasons (Sedlmeier and Theumer, 2020). Thus, providing participants with a less extensive set of practices might give them more time to adjust and assimilate.

Specific Combinations of Practices Yield Different Effects

In this context, which component of the yoga path or, rather, which combination of components is most effective? We cannot give a comprehensive answer to this question, as we investigated only four possible combinations of practices, but will tentatively discuss our findings in the following. The intensive ethical confrontation in the ethical education groups invited participants to reconsider some of their maladaptive cognitive, emotional, and behavioral habits and divert them to a more adaptive direction. Essentially, this is one of the core principles of cognitive-behavioral therapy and stress reduction programs (Lehrer et al., 2007; Powers et al., 2017).

The ethical education component of MBLM might help attendees gain a deeper awareness of their goals and values in life, empowering them to make adaptive choices and switch off the "automatic pilot" of daily actions. Acting in accordance with personal values has positive effects on well-being and quality of life (Brunstein, 1993; Franquesa et al., 2017). Likewise, the importance of value-related behavior has become increasingly popular in psychotherapy, for example, in acceptance and commitment therapy (Hayes et al., 2004), and in positive psychology in general (Seligman, 2004). It has been suggested as a potential mechanism of mindfulness (Kocovski et al., 2009) and yoga (Sullivan et al., 2017) interventions. Our findings are also in line with research demonstrating that incorporating ethical practice into yoga or mindfulness interventions increased their efficacy (Smith et al., 2011; Chen and Jordan, 2020). Remarkably, engagement in intergroup discussions was strongest in the ME condition, even after the class had ended. In contrast to all other conditions, these participants also formed an informal meditation group and continued to meet after they finished the study. It might well be that this group initiated a self-reinforcing process that boosted the treatment's efficacy.

Engaging in physical Hatha yoga practice and simple breathing exercises might have initiated an upsurge in resilience to stress (Hartfiel et al., 2011; Manincor et al., 2016). Perceived stress decreased most in this condition and participants reported the fewest and the mildest emotional and other adverse symptoms during the treatment. This speaks to the protective effects of physical yoga practice. Findings from other studies support the positive effect of (physical) yoga on psychological well-being and stress (Bhat et al., 2012; Gard et al., 2012;

Gorvine et al., 2019). Conversely, some studies found no effect on stress (Quach et al., 2016; Park et al., 2020). Admittedly, the yoga interventions under investigation in these studies varied greatly, making it hard to draw reliable conclusions. Yet, many of the abovementioned studies used psychological as well as physiological measures of stress. Thus, a multimodal assessment and use of more standardized intervention protocols (Sherman, 2012) in future studies might provide more support for the stress-relieving effect of physical yoga.

Possibly, physical yoga might have enhanced non-judgmental metacognitive monitoring, as the yoga instructor repeatedly encouraged participants to observe their bodily sensations and thoughts in an accepting and non-judgmental manner. This process has been proposed as a central mechanism in yoga-based practices (Schmalzl et al., 2015) and mindfulness meditation (Lindsay et al., 2018). This accepting stance might have broadened to include the meditation practice, making it easier for participants to meditate. Moreover, physical yoga and breath work have been found to decrease sympathetic response and increase vagal/parasympathetic activity (Gard et al., 2014; Riley and Park, 2015), thereby intensifying the calming effect of yoga. In contrast to participants in the other conditions, participants in the MY condition were the least talkative during and after class and developed the least group cohesion. Our impression was that the MY condition provided participants with a valid opportunity to increase self-care but did not lead to the profound reorientation and reconsideration of values that we observed in the two ethical education conditions.

Limitations and Future Directions

The single-case multiple-baseline design enabled us to monitor changes in well-being, stress, and subjective experience continuously and with a high time resolution. However, a few features of the study might limit the generalizability of its outcomes. First, we recruited a convenience sample of young healthy participants from the general public, which consisted mainly of students. The majority of participants were 18–36 years old, with two exceptions—two women who were 57 and 61 years old. Nonetheless, age did not significantly predict any of the outcome variables. Still, this sample cannot be considered representative of the general public. Moreover, as participants received no financial compensation for their participation, we have to assume that they were intrinsically motivated to participate in this study and shared an inherent interest in or openness to yoga and meditation. The lack of financial compensation might explain the relatively high number of dropouts and high amounts of missing data and attrition toward the end of the study. Future studies should consider providing financial or other compensation to increase commitment in studies that employ intense data-gathering periods. Furthermore, this approach might also attract individuals who are less intrinsically motivated.

In single-case research, a sample of 42 participants is considered exceptionally large. With up to 85 measurements per participant for daily measures, findings, and effect size estimates should be very robust. This applies less to measures of stress. Usually, single-case research manuals recommend taking at least three to five baseline measurements (Barlow et al., 2009; Kratochwill et al., 2010). Unfortunately, this could not be achieved in all cases in this study. Thus, results on perceived stress should be interpreted with care. Future studies should either increase baseline lengths for all participants or try to capture perceived stress more often. The latter could be achieved by including simple questions in daily assessments, such as "How stressed have you felt throughout the day?"

The sample size was somewhat small for multilevel modeling and pre–post comparisons, though. Multilevel modeling is usually applied to much larger data sets with a large number of data points at both levels. However, simulation studies performed with multiple-baseline data have included fewer participants and measurements occasions and reported satisfactory results (Ferron et al., 2009; Moeyaert et al., 2017). Nevertheless, more research is needed to validate our findings. Likewise, subgroup samples for the four conditions were comparatively small for drawing reliable conclusions through ANOVAs. Nonetheless, we were able to comply successfully with one of the main limitations of yoga and meditation research, that is, finding suitable control groups. The meditation-only condition served as an appropriate baseline group for depicting the effect of meditation as well as factors common to a group setting (Kinser and Robins, 2013; Stein and Witkiewitz, 2020). Intriguingly, our study showed that these factors were maybe not as important and could not outweigh the partially negative effects of mantra meditation.

A couple of improvements could be made to make the treatment and the data collection more feasible and enjoyable for participants. First, it would be advisable to give participants more guidance on mantra meditation. Second, daily questionnaires could be shortened and at the same time be made more specific (see above). Alternatively, experience-sampling methods or ecological momentary assessment (Shiffman et al., 2008) provide an intriguing means to capture immediate experiences at different time points in one day. Furthermore, participants should be encouraged to make journal-like entries in the daily questionnaire and reliably report challenging situations, such as exams. This would enable researchers to understand the fluctuations in their daily experience better. We did provide a field for exceptional experiences in our questionnaire, but not all participants regularly made use of this.

Finally, future studies could dismantle the effects of the eight-fold yoga path in an even more detailed way. Accordingly, studies could compare the effects of combined practices to treatments incorporating only ethics, only physical yoga, in addition to only meditation. Alternatively, they could examine the effects of diverse meditation techniques in this context. Current research has revealed a multiplicity of meditation techniques (Matko and Sedlmeier, 2019; Matko et al., 2021b), most of which are under researched at present. Furthermore, yoga incorporates a collection of diverse breathing techniques that can have quite different, sometimes even opposing effects on practitioners (Raghuraj et al., 1998; Peng et al., 2004). Thus, future studies should examine different combinations of ethical education, postures, breathing practices, and meditation techniques. Dosing questions should be paid special attention in this context. The four conditions we investigated in this study differed in session

length, which might have influenced their outcomes. However, the assigned and reported home practice was comparable across the various components and could not account for differences in well-being change. Furthermore, as we mentioned above, the longest treatment was not the most effective. Nevertheless, more studies are needed to truly understand the multifaceted practice of yoga in its entirety. In the end, these research efforts could contribute to the development of a profound theory of yoga.

DATA AVAILABILITY STATEMENT

All scripts and data that support the results can be found at the Open Science Framework (osf.io/n7y64/).

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the institutional review board of the Chemnitz University of Technology. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

KM designed and executed the study, analyzed the data, and wrote the first draft of the manuscript. PS collaborated on the study design and data analysis. HB conceptualized and supervised the interventions and collaborated with the study design and data analysis. All authors worked on the final version of the manuscript.

FUNDING

This project was funded by Karl and Veronica Carstens Foundation under Award Number KVC 0/098/2018. The publication of this article was funded by Chemnitz University of Technology.

ACKNOWLEDGMENTS

We thank Christin Block and Felix Neuhaus for assisting in the execution of the study. We also acknowledge their and Annika Sternkopf's help in preparing and screening the data. We thank Ulrich Ott for the fruitful discussions concerning the clustering of adverse events. Thank you to Philipp Kanske for giving us access to the central experiment server of the Dresden University of Technology. Moreover, our thanks go to Anita Todd for her valuable comments on a previous version of this paper.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.672301/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

CONCEPTUAL ANALYSIS
published: 12 October 2021
doi: 10.3389/fpsyg.2021.727857

The Mindfulness Map: A Practical Classification Framework of Mindfulness Practices, Associated Intentions, and Experiential Understandings

Nava Levit-Binnun[1]*, *Keren Arbel*[1,2] *and Dusana Dorjee*[3]

[1] *Muda Institute for Mindfulness, Science and Society, Sagol Center for Brain and Mind, The Interdisciplinary Center (IDC), Herzliya, Israel,* [2] *Department of East Asian Studies, Tel Aviv University, Tel Aviv-Yafo, Israel,* [3] *Psychology in Education Research Centre, Department of Education, University of York, York, United Kingdom*

When considering the numerous mindfulness-based and mindfulness-informed programs that have flourished in the past decades it is not always clear that they all refer to the same "mindfulness." To facilitate more clarity and precision in describing, researching and teaching mindfulness in the secular settings, we propose a classification framework of mindfulness practices, intentions behind them and the experiential understandings the practices may aim to develop. Accordingly, the proposed framework, called the Mindfulness Map, has two axes. The first axis outlines mindfulness practices (and associated instructions) classified into four groups (MGs), e.g. the MG1 focuses on cultivating attention to the present moment somatic and sensory experience while the MG4 focuses on cultivating the ability to recognize and deconstruct perceptual, cognitive and emotional experiences and biases. The second axis outlines possible intentions (INTs) to cultivate particular experiential understanding (EU) *via* teaching and practicing the MGs, e.g., the INT1 designates the intention to gain EU of how our relationship to experience contributes to wellbeing, the INT2 refers to the intention to gain EU of the changing nature of body, mind and external phenomenon. We suggest that the same MG can lead to different EUs outcomes based on the specific INTs applied in their teaching or practice. The range of INTs and EUs included here is not exhaustive, there are further types the Map could be expanded toward. Aside from encouraging more fine-grained distinctions of mindfulness practices, the proposed Map aims to open discussions about interactions between MGs, INTs, EUs and practice outcomes. The Map may facilitate more nuanced and precise approaches to researching the range of outcomes cultivated by mindfulness practices, help bridge contradictory findings, and catalyze further debate and research into ethical aspects of mindfulness. The Map also highlights the need for further teaching development and research on longer-term trajectories of mindfulness practice. While the proposed Mindfulness Map organises the mindfulness practice territory along two axes, it is aimed as a starting point for further discussion and can be further revised and/or expanded by other axes.

Keywords: mindfulness, compassion, loving kindness, map, framework, experiential understanding, intention, insight

OPEN ACCESS

Edited by:
Sucharit Katyal, Technical University of Denmark, Denmark

Reviewed by:
Cristiano Crescentini, University of Udine, Italy
Craig Hassed, Monash University, Australia

***Correspondence:**
Nava Levit-Binnun
navalb@idc.ac.il

Specialty section:
This article was submitted to Cognitive Science, a section of the journal Frontiers in Psychology

Received: *19 June 2021*
Accepted: *13 September 2021*
Published: *12 October 2021*

Citation:
Levit-Binnun N, Arbel K and Dorjee D (2021) The Mindfulness Map: A Practical Classification Framework of Mindfulness Practices, Associated Intentions, and Experiential Understandings. Front. Psychol. 12:727857. doi: 10.3389/fpsyg.2021.727857

INTRODUCTION

"Mindfulness" is currently often used as an umbrella term. It typically denotes practices involving paying attention to both external and internal bodily sensations or mental contents, with certain attitudes and intentions. Mindfulness is also sometimes considered as a process, a state of mind and/or a trait (Davidson and Kaszniak, 2015; Dorjee, 2017). While the working definition that was coined by John Kabat-Zinn ("the awareness that emerges through paying attention on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment," (Kabat-Zinn, 2003) is often found in the non-Buddhist contexts (Kabat-Zinn, 2005), it is generally accepted that the definition is not exhaustive or exclusive (e.g., Bishop et al., 2004; Brown and Ryan, 2004; Fletcher and Hayes, 2005; Dorjee, 2010; Chiesa, 2013; Nilsson and Kazemi, 2016). Similarly, in the Buddhist tradition there is not a single agreed definition, theory or understanding of the term "mindfulness" (e.g., Dorjee, 2010; Bodhi, 2011; Dunne, 2011, 2015; Gethin, 2011, 2015; Anālayo, 2016).

Historically, mindfulness practices were considered foundational for the contemplative life and typically practiced alongside other practices that strengthen wholesome qualities, such as kindness and compassion, or in preparation and support for meditations that generate insight into the nature of the self (Dorjee, 2017; Dahl and Davidson, 2019). Arguably, psychological processes such as non-reactive attention and associated metacognitive (introspective) skills cultivated through mindfulness are involved in and built upon in other forms of meditation including those cultivating virtue-orientation and self-inquiry (Dorjee, 2013; Dahl and Davidson, 2019). This wide-reaching applicability of mindfulness across meditation types may be one of the reasons why the term "mindfulness" is now often used in a way that includes or implies other meditation practices such as those developing compassion or insight.

Thus not surprisingly, when looking at the myriad of mindfulness practices and programmes with mindfulness elements that have flourished in the past 30 years (Harrington and Dunne, 2015), it is often not clear whether they all refer to the same "mindfulness." For example, even within the well-researched Mindfulness-Based Stress Reduction (MBSR, Kabat-Zinn, 2013) and Mindfulness-Based Cognitive Therapy (MBCT, Segal et al., 2013) programs, participants learn mindfulness in various ways, across a range of practices such as mindful eating, body-scan, mindful yoga, and sitting meditations ranging from awareness to breathing to practicing open awareness (Kabat-Zinn, 2013; Segal et al., 2013). Recently, Thupten (2019), commented that: "Complications arise when one starts examining what exactly is being taught as 'mindfulness' in the secular context. Some see focus and awareness to be the two main skills that are taught; others emphasize open awareness and the attitude of non-judgment; and some also bring the affective tone of tenderness or kindness to be part of the core practice. Many modern mindfulness teachers also include elements of loving-kindness as part of their instruction."

Over the past years, several authors have proposed models and classifications of contemplative practices (Dorjee, 2010; Vago and David, 2012; Schmidt, 2014; Dahl et al., 2015; Garland et al., 2015; Lutz et al., 2015; Grossenbacher and Quaglia, 2017; Khoury et al., 2017; Lindsay and Creswell, 2017; Fresco and Mennin, 2019) usually emphasizing the underlying cognitive mechanisms. The present paper continues these efforts with the aim to reduce confusion and increase precision in describing and differentiating practices that are currently associated with the term mindfulness and suggesting a two-dimensional classification map. The first axis of the Mindfulness Map outlines four **groups of mindfulness practices (MGs)** commonly found in contemporary (secular) scientific discourse on mindfulness.

A related challenge is the lack of clarity about the experiential understandings that can be cultivated in different practices and the associated intentions behind the practices. The term "insight" is sometimes used in this context, but we prefer the term "experiential understanding" due to the varied meanings of "insight" in psychology and the Buddhist discourse. We understand experiential understanding interchangeably with the term "modes of existential awareness" (Dorjee, 2016) which describes an overarching phenomenological state associated with our sense of self[1] and perception of reality (an overarching "optic" of perceiving self and reality), but choose to use the term "experiential understanding" in the context of the current Map because this concept is more intuitively graspable for practitioners and teachers. For instance, some of the mindfulness practices may cultivate experiential understanding of how our relationship to thoughts, emotions and sensations contributes to or undermines our wellbeing. Specifically, we know that ruminative immersion in negative thoughts is symptomatic of anxiety and depression whereas observation of negative thoughts as passing and fleeting events (decentering), which can be considered an example of an experiential understanding, is predictive of recovery from anxiety and depression (e.g., Hoge et al., 2015). We suggest here that an experiential understanding (e.g., of how our relationship to experience relates to wellbeing) can be cultivated to some depth in all mindfulness practices, although some practices are less associated with the intention to do so than others and this may modulate the depth of the resulting experiential understanding. Therefore, the second axis of the Map aims to capture *types of intentions (INTs) towards cultivation of particular experiential understandings* (EUs) that can be developed through mindfulness practices. In this way, the same mindfulness practice can result in different EUs based on the INTs the teacher and/or the practitioner brings to the practice. The postulation of the INT dimension can open focused discussions about the unintentional and intentional types of EUs cultivated through mindfulness practices. It can also support further considerations about the relevance of intentions for cultivating ethical behaviors to different mindfulness-based programs and interventions. While we identified four MGs, there are likely more types of INTs for EUs than those proposed in the Mindfulness Map. Notably, the proposed Map distinguishes INTs for EUs from reasons for mindfulness practice. The reasons can range from stress reduction, through health-focused

[1]The sense of self refers to both conceptual and experiential perception of self.

clinical reasons, such as reducing anxiety symptoms or chronic pain, skill-enhancement for improved academic or workplace performance to self-exploration and better self-understanding (Shapiro, 1992; Pepping et al., 2016; Sparby and Ott, 2018).

Importantly, the proposed mindfulness classification map is trying to capture the variety of current uses of the term "mindfulness" in secular contemplative teaching and scientific discourse; it does not aim to describe the full traditional Buddhist landscape of practices, EUs and associated INTs. The primary aim of the classification proposal presented here is to provide a practical framework that can support mindfulness teachers, practitioners and researchers to clearly locate the particular mindfulness they teach, practice or research within a territory of MGs, associated INTs and EUs. In this way, the Map may facilitate development of a much-needed longer-term perspective on both mindfulness practice and teaching, beyond MBSR or MBCT courses (Dorjee, 2017). It may also support a finer classification and specification of mindfulness practices in mindfulness research, possibly leading to more comprehensive understanding of mindfulness, its mechanisms, and effects. Markedly, the proposed Map is aimed as a starting point for further discussion and may be revised and/or expanded by other axes. In what follows we describe the four MGs and then give examples of four types of INTs. We then elaborate on how the different types of EUs manifest in each combination of MGs and INTs.

THE FOUR GROUPS OF MINDFULNESS PRACTICE

The four mindfulness practice groups (MG) presented in the Mindfulness Map were inspired by Kristin Neff's work (2015)[2] on four aspects of mindfulness practice: (m1) paying attention to experience in the present moment; (m2) relating to experience without judgment or resistance; (m3) Relating to the experiencer with the desire to alleviate suffering (compassion); (m4) understanding better the nature of both experience and the experiencer (wisdom). We adopted the four-fold division with some alterations and called the categories *mindfulness practice groups (MG)*, because each of them is not a description of a single technique, but a grouping of several techniques with similar key instruction characteristics. In addition, we altered the definitions in several cases to be consistent with terms used in the psychological literature.

The Mindfulness practice Groups (MGs) are:

MG1—Cultivating[3] attention to the present moment somatic and sensory experience

MG2—Cultivating non-reactive and a non-judgmental attitude to experience

MG3 –Cultivating wholesome and pro-social mental habits

MG4—Cultivating the ability to recognize and deconstruct perceptual, cognitive and affective experiences and biases.

The descriptions below cover the main characteristics of techniques and instructions in each mindfulness group.

MG_1: Cultivating Attention to the Present Moment Somatic and Sensory Experience

Practices in MG1 strengthen concentration capabilities and stabilize awareness of somatic and sensory experience. The ability to observe the present bodily experience (as opposed to analyzing or conceptualizing it) is developed through MG1 techniques.

For example, MG1 includes practices that instruct practitioners to attend to their breath and/or body without additional instructions (e.g., Arch and Craske, 2006; Zeidan et al., 2010a). Other practices in this family would be listening to sounds, observing visual, tactile, olfactory, or gustatory objects (e.g., raisin tasting exercise), variations of body-scan, mindful running, and certain yoga practices (Petrillo et al., 2009; Kabat-Zinn, 2013; Hong et al., 2014; Schultchen et al., 2019). An informal mindfulness practice of MG1 would be attending to everyday activities like washing the dishes or eating a meal—with particular emphasis on the importance of noticing sensory experience as it occurs in the present moment (Hanley et al., 2015).

Mindfulness practices that have been employed in studies that investigated the effects of brief mindfulness practices often belong to MG1 (Arch and Craske, 2006; Dickenson et al., 2013). For example, in Schindler et al., 2019 (p. 1057), "Participants in the mindfulness exercise condition listened to a 5-min recording about concentrating on one's breath and becoming aware of what is happening in the present moment." Typical brief MG1 instructions ask participants to: "focus on the actual sensations of breath entering and leaving the body. There is no need to think about the breath—just experience the sensations of it. When you notice that your awareness is no longer on the breath, gently bring your awareness back to the sensations of breathing" (Arch and Craske, 2006, p. 1852).

MG1-type practices have been shown to benefit wellbeing and mental health, likely through stabilization of awareness and reduction in rumination. This has been assessed with indexes of mood, cardiovascular function, affect, aggression, attention, pain, social stress responses, mental state attribution and empathy (e.g., Zeidan et al., 2010a,b; Dickenson et al., 2013; Creswell and Lindsay, 2014; Tan et al., 2014; Norris et al., 2018).

MG_2: Cultivating a Non-reactive and Non-judgmental Attitude to Experience

In MG2 practices, the attitude of non-judgmental acceptance is added to the MG1 practices and one cultivates an interested and non-reactive stance toward present moment experience which now also includes mental phenomena. On top of the ability to focus on the elements that make up sensory and somatic experiences (MG1), one is asked to actively allow the experience to unfold without self-criticism or denial of unwanted sensations, emotions or cognition. This includes non-reactive non-judgmental noticing of automatic and habitual tendencies

[2]Slide 21: https://greatergood.berkeley.edu/slides/MindfulnessCompassion-Slides-FINAL-forweb.pdf.

[3]Please note that we use the term "cultivating" here to refer to the mindfulness practice technique rather than the experiential outcome.

of evaluating, craving, rejecting, denying and avoiding. These attitudinal qualities that are now added to MG1 practices create a sense of space between the object of observation and the automatic reaction. This in turn, facilitates the weakening of automatic reactions as one familiarizes oneself with a different way of responding to experience including the attitudes of acceptance, curiosity, and openness. Practitioners are guided to distinguish between the elements that make up experience (sensations, thoughts, urges) and the reactions to these elements, then carefully observe the dynamic relations between them moment by moment.

Importantly, while MG1 is more focused on stabilizing awareness on an anchor (e.g., the breath), in MG2 and onward, the *attitude* toward our experience is a key aspect to develop. As a curious and non-judgmental attitude is cultivated in MG2, it can be directed to a various anchor of attention, allowing the practice to generalize inside and outside of formal mindfulness practice. This is a crucial transition as it enables more frequent experiences of mindful states, that can, in time, induce trait-like shifts in relating to our experience and to others.

The very first practices in MBSR and MBCT programs (e.g., body scan, movement practices) begin as MG1 but *via* further instructions to cultivate the attitudinal qualities they shift into MG2. In the beginning these attitudes are geared toward sensory and somatic experiences. Later practices (e.g., sitting meditations) in these programs, employ a similar attitude toward affective and cognitive states (Segal et al., 2013).

It seems that most mindfulness research to date has focused on the MG2 practices. Studies of short interventions often employ basic MG2 practices that add to MG1 a non-judgmental and accepting attitude. A typical example is the study of a brief regular mindfulness practice intervention and its effects on cognitive and affective brain indexes in older adults (Malinowski et al., 2017, p. 81) in which participants "were required to focus their attention on the sensations accompanying their breathing, either attending to the experience at the nostrils, around the diaphragm or the movement of the abdomen when inhaling and exhaling, without manipulating the breath in any form. Whenever attention would slip or wander off, the task would be to become aware of it and, without further elaboration, to redirect the focus of attention back to the sensation of breathing. Participants were instructed to recognize other arising thoughts, feelings or sensations, trying not to judge or evaluate them, and maintain a curious, non-elaborating attitude toward them." Most practices in MBSR/MBCT interventions could be categorized as MG2s (e.g., Alkoby et al., 2019). Beneficial effects of MBSR/MBCT on mental health have been well documented and there is also evidence of these interventions leading to improvements in wellbeing and aspects of cognition (e.g., Alberts and Thewissen, 2011; Gu et al., 2015; Goldberg et al., 2018b; Querstret et al., 2020). Similarly, non-MBSR/MBCT interventions in MG2, often very brief, have been shown to improve aspects of cognition such as attention and inhibitory control (e.g., Malinowski and Shalamanova, 2017; Malinowski et al., 2017; Schöne et al., 2018; Pozuelos et al., 2019).

MG_3: Cultivating Wholesome and Pro-Social Mental Habits

MG3 practices aim to explicitly develop wholesome and prosocial emotions, thoughts and behaviour's including kindness, compassion, and appreciation (Shapiro et al., 2006; Dahl and Davidson, 2019; Thupten, 2019). They include practices such as Loving Kindness meditation, Compassion meditation and Gratitude practices and usually involve active use of imagery to evoke particular emotions (e.g., imagining oneself, a benefactor, a neutral person, a difficult person or beings in general and addressing them with phrases of compassion and/or kindness), and explicit cognitive emphasis on appreciating what is wholesome.

At least some of the prosocial qualities, for example kindness, seem to be considered mindfulness-based in the early Buddhist discourse[4], even though they don't seem to be discussed in this way in the Mahayana schools (Wallace, 1999). Still, various mindfulness practices that stabilize present-centered awareness are typically practiced in preparation or alongside loving-kindness and compassion practices (Dahl and Davidson, 2019). For example, a compassion practice involves sustaining attention on the content of the meditation and employment of non-judgmental attitude when unpleasant sensations, emotions or thoughts arise (e.g., when awareness of suffering increases) (Neff and Dahm, 2015).

Indeed, MG3 practices often appear in programs and in studies in conjunction with mindfulness practices (Brewer et al., 2011). For example, "Mindful Self-Compassion (K. Neff and Germer, 2018) and "Mindfulness-based compassionate living" (Van den Brink and Koster, 2015) are 8-week programs that develop both the skills of mindfulness and compassion. Studies on the effects of these programs or similar programs have found beneficial effects on wellbeing, e.g. increases in positive emotions and self-compassion (Neff and Germer, 2013; Mantzios and Wilson, 2015; Shahar et al., 2015; Friis et al., 2016; Graser et al., 2016; Eriksson et al., 2018; Ondrejkov et al., 2020).

MG_4: Cultivating the Ability to Recognize and Deconstruct Perceptual, Cognitive and Emotional Experiences and Biases

In MG4 practices, one deconstructs subjective experience into its various components (attention, sensation, feelings, cognition, and perception) and observes the interplay between them. The curious and non-judgmental attitude to the present experience fostered in MG2 leads to initial experiences of decentering—perceiving mental contents as transient fleeting phenomena (Fresco et al., 2007). Decentering develops further and is built on in MG4 practices supporting deeper self-inquiry. In the modern context of mindfulness-based approaches an example of an initial practice in this group is the "choiceless awareness" practice in MBSR and MBCT whereby one is instructed to simply rest one's awareness on mental components of experience,

[4]While the famous discourse on establishing mindfulness, the satipa??hāna sutta, does not mention pro-social practices as part of the mindfulness inventory, interestingly, the discourse on cultivating friendship, the *metta sutta*, refers to cultivating friendliness as a mindfulness practice.

without identifying or engaging with any particular component (Kabat-Zinn, 1990, pp. 59–74; Segal et al., 2002, pp. 146–147, 164–165). Such opening up of a degree of space between awareness and mental phenomena and between stimulus and response may result in the recognition "that "mind" is not identical to mental phenomena. In other words, we are not our thoughts, feelings, or experiences (Chambers et al., 2009) as is emphasized in the "thoughts are not facts" practice in MBCT (Segal et al., 2013, p. 322). The key difference between MG2 and MG4 practices is the targeted instruction examining the nature of experience and Self in MG4 in contrast to focus on development of attitudinal qualities in MG2. As the ability to deconstruct experience develops, automatic reactivity further weakens and distorted perceptions, misconceptions and biases that underlie craving, avoiding and rejecting leading to mental distress are deconditioned.

MBSR and MBCT don't go beyond the initial MG4 practices associated with decentering and one of the pressing questions in the secular mindfulness field is how the repertoire of secular MG4 could be expanded further toward more advanced MG4 practices. In the traditional Theravada Buddhist context, some of the *vipassana practices* can be included in MG4 (Chiesa, 2010; Dunne, 2015). These could serve as a basis for expanding the MG4 practice in the secular mindfulness context. For example, an advanced MG4 practice would be examining cognitive reification processes that give rise to implicit beliefs and biases that thoughts, emotions, and perceptions are accurate depictions of reality (Dahl et al., 2015). Such practice may, for instance, invite practitioners to sustain a mindfulness level that can notice the "gaps" in the elements of experience (e.g., thoughts, emotions, mind states, pleasant, and unpleasant experiences, the sense of Self) and investigate how noticing the gaps changes their perception and the sense of them being "real" (e.g., Burbea, 2014, p. 95). These practices can be built on in further deeper practices deconstructing the experience of self and examining self as a context (e.g., as suggested in Acceptance Commitment Therapy (ACT), (Fletcher and Hayes, 2005), and seeing that unitary sense of self is constructed by changeable self-related experiences and narratives and therefore is illusory (Dahl et al., 2015, 2020). With time, these insights are internalized, and they become a trait-like perspective on experience, as opposed to a transient state of awareness (transformation from state to trait).

In contemporary scientific literature, vipassana or open monitoring practices are often referred to as advanced mindfulness practices. Moreover, studies of long-term practitioners often refer to a range of traditional Buddhist practitioners as mindfulness meditators creating confusions (e.g., Lykins and Baer, 2009; Chiesa, 2010; Manna et al., 2010; van den Hurk et al., 2010; Chiesa and Malinowski, 2011; Ferrarelli et al., 2013; Ataria et al., 2015; Laneri et al., 2016; Kral et al., 2018). For example, a recent highly cited review of neural correlates of mindfulness made integrative inferences across studies ranging from MBSR, to Vipassana, Zen Buddhism and Dzogchen (Tang et al., 2015). These discrepancies call for more refined classification of advanced mindfulness practices and their overlaps and differences from meditation practices currently labeled as mindfulness.

Importantly, the numerical values associated with the MGs do not necessarily represent a rigid progression, as one may not always begin with MG1 practices and advance through MG2, MG3, and MG4. They represent, however, degrees of complexity in self-inquiry as MG1 practices are simpler and less focused on self-exploration than MG4 practices. To some extent skills and qualities such as non-reactivity and decentering that are developed in MG1 and MG2, are also needed to fully develop MG3 and MG4—but not the other way around.

THE FOUR TYPES OF INTENTIONS AND ASSOCIATED EXPERIENTIAL UNDERSTANDINGS

The practices in the four MGs can be taught and practiced with a variety of intentions (INTs) for EUs which are overarching phenomenological states resulting from meditation practice. We propose that INTs might be essential facilitators of EUs they are directed toward, they may enable continuous engagement with practices cultivating certain EUs, and catalyse further progression onto more refined EUs. It is an empirical question whether some EUs arise regardless of INTs a practitioner or teacher brings to their practice, simply as a result of particular MG practice types. As a starting point, we propose here an outline of the possible INTs. Although there may be a range of INTs, in this paper we chose four specific INTs to demonstrate the second axis of the Map.

The four Intentions (INTs) are:

INT_1 Intention to gain experiential understanding of how the relationship to experience contributes to mental distress and wellbeing

INT_2 Intention to gain experiential understanding of the changing nature of body, mind and external phenomenon

INT_3 Intention to gain experiential understanding of the relationship between sense of self and mental distress and wellbeing

INT_4 Intention to gain experiential understanding of how positive and prosocial mental states contribute to wellbeing.

The first three INTs are based on the three traditional Buddhist characteristics of experience (*tilakkha?a),* that, according to classical Buddhist tradition, are central to understanding the causes of mental distress and alleviating it[5]. These are: (1) *dukkha,* meaning dissatisfaction and suffering; (2) *anicca,* meaning impermanence; and (3) *anatta,* meaning not-self. In addition, we have added an INT that is based on the Buddhist wholesome intentions and states of mind such as "loving kindness," "compassion" "rejoicing" and "equanimity" (Brahmaviharas). We are focusing on these four INTs for several reasons. First, many secular mindfulness practices are derivatives of programs (e.g., MBSR, ACT) which, according to their founders, are grounded in Buddhist meditation (Hayes, 2002;

[5]Although these concepts also appear in much broader contexts in Buddhist discourse, here they are applied in a narrower context, namely, cultivating intentions that are geared toward understanding various mechanisms of wellbeing as they appear in contemporary psychological and scientific discourse.

Kabat-Zinn, 2011; Husgafvel, 2018). Second, these INTs resonate with elements of experience and EUs that are emphasized and explored in the context of secular mindfulness practices and interventions, although not always clearly articulated. For example, according to the Mindfulness Based Interventions: Teaching Assessment Criteria (MBI:TAC, third-version, 2021), skillful facilitators should be able to assist participants in noticing whether elements of experience change or are constant, explore the sensations of reactions/responses to experiences, investigate how bringing awareness and particular attitudes toward experiences affect the experiences, and illuminate how they see the ways in which their mind becomes "caught" or stuck in their particular way of relating to experience (see the Mindfulness Based Interventions: Teaching Assessment Criteria; MBI:TAC, third-version, 2021). In other interventions, such as ACT, elements of experience are investigated in order to gain insights into the nature of the Self (Fletcher and Hayes, 2005).

Importantly, here we distinguish between INTs for EUs and reasons for practicing mindfulness. The reasons can range from fulfillment of spiritual aspirations (Symington and Symington, 2012), toward specific clinical goals such as alleviation of depression or stress symptoms (e.g., MBCT) or toward self-enhancement, (e.g., Mindful Sport Performance Enhancement (MSPE, Kaufman et al., 2009); Mindfulnes-Based Mind Fitness Training (MMFT, Gans et al., 2014; Jha et al., 2015); mindful eating to reduce craving, (Kristeller et al., 2014; Mason et al., 2018). An early study suggested that reasons for meditation practice can change with longer-term practice, progressing from self-enhancement to self-exploration and then self-understanding (Shapiro, 1992). There have been repeated calls for the reasons behind mindfulness practice to be examined empirically (Harrington and Dunne, 2015; Pepping et al., 2016) since they may modulate practice outcomes (Davidson and Kaszniak, 2015; Dorjee, 2016). Here we propose the INT axis as part of the Mindfulness Map to capture intentions that may closely interact with reasons for mindfulness practice but denote a particular experiential perspective with which we approach a mindfulness practice.

Since the focus in this proposal is on mindfulness in the secular context, the INTs are formulated in relation to reducing mental distress and supporting wellbeing. The term *mental distress*, in this context, refers to both mental illness as understood in Western psychology and more subtle forms of mental discomfort which would not be considered pathological but impact wellbeing and are gaining increasing research interest, such as greed (Ryff, 2018) or intention to harm. EUs facilitated by application of INTs are associated with experiential knowledge that plays a key role in reduction of mental distress which can be achieved through application of this EU to managing our thoughts, feelings, behaviors and sense of self. Similarly, *wellbeing* in the context of the above INTs is not simply understood as pleasure-based happiness or life satisfaction as in the subjective wellbeing conceptualizations (e.g., Diener et al., 1985). It is closer to the notion of eudemonic wellbeing (Ryff, 1989) formulated in terms of meaningful life inspired by Aristotelian virtues. Yet, the concept of wellbeing in the current proposal goes beyond psychological eudemonic wellbeing in its grounding of wellbeing in the applied self-inquiry into mental distress and its sustaining in everyday functioning. This understanding of wellbeing arises from observing and relating to our experience (i.e., applying mindfulness), rather than mere intellectual learning about mental distress and its causes.

Experiential Understandings Resulting From Intentions Applied to the Mindfulness Practice Groups

Each of the four INTs applied to the four MGs leads to different types of resulting experiential understandings (EUs) creating The Mindfulness Map (see **Table 1**). As can be seen from the table, in most cases, there is a sense of deepening progression of EUs implicit in application of INTs to the four MGs and from MG1 through to MG4.

One way of using the Mindfulness Map is to examine the EUs that may arise when applying different INTs to a particular MG. As an example, we will describe the EUs that may arise when applying the first three INTs within MG1. Practitioners engaged in MG1 practices often experience restlessness, anxiety, boredom, and difficulty to regulate attention. With the INT1 lens (intention to gain experiential understanding how the relationship to experience contributes to mental distress and wellbeing), they can begin to identify the relationship between attention regulation and mental distress. With the INT2 lens (intention to gain experiential understanding of the changing nature of body, mind, and external phenomena), they can begin to notice the constant flow of changing experiences in the present moment and observe the dynamic changing nature of these experiences. The malleability and stability of attention itself can also be understood as changing. This EU enables one to relate to distractions as momentary states, laying the foundations of a non-judgmental attitude further developed in MG2. With the INT3 lens (intention to gain experiential understanding of the relationship between sense of self and mental distress and wellbeing) practitioners can notice the automatic and scattered nature of attention. This can demonstrate, on a rather crude level, how one's agency is limited in controlling somatic and sensory experiences as well as attention to them. Noticing the wandering mind, which is most of the time not subject to one's control, can start to reduce rigid beliefs about the sense of self. The INT4 (intention to gain experiential understanding of how positive and prosocial mental states contribute to wellbeing) is typically not applied when practicing MG1. The limited scope of present moment awareness to somatic experiences may induce non-reactivity, but not necessarily pro-social emotions and attitudes. Critics may even point to the possibility of using the outcomes of M1 practices in ways that contradict INT4; the typical example is "the sniper's mindfulness"—using concentration practices for harming others (e.g., Monteiro et al., 2015).

Another way of using the Mindfulness Map is to examine how a specific INT applied across the four MGs may accelerate insights that can reduce mental distress and increase wellbeing. For example, as mentioned above, applying INT3 (intention to gain experiential understanding of the relationship between sense of self and mental distress and wellbeing) in MG1 enables

TABLE 1 | The Mindfulness Map.

	MG1: cultivating intentional attention to the present moment	**MG2: Cultivating a non-reactive and non-judgmental attitude to experience**	**MG3: Cultivating wholesome and pro-social mental habits**	**MG4: Cultivating the ability to recognize and deconstruct perceptual, cognitive and emotional experiences and biases**
INT1: to understand how the relationship to experience contributes to mental distress and wellbeing	Experiential understanding (EU): Beginning to identify the relationship between attention regulation and mental distress.	EU: Mental distress is understood to be dependent on craving and rejecting certain experiences. A non-reactive and non-judgmental attitude creates a space between experience and reaction and hence reduces mental distress.	EU: Discerning that mental distress or wellbeing are conditioned by the mental attitudes present at each moment. Experiencing internal or external experiences with the presence of wholesome states reduces mental suffering, while the presence of unwholesome states increases it.	EU: Understanding of the relationship between lessening of mental distress and reduced craving, avoiding/rejecting is deepened following cultivation of the decentering from experience (stepping out from thoughts, emotions, sensations).
INT2: to understand the changing nature of body, mind and external phenomena	EU: Beginning to observe the dynamic changing nature of the mental processes, particularly those including somatic and sensory experiences.	EU: Beginning to understand that all the elements that make up experience (sensations, thoughts, emotions, urges) are interdependent, transient and temporary occurrences.	EU: Seeing that wholesome states are also transient and dependent on various causes and conditions.	EU: Deepening and internalizing the understanding that every experience, as well as every external phenomena (e.g., property, people, etc.) is transient, temporary and interdependent in its occurrence. This facilitates the release of craving and identification from them.
INT3: to understand the relationship between sense of self and mental distress and wellbeing	EU: Beginning to recognize a lack of control over somatic and sensory experiences. This can start to reduce the rigidity of sense of self.	EU: Beginning to understand how craving and avoidance/rejection patterns solidify the sense of self; beginning to understand the relation between degrees of solidification in the sense of self, and the reduction in mental distress.	EU: Identifying the relationship between self-modes (e.g., flexible or rigid sense of self) and the presence of wholesome or unwholesome states (cognitions, attitudes and emotions). Beginning to see that during wholesome states, the "self," "other" and the "world" are less rigidly separated than previously assumed.	EU: Understanding that the "self" is a complex phenomenon constructed from changing and interdependent processes. It is not static, solid and independent, but rather depends on an ever-changing context.
INT4: to understand how positive and prosocial mental states contribute to wellbeing	EU: Not realized in MG1.	EU: Reducing reactivity allows for the acceptance of the present experience resulting in more acceptance of oneself and others and consequently lesser distress.	EU: Actively cultivating wholesome states and pro-social habits (which are more than cultivating acceptance and self-compassion as in MG2) enables the realization how these states support and enhance wellbeing.	EU: The weakening of identification with experience and deepened understanding of the construed nature of self leads to less self-focus. This in turn releases capacity for other-focused processes and behaviours. The conditions are formed for the spontaneous appearance of wholesome and prosocial mental states.

While there are four MGs which encompass the majority of practices employed in contemporary mindfulness programs, these practices may be associated with a wide range of INTs. INTs applied to the four MGs lead to different types of resulting experiential understandings (EUs). Here we detail the EUs for the four specific INTs discussed in this manuscript.

an initial EU regarding one's limited agency in controlling one's experience. In MG2–MG4 deeper EUs are enabled. The decentering arising in MG2 and further developed in MG4, together with the INT3, enables increased understanding of how the sense of self emerges from craving and avoidance/rejection of present moment experiences and how this relates to mental distress, leading to a rigid sense of self. Non-judgmental acceptance of experience and letting go of craving and avoidance/rejection of experiences enables a more flexible sense of self. The craving and avoidance/rejection patterns can be seen as the "glue" that holds the rigid self together. In addition, the flexible and rigid sense of self relates to the reduction or increase of mental distress, respectively. Applying INT3 with MG3 enables practitioners to further notice that the sense of self is influenced by the wholesome states and pro-social attitudes (e.g., generosity, compassion, gratitude and other similar qualities) and in turn influences the experience of wellbeing. This can further develop into the understanding that the "self," "other" and the "world" are less rigidly separated than previously assumed. These EUs support the emergence of, and are supported by, additional EUs that can be cultivated by applying INT3 in the more advanced MG4 practices. This allows practitioners to cultivate EUs where the self is understood as a complex phenomenon constructed from changing and interdependent processes and depending on an ever-changing context. As a result, mental distress that is related to a perception of a solid and independent self and can be seen as arising from confusion and misunderstanding and easier to let go of.

DISCUSSION

In this article we presented a practical classification map of MGs and outlined how these can be taught or practiced with four possible INTs resulting in different EUs. This Map follows several

recent attempts to classify meditation and mindfulness practices (Dorjee, 2010; Vago and David, 2012; Schmidt, 2014; Dahl et al., 2015; Garland et al., 2015; Lutz et al., 2015; Grossenbacher and Quaglia, 2017; Khoury et al., 2017; Matko and Sedlmeier, 2019). One influential proposal suggested dividing meditation practices into attentional, constructive, and deconstructive families (Dahl et al., 2015). We resonate with this approach but also recognize that it is more encompassing than our focus on mindfulness practices. In addition, it differs from the Mindfulness Map in its emphasis on underlying cognitive mechanisms of meditation. Finally, none of the previous accounts introduced the dimension of INTs behind mindfulness practices and associated EUs. We will now consider possible applications of the current Map to mindfulness research and teaching.

Applications of the Map in Mindfulness Research

Current research of mindfulness practices relies mostly on self-report measures to assess mindfulness, drawbacks of which are subject to ongoing discussion, although there have been some recent attempts to design behavioral measures as well (Baer, 2011; Bergomi et al., 2013; Sauer et al., 2013; Levinson et al., 2014; Goldberg et al., 2018a; Wong et al., 2018; Hadash and Bernstein, 2019; Isbel et al., 2020).We suggest a Map, such as the one presented here, may introduce clarity into what aspects of mindfulness practices the different measures are addressing, enabling researchers to better match the tools to the practice they are investigating. For example, the Mindfulness Attention Awareness Scale [MAAS, (Brown and Ryan, 2003)] has been used to study mindfulness-based intervention studies. As its items are mostly assessing difficulties in paying attention (Grossman, 2011), we suggest it mostly assess MG1 and may not capture the full range of expected changes in mindfulness following MG2-MG4. On the other hand, the Five Facets of Mindfulness Questionnaire (FFMQ, Baer et al., 2008) which includes items related to non-judging of inner experience, and non-reactivity toward inner experience may not be appropriate for interventions that mostly rely on MG1 practices. The recently developed Metacognitive Processes of Decentering Scale (Hanley et al., 2020) that attempts to measure how one is able to decenter from internal experience may be mostly relevant for interventions involving MG4 and partially for MG2 practices. In addition, the Map can make more visible some of the gaps across the range of current mindfulness measurement tools and inform the development of new ones. For example, in comparison to MG2-4 there are clearly fewer measures assessing MG3, the Self-compassion scale (SCS) is possibly a rare example (Neff, 2003) targeting the construct of self-compassion which overlaps with the concept of mindfulness.

In addition, the Mindfulness Map explicitly conceptualizes and outlines in practical terms how the INTs may interact with the MG types to result in different EUs. In this way, the Mindfulness Map enables finer-grained assessment of possible modulators (INTs) of intervention outcomes and the associated EUs. No research so far attempted to investigate the modulating role of INTs to outcomes or considered associations between cultivation of various EUs and resulting wellbeing outcomes. The Mindfulness Map enables such distinctions to be drawn and experimentally evaluated. This will necessitate development of new assessment tools to capture different INTs including and beyond those we have outlined and associated EUs. One step to this direction is the current development of the Mechanisms of Contemplative Practice Inventory (Dorjee et al., 2021) which aims to evaluate a range of intentions behind contemplative practice and a progression of modes of existential awareness (EUs). The current Mindfulness Map draws further refined distinctions amongst possible EUs cultivated in secular practice which can be evaluated empirically with tools tailored to assessing these EUs.

The Mindfulness Map also has the potential to enable more accurate cumulative assessments of research evidence regarding particular mechanisms of, or outcomes of, mindfulness practices. Presently, most studies do not distinguish practices in the MG1-MG4 groups and group them together; they also don't take the moderating effects of INTs and possible EUs into account. Consequently, the current systematic reviews and meta-analyses only provide rather crude overarching assessment of the mechanisms and outcomes of mindfulness interventions (e.g., Grossman et al., 2004; Chiesa et al., 2011; Kaunhoven and Dorjee, 2017; Carsley et al., 2018; Garland and Howard, 2018; Goldberg et al., 2018b, 2019, 2021; Wielgosz et al., 2019). This precludes the ability to reach clear conclusions regarding the effects and underlying mechanisms of different mindfulness practices, their interactions and long-term effects (Farias et al., 2016; Schumer et al., 2018; Britton, 2019). Indeed, there have been previously repeated calls for more finer-grained distinctions of mindfulness practices and their intended outcomes (Chiesa and Malinowski, 2011; Davidson and Kaszniak, 2015). For example, recently, two groups conducted a systematic review and a meta-analysis to determine the prosocial effects of mindfulness (Kreplin et al., 2018; Donald et al., 2019). In one case, the analysis concluded that meditation has limited prosocial effects (Kreplin et al., 2018), while in the other, it found medium size effects for the impact of mindfulness interventions on pro-social behaviors (Donald et al., 2019). We suggest such contradictory conclusions may result from collapsing across different MGs and INTs resulting in different EUs.

The lack of these distinctions can also impact on considerations about possible harmful effects of mindfulness. There seems to be an underlying assumption in the mindfulness research that brief mindfulness inductions in beginner practitioners may represent advanced practices such as those found in MG2-4 (e.g., Arch and Craske, 2006; Tan et al., 2014; Norris et al., 2018). For instance, a 5-minute brief-mindfulness induction may instruct participants to pay particular attention to the sensation of their breathing (MG1), but also adapt a particular attitudinal stance (MG2) toward a distracted mind and wandering attention (e.g., to view them as natural, fleeting states of mind, and return attention to their breathing each time a distracting thought, emotion or memory occurred, Tan et al., 2014). For example, in a study that investigated potential morally-negative consequences of mindfulness practice, Schindler et al. (2019), assessed harm-based moral reactions across five studies.

In one mindfulness condition participants were asked to listen to a 5-min recording instructing them to concentrate on one's breath and becoming aware of what is happening in the present moment (MG1). In another mindfulness condition participants listened to a 12-min recording which additionally suggested that any emerging feelings and thoughts should be faced in a non-judgmental manner (MG2). Contradictory to their hypothesis, they found that after the brief mindfulness inductions participants were less likely to report morally-aligned intentions. Since it usually takes time and effort to develop the level of concentration needed to sustain a more refined intention, such as understanding the association between relation to experience and mental distress, it is questionable whether such 5 or 12-min practices are sufficient to represent anything beyond MG1 and whether any INT can be applied effectively in such a short time or a relevant EU arise.

These examples suggest an inherent assumption that the various mindfulness practices (of any kind) evoke similar mental states and thus should lead to similar types of psychological or physiological changes regardless of the specific MG employed and the intention of the teachers and students. The Map shows that different combinations of practices and underlying intentions may evoke different mindfulness states. Based on the instructions in Schindler et al. (2019) the participants were engaging in MG1 and MG2 practices without any particular intention instructions. According to the Mindfulness Map, we would not expect prosocial states of mind to be affected by MG1 or MG2 practices alone. Thus, analyzing effects of mindfulness based on MGs, INTs, and EUs, may lead to more precise conclusions regarding the various effects of mindfulness practices.

Finally, the Map can help articulate and support new research questions about mindfulness that are particularly relevant now that the field is moving toward a more refined understanding of mindfulness. Here are some examples: Do different MGs lead to different wellbeing outcomes and physiological changes? Are these modulated by INTs? How do wellbeing outcomes link to EUs? Is training in a range of practices across MGs more likely to result in better wellbeing, or is expertise in particular practices in certain MGs better for fostering wellbeing? Are there individual differences in benefits from different combinations of MGs and INTs? Are explicit ethical INTs (e.g., non-harm) necessary for EUs pertaining to ethical behavior (such as evoking a compassionate stance) to arise? Or do these EUs arise automatically?

Using the Mindfulness Map to Support Teacher Training and Programme Development

Given that the current teacher training doesn't distinguish across MGs and doesn't explicitly consider the impact of different INTs on teacher EUs and resulting outcomes of mindfulness course participants, the Mindfulness Map provides a framework to open up a focused debate about these factors. Even during a course that lasts for several weeks, there can be a transition between the different MGs of mindfulness and associated INTs. For example, MBSR usually begins with simple body scan (MG1) with the facilitator inviting participants to inquire into the relation between increased attention regulation and lower mental distress (INT1). In later stages of an MBSR program the practice will move to a MG2 practice (e.g., mindfulness of breath) with an invitation to inquire into the changing nature of experience (INT2). Working with the Map may help with a more accurate and comprehensive training of mindfulness teachers, particularly if MG3 and MG4 are explicitly included. This is because most of the practices in MBSR and MBCT are situated in MG1 and MG2 and span mostly INT1 and INT2. The level of expansion to MG3 and MG4 and to the other INTs depends on the EUs the facilitator has cultivated in their personal practice (Kabat-Zinn, 2011), and their ability to lead students in more advanced practices. Teacher training programs should provide opportunities for facilitators to expand their personal EUs through practices that span the full range of the Map, as well as cultivate their skills to facilitate the wider repertoire of EUs in their students through meditation instructions and inquiry techniques that emphasize the various INTs[6].

In addition, the introduction of the dimension of INTs (including and beyond those discussed in this article) in the Mindfulness Map can facilitate discussions about ethics in western-mindfulness teaching (e.g., Thupten, 2019). Explicit articulation of INTs can, perhaps, help to distinguish between teaching of mindfulness that focuses on INT1 and mindfulness practices taught from a wider perspective of all the INTs. This might be of relevance to current exploration of the potential of mindfulness practices in contributing to societal challenges such as in-group/out group biases, conflict resolution or climate change (Lueke and Gibson, 2015; Tincher et al., 2016; Alkoby et al., 2019; Geiger et al., 2019). For example, practices in MG1 delivered with INT1 (Intention to gain experiential understanding of how the relationship to experience contributes to mental-distress and wellbeing) are unlikely to lead to wider prosocial change, whereas MG2-MG4 delivered with INT3 (Intention to gain experiential understanding of the relationship between sense of self and mental-distress and wellbeing) or INT4 (Intention to gain experiential understanding of how positive and prosocial mental states contribute to wellbeing) may lead to EUs linked to realizing the constructed nature of the sense of self resulting in lessening of in-group identification and out-group rejection. Thus, they may be more suited to lead to prosocial outcomes and behavioral changes, particularly if combined with further context-specific INTs (e.g., climate-friendly behaviour modification).

The Mindfulness Map allows us to understand the limitations of current mindfulness programs and move toward a longer-term perspective on mindfulness practice and its teaching (Dorjee, 2017). For example, since most of the western secular mindfulness programs are based on the MBSR, we can assume

[6]The same point applies to courses that cultivate compassion (e.g., Mindful Self-Compassion, Neff and Germer, 2018; and Mindfulness-Based Compassionate Living, Van den Brink and Koster, 2015); While these programs seem to emphasize MG3, it remains unclear to what extent MG1 and MG2 are cultivated in these programs, which probably also depend on the level of training of the instructor.

that no programs currently incorporate substantial practices from MG4. As mentioned, MBSR cultivates MG1 and MG2, and sometimes incorporates elements of MG3 and MG4 (depending on the training, understanding and capabilities of the teacher), but advanced programs that explicitly develop MG4 in the secular context are rare. There is a growing interest in in-depth secular courses for MBSR graduates (both short programs and long-term), where there is more time to emphasize MG3 and MG4 practices and a broad set of intentions (Levit-Binnun, 2021). A clearer understanding of the range of MGs and INTs underlying various mindfulness practices and programs can assist both teachers and practitioners in making more informed decisions about how to advance their EUs and what guidance to seek. In this way, the Map may facilitate development of a much needed longer-term perspective on mindfulness practice (Dorjee, 2017).

Limitations of the Mindfulness Map Framework

While the proposed framework has a potential to facilitate more fine-grained distinctions of mindfulness practices, the Mindfulness Map is not intended as a complete framework; rather, it is an initial starting point to open up further discussions about the proposed axes and the MGs and INTs included in the Map. It is possible that the Mindfulness Map needs to be further expanded by additional axes, such as an axis capturing the variety of reasons for engaging in mindfulness practice (Shapiro, 1992; Pepping et al., 2016; Sparby and Ott, 2018). Indeed, it is likely that reasons for mindfulness practice interact with INTs and modulate the resulting EUs further. For example, a practitioner may approach the INTs differently if practicing to reduce their anxiety versus if one practices to realise existential interdependence. Practicing to reduce anxiety would imply a self-focused perspective of mental distress and wellbeing, whereas practicing to realise existential interdependence would involve a more widely encompassing perspective of mental distress and wellbeing including interactions between one's own and others mental distress and wellbeing. Importantly, the proposed framework does not include the full range of meditation practices, INTs and EUs that can be found across contemplative traditions. This means that the map doesn't encompass the full range of phenomenological states and associated experiential knowledge reported in some of these traditions, e.g., states of enlightenment. Finally, the Mindfulness Map proposed in this narrative review requires further extensive empirical research to enable its refinement and to strengthen its empirical grounding.

CONCLUSION

In sum, the Mindfulness Map we proposed aims to provide a means to conceptualize and organize the myriad uses of "mindfulness" in current mindfulness-based teaching and research. Describing practices in terms of specific MGs, INTs and expected EUs can contribute to moving the field of contemporary mindfulness research toward more refined understanding of mindfulness practices and their effects and address the prevailing confusions resulting from collapsing across a wide range of mindfulness practices that may be representing different mental states, psychological processes and resulting outcomes. It can also facilitate more focused debate about long-term support of mindfulness teachers and practitioners in their practice, and associated challenges of developing advanced mindfulness programs in the secular context. The proposed Mindfulness Map is aimed as a starting point for further discussion and can be further revised and/or expanded by other axes.

AUTHOR CONTRIBUTIONS

NL-B and KA developed the first version of the map. NL-B, KA, and DD developed the final version of the map. All authors contributed to the article and approved the submitted version.

ACKNOWLEDGMENTS

We are grateful for Asaf Federman for helpful discussions and assistance in early versions of this manuscript. We also wish to thank Amos Avisar, Maty Liebliech, Thor Gonen, and Itamar Bashan for their valuable comments in the first version of the manuscript.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

SYSTEMATIC REVIEW
published: 12 November 2021
doi: 10.3389/fpsyg.2021.660650

Exploring the Effects of Meditation Techniques Used by Mindfulness-Based Programs on the Cognitive, Social-Emotional, and Academic Skills of Children: A Systematic Review

Marisa G. Filipe[1†], Sofia Magalhães[2†], Andreia S. Veloso[2], Ana Filipa Costa[2], Lúcia Ribeiro[2], Patrícia Araújo[3], São Luís Castro[2] and Teresa Limpo[2]*

[1] Center of Linguistics, School of Arts and Humanities, University of Lisbon, Lisbon, Portugal, [2] Center for Psychology at University of Porto, Faculty of Psychology and Education Sciences, University of Porto, Porto, Portugal, [3] TRIE-Transdisciplinary Research Center for Innovation & Entrepreneur Ecosystems, Manuel Teixeira Gomes Higher Education Institute (ISMAT), Portimão, Portugal

OPEN ACCESS

Edited by:
Sisir Roy,
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Reviewed by:
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Royal College of Surgeons in Ireland, Ireland

***Correspondence:**
Marisa G. Filipe
marisa.filipe@campus.ul.pt

† These authors have contributed equally to this work and share first authorship

Specialty section:
This article was submitted to Consciousness Research, a section of the journal Frontiers in Psychology

Received: 29 January 2021
Accepted: 30 September 2021
Published: 12 November 2021

Citation:
Filipe MG, Magalhães S, Veloso AS, Costa AF, Ribeiro L, Araújo P, Castro SL and Limpo T (2021) Exploring the Effects of Meditation Techniques Used by Mindfulness-Based Programs on the Cognitive, Social-Emotional, and Academic Skills of Children: A Systematic Review. Front. Psychol. 12:660650. doi: 10.3389/fpsyg.2021.660650

There is evidence for the positive impact of mindfulness in children. However, little is known about the techniques through which mindfulness practice results in differential outcomes. Therefore, this study intended to systematically review the available evidence about the efficacy of meditation techniques used by mindfulness-based programs on cognitive, socio-emotional, and academic skills of children from 6 to 12 years of age. The review was registered on the PROSPERO database, and the literature search was conducted according to PICO criteria and PRISMA guidelines. The EBSCO databases were searched, and 29 studies were eligible: nine randomized controlled trials and 20 quasi-experimental studies. All the included randomized controlled trials were rated as having a high risk of bias. Overall, the evidence for mindfulness techniques improving cognitive and socio-emotional skills was reasonably strong. Specifically, for cognitive skills, results showed that all the interventions used "body-centered meditations" and "mindful observations." Regarding socio-emotional skills, although all the studies applied "body-centered meditations" and "mindful observations," "affect-centered meditations" were also frequent. For academic skills, just one quasi-experimental trial found improvements, thus making it difficult to draw conclusions. Further research is crucial to evaluate the unique effects of different meditation techniques on the cognitive, social-emotional, and academic skills of children.

Systematic Review Registration: Identifier: RD42019126767.

Keywords: meditation, mindfulness, mindfulness techniques, children, systematic review

INTRODUCTION

"Mindfulness" is a term frequently used to describe a mental faculty related to attention, awareness, retention/memory, and/or discernment (Davidson and Kaszniak, 2015). A popular definition of mindfulness entails a deliberate conscious awareness of the present moment without judgment (Kabat-Zinn, 2003). Another common meaning of mindfulness is related to a specific form of

meditative practice (Goleman, 1988; Goleman and Davidson, 2018). This type of meditation fosters the ability to bring a non-judging awareness to a specific thing and strengthens our ability to notice our mind wandering (Goleman and Davidson, 2018). Importantly, mindfulness is a psychological process that can be developed through practice (Kabat-Zinn, 2003; Bishop et al., 2004), and several studies have shown that this specific training leads to improvements in psychological wellbeing and mental health (e.g., Bowen et al., 2006; Chiesa, 2009; Chiesa and Serretti, 2011; for a review see Keng et al., 2011). These positive effects have also been highlighted among children (for a review and meta-analyses see Klingbeil et al., 2017 and Maynard et al., 2017). Still, little is known about the techniques through which mindfulness practice results in those benefits, particularly for children. Thus, in this study, we performed a systematic review of the current literature about the efficacy of meditation techniques used by mindfulness-based programs on the cognitive, social-emotional, and academic skills of children.

Mindfulness-based interventions employ several training techniques (Kabat-Zinn, 2003), which involve a huge number of diverse practices. To do justice to this diversity, several attempts were made to classify these practices, and different taxonomies included a diversity of techniques from various backgrounds and contexts (Nash and Newberg, 2013; Schmidt, 2014; Lutz et al., 2015). For instance, Singer et al. (2016) developed a classification of practices based on Buddhist traditions, contemplative sciences, and neuroscientific research. The authors distinguished three broad classes of mental skills: (1) present-moment attention and body awareness, including breathing meditation and body scan as core exercises; (2) socio-affective abilities such as gratitude, compassion, prosocial motivation, and accepting difficult emotions through loving-kindness meditation and dyadic exercises as core practices; and (3) socio-cognitive capacities such as metacognition and perspective taking that incorporates core practices like observing thoughts, meditation, and dyadic perspective-taking exercises. Furthermore, Hildebrandt et al. (2017) explored the differential effects of these classes of mental abilities and found that present-moment attention practices increased attentional facets, but only socio-affective and socio-cognitive training led to broad changes in ethical-motivational skills such as nonjudgmental attitude, compassion, and self-compassion.

In 2019, Matko and Sedlmeier developed a new classification system for meditation techniques to make it accessible and understandable to practitioners/researchers with different backgrounds. Through a survey with 100 experienced meditators, the authors found seven main clusters of techniques: (1) body-centered meditation (i.e., concentrating on energy center or channeling, body scan, breath abdomen, observing the body, and breath nose); (2) mindful observation (i.e., observation of thoughts or emotions, long meditation, and sitting in silence); (3) contemplation (i.e., contemplating on a question, contradiction, or paradox); (4) mantra meditation (meditation with sound, singing sutras or mantras, and repeating syllables); (5) visual concentration (i.e., visualizations and concentrating on an object); (6) affect-centered meditation (i.e., cultivating compassion and opening up to blessings); and (7) meditation with movement (i.e., meditation with movement, manipulating the breath, walking, and observing senses).

Several reviews have examined the efficacy of mindfulness practice on adults, and there is evidence for the positive impacts of mindfulness training (Baer, 2003; Grossman et al., 2004; Mackenzie et al., 2005; Smith et al., 2005; Ott et al., 2006; Matchim and Armer, 2007; Toneatto and Nguyen, 2007; Winbush et al., 2007; Praissman, 2008; Teixeira, 2008; Carmody and Baer, 2009; Ledesma and Kumano, 2009). Some of these reviews applied meta-analytic methods to quantify the efficacy of this intervention (Baer, 2003; Grossman et al., 2004; Ledesma and Kumano, 2009), and robust evidence for the positive impact of mindfulness practice was found. Research with children is not yet as extensive as with adults, but it is growing rapidly. For example, two recent meta-analyses indicated the increased interest in the utility of mindfulness training in young people. Specifically, Klingbeil et al. (2017) reported data from participants between 4 and 18 years of age and analyzed two broad categories of outcome measures: (i) skills of mindfulness, attention, and meta-cognition/cognitive flexibility and (ii) academic performance and emotional/behavioral regulation. As a result, the authors found significant improvements across outcomes in all categories. Maynard et al. (2017) analyzed data from studies implementing mindfulness training in schools to participants aged between 4 and 20 years and also found that this intervention had a small-to-medium effect on cognitive and socio-emotional skills.

Research has repeatedly shown that mindfulness training improves the performance of children on tasks that assess cognitive functioning such as attention or executive functions (e.g., Semple et al., 2010; Leonard et al., 2013; Britton et al., 2014; Schonert-Reichl et al., 2015; Felver et al., 2017; Lawler et al., 2019). For example, 12 sessions of mindfulness training improved the performance of preschoolers on an attention task, while no changes were observed in the passive control group (Quan et al., 2019). For executive functions, after 8 weeks of mindfulness training, parents reported improvements in children in inhibition, shift, emotional control, initiative, working memory, planning, organization of materials, and monitoring skills (7–9 years old) (Flook et al., 2010).

The impact of mindfulness training has also been studied on emotional mental health (Bohlmeijer et al., 2010; Fjorback et al., 2011; Gotink et al., 2015; Guendelman et al., 2017). For example, after 12 weeks of mindfulness, yoga movements, and breathing training, fourth- and fifth-grade students (i.e., 9- and 10-year-old children) reduced involuntary responses to stress (such as rumination and intrusive thoughts) when compared with a waitlist control group (Mendelson et al., 2010). Napoli et al. (2005) examined the effects of a 24-week mindfulness intervention on attention and anxiety levels in first- and third-grade students, and results showed that mindfulness training reduced attentional problems and anxiety in children. Furthermore, mindfulness interventions have been found to improve social-emotional skills. For instance, teachers reported significant increases in

optimism and improvements on classroom social behaviors of students (9–13 years of age) who participated in a mindfulness education program (Schonert-Reichl and Lawlor, 2010).

As mindfulness has shown positive effects on many aspects of wellbeing, studying the impact of mindfulness in schools has been worth it (Huppert and Johnson, 2010). For instance, studies have found a positive relationship between mindfulness and academic performance (McCloskey, 2015; Lin and Mai, 2018), probably because it reduces stress and anxiety (McCloskey, 2015), increases attention and memory (Lin and Mai, 2018), and/or enhances specific skills such as openness, attention, or inquiry (Docksai, 2013). As an example, performance on a reading comprehension test was significantly improved after participation in an intensive 2-week mindfulness training (Mrazek et al., 2013).

Even though research has accumulated evidence suggesting that mindfulness training improves cognitive, socio-emotional, and academic skills, studies are needed to clarify which intervention techniques produce change (Shapiro and Carlson, 2009). Yet, a systematic review focusing on the meditation techniques used by mindfulness-based programs that result in those outcomes has not been conducted. Thus, our primary aim was to identify different techniques to improve cognitive, social-emotional, and academic outcomes. Specifically, we explored a multiplicity of meditation-based techniques. As research with children is growing rapidly, we focused our attention on school-age children. We also selected other study inclusion criteria to maintain the focus on interventions delivered with high quality, i.e., the studies should include an active or an inactive/passive control condition to provide a comparable condition and quantitative measures should be reported as outcomes. We expected to analyze the frequency and impact of different techniques in order to understand which practices are frequently used for promoting different types of skills. Our conclusions are likely to reveal how future research on the effectiveness of mindfulness interventions may be improved.

METHOD

Search Strategy

A systematic literature search was carried out using MEDLINE and EBSCO (PsycINFO, CINAHL, ERIC) databases from the year 2009 to March 2019. An update was conducted from the year 2019 to March 2021. The review was conducted according to PRISMA guidelines (Moher et al., 2009) and was registered on the PROSPERO database for systematic reviews (registration 2019: CRD42019126767). The following keywords were used to conduct the search: Child* OR Children* OR "Primary School" OR "Elementary School" OR "Primary Education" OR "Elementary Education" AND (Mindfulness* OR Mindful*) AND (Intervention* OR Training* OR Program* OR Exercise* OR Techniques*) NOT ("Clinical Population" OR "Clinical Patients" OR Patients* OR Clinical* OR Inpatient* OR Outpatient* OR Disorder* OR Disabilities*). Filters for source types (academic Journals), age (6–12 years), and language (English) were applied. An additional search through other sources was conducted.

TABLE 1 | Population/participant, intervention/indicator, comparator/control, outcome (PICO) framework.

PICO framework	
Population	Typically developing children from 6 to 12 years of age
Intervention	Meditation techniques used by mindfulness-based programs
Comparison	Other types of intervention and/or a placebo condition
Outcome	Cognitive, social-emotional, and academic outcomes

Inclusion and Exclusion Criteria

Using the Population, Interventions, Comparison, Outcomes (PICO) framework, inclusion and exclusion criteria were based on the following research question: In typical school-age children, what meditation techniques used by mindfulness-based programs, compared with other types of intervention and/or placebo conditions, are more effective in developing cognitive, social-emotional, and academic outcomes? (**Table 1**).

In order to be included, studies had to: (i) include typically developing children aged 6–12 years; (ii) clearly describe the mindfulness techniques employed; (iii) include an active or an inactive/passive control condition to provide a comparable condition to test the effects of techniques; (iv) include measures of cognitive, socio-emotional, or academic skills as outcomes; (v) provide quantitative measures; and (vi) be published in English. Reviews, meta-analyses, editorials, opinion papers, and dissertations were excluded.

Risk of Bias (Quality) Assessment

To assess the risk of bias in randomized trials, we used the Cochrane Collaboration's tool, namely, the RoB 2.0 (Sterne et al., 2019). This tool assesses five domains of bias: (1) bias due to randomization, (2) bias due to deviations from intended intervention, (3) bias due to missing data, (4) bias due to outcome measurement, and (5) bias due to selection of the reported result. The risk of bias was assessed by two authors (AV and SM) independently from each other (selecting "low risk," "high risk," or "no information" of bias). The unclear risk was selected when details were not reported or unknown. Discrepancies were resolved through discussion. Given that we anticipated that most of the studies would be at high risk of bias, we did not restrict analyses based on this parameter.

Data Extraction

We developed the data extraction from all eligible articles based on the Preferred Reporting Items for Systematic review and Meta-Analysis Protocols (PRISMA-P; Moher et al., 2009) flow diagram, following four stages: (1) identification, (2) screening, (3) eligibility, and (4) inclusion. Once the references had been obtained, we used the Rayyan software (Ouzzani et al., 2016) to compile the articles. Studies were initially identified by title and abstract, according to the inclusion criteria established. This full search was evaluated for inclusion by two authors (SM and AF) independently from each

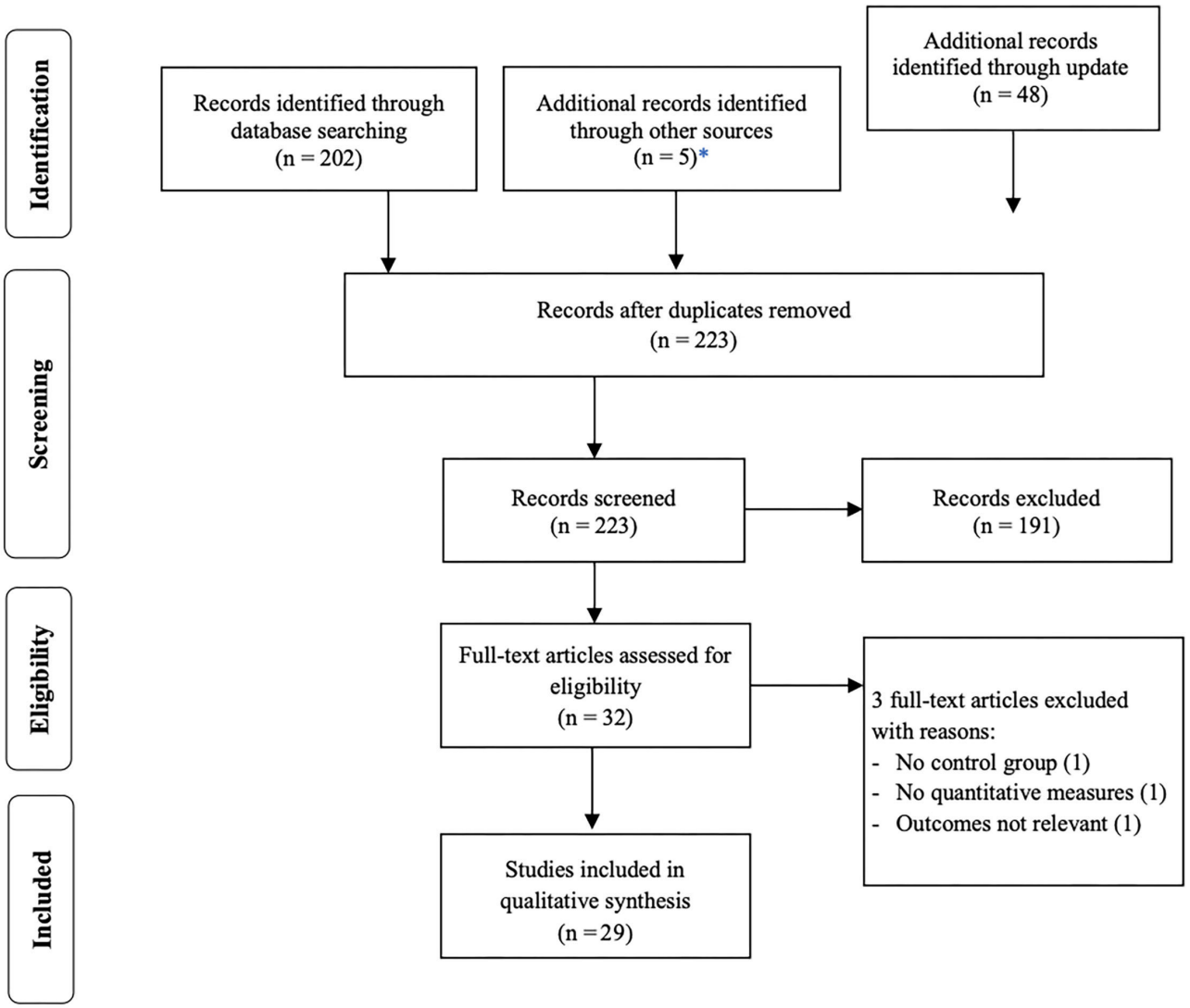

FIGURE 1 | Preferred Reporting Items in Systematic Reviews and Meta-Analyses (PRISMA) flow diagram of selection of studies. *Other sources for identification of further articles included Google Scholar and "snowballing" techniques such as searching non-indexed journals and references of all full-text articles.

other, and discrepancies were resolved by discussion. A study was included when both reviewers independently assess it as satisfying the inclusion criteria. A third author (MF) mediated in the event of disagreement following discussion. Extracted information included: studies characteristics (*viz.* general study characteristics, effects of interventions, and mindfulness techniques). The types of techniques used within each intervention were coded according to the seven main clusters suggested by Matko and Sedlmeier (2019).

RESULTS

Trial Flow

A total of 250 articles were identified from the databases using the search strategy previously described. Five articles were added through other sources. Thirty-two duplicates were removed, and 223 articles were screened by title and abstract. Of these, 191 reports were excluded since they did not meet the inclusion criteria. There was almost perfect agreement between the two judges (Cohen's $\kappa = 0.97$). Thus, 32 papers were included, and their full-text analyzed, of which 29 met inclusion criteria. This trial flow is presented in a PRISMA flow diagram in **Figure 1**.

General Study Characteristics

Settings

Twelve of the 29 studies included in this review were conducted in the United States. The other studies were conducted in Canada ($n = 2$), Israel ($n = 2$), United Kingdom ($n = 2$), Spain ($n = 2$), Australia ($n = 1$), Brazil ($n = 1$), Germany ($n = 1$), Korea ($n = 1$), Italy ($n = 1$), Netherlands ($n = 1$), New Zealand

TABLE 2 | Characteristics of the included studies.

Authors	Country	Method	Age range	Type of comparison groups	Comparison groups conditions	Intervention group(*n*)	Comparison groups (*n*)
Alampay et al. (2019)	Philippines	RCT	9–16 years	Active	Handicrafts condition	87	99
Bakosh et al. (2016)	United States	QED	3rd grade	Passive	Business as usual	93	98
Bakosh et al. (2018)	United States	RCT	1st–4th grades	Passive	Waitlist	167	170
Bauer et al. (2020)	United States	RCT	Mean = 11.76 years (SD = 0.40)	Active	Coding training	15	16
Britton et al. (2014)	United States	RCT	Mean = 11.79 years, (SD = 0.41)	Active	African history course with a matched experiential activity	55	46
Crescentini et al. (2016)	Italy	QED	7–8 years	Active	Emotion awareness not involving meditation exercises	16	15
Bergen-Cico et al. (2015)	United States	QED	6th grade	Active	Exposure to information about mindful awareness, but do not practice mindful yoga and meditation	72	72
Butzer et al. (2017)	United States	RCT	7th–12 th grade	Active	Physical education as usual	117	94
de Carvalho et al. (2017)	Portugal	QED	3rd–4th grade	Passive	Waitlist	223	231
Devcich et al. (2017)	New Zealand	QED	9–11 years	Active	Emotional literacy program	54	52
Enoch and Dixon (2017)	United States	QED	6–12 years	Passive	Business as usual	20	20
Flook et al. (2010)	United States	RCT	7–9 years	Active	Silent reading period	32	32
Gould et al. (2012)	United States	QED	4th–5 th grade	Passive	Waitlist	51	46
Janz et al. (2019)	Australia	QED	Mean = 78.03 months (SD = 10.71)	Passive	Waitlist	55	36
Parker et al. (2014)	United States	RCT	9–11 years	Passive	Waitlist	71	40
Ricarte et al. (2015)	Spain	QED	6–13 years	Passive	Waitlist	45	45
Rodríguez-Ledo et al. (2018)	Spain	QED	11–14 years	Passive	Business as usual	108	48
Schonert-Reichl and Lawlor (2010)	Canada	QED	9–13 years	Passive	Waitlist	139	107
Schonert-Reichl et al. (2015)	Canada	RCT	9–11 years	Active	Social responsibility program	48	51
Tarrasch (2018)	Israel	QED	9–10 years	Passive	Business as usual	58	43
Tarrasch et al. (2017)	Israel	QED	4th–5th grade	Passive	Waitlist	138	78
Thomas and Atkinson (2016)	United Kingdom	RCT	8–9 years	Passive	Waitlist	16	14
van de Weijer-Bergsma et al. (2014)	Netherlands	QED	8–12 years	Passive	Waitlist	95	104
Viafora et al. (2015)	United States	QED	11–13 years	Passive	Waitlist	Group 1: 28 Group 2: 15	20
Vickery and Dorjee (2016)	United Kingdom	QED	7–9 years	Passive	Waitlist	33	38
Waldemar et al. (2016)	Brazil	QED	10–14 years	Passive	Waitlist	64	68
White (2012)	United States	QED	8–11 years	Passive	Waitlist	70	85
Wimmer et al. (2016)	Germany	QED	5 th grade	1 Active 1 Passive	Concentration training; Business as usual	16	Group 1: 8 Group 2: 10
Yook et al. (2017)	Korea	QED	2nd–4 th grade	Passive	Business as usual	23	23

RCT, randomized controlled trial; QED, quasi-experimental design.

($n = 1$), Philippines ($n = 1$), and Portugal ($n = 1$) (**Table 1**). Four studies were published between 2010 and 2012, seven studies were published between 2014 and 2015, while 15 studies were published between 2016 and 2018, and three studies were published between 2019 and 2021 (**Table 2**).

Participants

Age varied across studies. Four studies included 6-year-olds, nine studies recruited 7-year-olds, 13 studies recruited 8-year-olds, 19 studies recruited children with 9 years old, 16 studies included children with 10 years old, and 15 studies included children

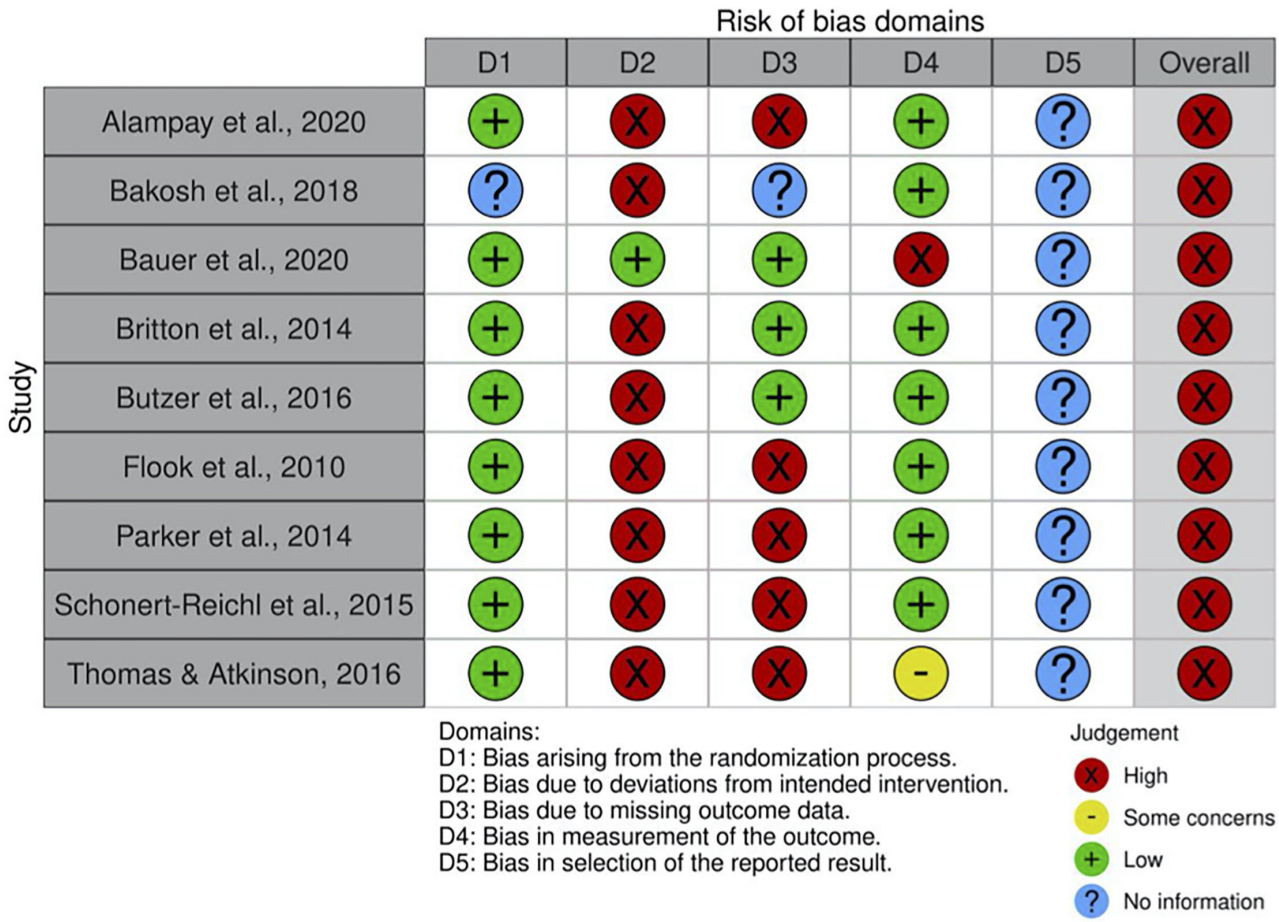

FIGURE 2 | Risk of bias graph across randomized controlled trials.

with 11 years old (**Table 2**). Sample sizes for intervention groups ranged from 15 to 223 and for control groups from 8 to 231.

Research Design

Nine randomized controlled trials (RCT) and 20 quasi-experimental design (QED; studies using a comparison group design, but participants were not randomly assigned to conditions) were included in the review (**Table 2**). Regarding control groups, only one study compared the performance of the mindful group with an active and a passive control group (i.e., concentration training and business as usual, respectively). Nineteen studies included only passive control groups (i.e., waitlist and business as usual) and nine included only active control groups (i.e., handcrafts condition, coding training, history course, emotional literacy program, silent reading period, social responsibility program, physical education, and exposure to mindful awareness; **Table 2**).

Risk of Bias

Several authors fail to report design characteristics (i.e., allocation concealment, blinding, and incomplete outcome data) to conduct an accurate assessment of the risk of bias. There was almost perfect agreement between the two judges that conduct the assessment (Cohen's $\kappa = 0.89$). Overall, there was a high-risk of bias across the 9 RCTs included in the review, with variation in high-risk areas across studies see **Figure 2** for a table reporting each domain of risk for each study and **Figure 3** for a summary of risk across studies.

Intervention Characteristics

Duration, intensity, and dosage of mindful interventions varied across the 29 included studies. For studies reporting adequate information, a wide range of daily doses of formal mindfulness practice were reported, from 4 to 90 min per session. Interventions ranged from 2 weeks to 9 months. Studies also varied in terms of how frequently children met to receive the intervention, from one time per week to daily interventions. The most frequent option was sessions of 45 min once a week for 8 weeks (**Table 3**).

As can be seen in **Table 3**, the included studies examined several mindfulness interventions that, in most cases, were linked to previously existing mindfulness programs, such as mindfulness-based cognitive therapy (MBCT) for depression or mindfulness-based stress reduction (MBSR). Importantly,

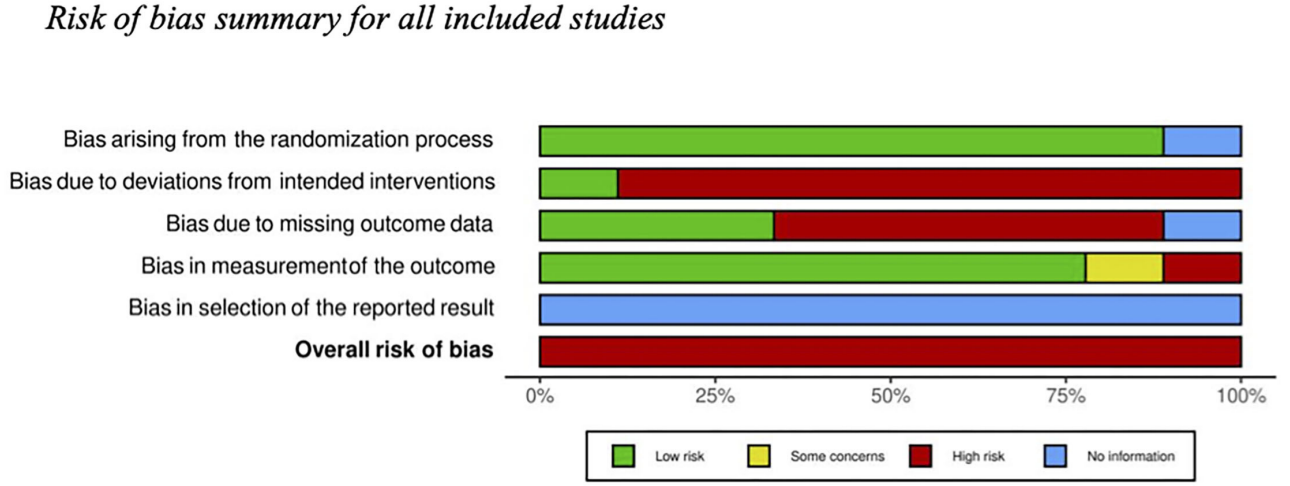

FIGURE 3 | Risk of bias summary across randomized controlled trials.

only nine programs were assessed with RCTs, namely, the MBCT adapted to the Kamalayan curriculum, the MBSR—adapted program, the Calmer Choice, the Meditation condition formulated according to Roth's Integrative Contemplative Pedagogy, the Kripalu Yoga in the Schools, the Innerkids Program, the Master Mind, the MindUP program, and the Paws.b.

Effects of Interventions

Overall, as shown in **Table 4**, among the included studies, 16 assessed cognitive skills, 21 evaluated socio-emotional abilities, and 3 explored academic-related skills. Within these studies, 100% found significant effects for cognitive skills, 90% showed a significant impact on socio-emotional abilities, and 33% suggested a significant improvement in academic skills.

The RCTs showed effects for measures assessing cognitive (*viz.* executive functions, attention, and self-control) and social-emotional (*viz.* stress physiology, empathy, perspective taking, emotional control, optimism, school self-concept, symptoms of depression, anxiety, peer aggression, prosocial behavior, and peer acceptance) skills (**Tables 3**, **4**).

The QEDs also found positive effects for cognitive skills (i.e., overall executive functions, attention, concentration, inhibitory control, cognitive flexibility, and immediate auditory-verbal memory), social-emotional abilities (*viz.* stress, wellbeing, mindfulness, self-esteem, resilience, psychological happiness, empathy, perspective-taking, emotional control, optimism, symptoms of depression, internalizing problems, peer aggression, prosocial behavior, increased peer acceptance, reduced anxiety, self-control, self-regulation, improvements in mental health problems, quality of life, self-compassion, acceptance, relaxation, happiness, aggressive behaviors, and social competence), and academic skills (*viz.* school self-concept, science and reading grades, and classroom behavior; **Table 3**).

Exploring the Effects of Meditation Techniques on Cognitive, Socio-Emotional, and Academic Skills

Overall, all interventions incorporated "body-centered meditations" and "mindful observations." Almost half of the interventions included "affect-centered meditations" (55%), "mantra meditations" (55%), "meditations with movement" (52%), and "visual concentration" (48%) (**Table 3**). Patterns of relationships between meditation techniques and cognitive, socio-emotional, and academic outcomes were identified and are presented below (detailed description presented in **Table 4**).

Cognitive Performance

As detailed in **Table 4**, results showed that interventions improving cognitive outcomes frequently used "body-centered meditations" and "mindful observations," while less frequent techniques to improve cognitive abilities were "affect-centered meditations," "meditations with movement," "visual concentrations," and "mantra meditation." The six RCTs that found improvements in cognitive skills used "body-centered meditations" ($n = 6$), "mindful observations" ($n = 6$), "affect-centered meditations" ($n = 4$), "meditations with movement" ($n = 3$), "mantra meditations" ($n = 3$), and "visual concentration" ($n = 2$). The 10 QEDS that showed benefits in cognitive outcomes employed "body-centered meditations" ($n = 10$), "mindful observations" ($n = 10$), "meditations with movement" ($n = 7$), "mantra meditations" ($n = 5$), "visual concentration" ($n = 5$), and "affect-centered meditations" ($n = 4$) (**Table 4**).

Socio-emotional Abilities

Findings suggested that, although all the interventions improving socio-emotional outcomes included "body-centered meditations" and "mindful observations," "affect-centered meditations" were also frequently applied. Less frequent techniques used to improve socio-emotional outcomes were "meditations with movement," "visual concentrations," and

TABLE 3 | Intervention characteristics, meditation techniques, and main findings of the included studies.

Study	Intervention	Duration/Intensity	Targets of intervention	Main findings
Alampay et al. (2019)	Mindfulness-based cognitive therapy (MBCT) adapted to the Kamalayan curriculum.	10 sessions of 75 min for the younger students or 90 min for the older students (10 weeks)	Depressive and anxiety symptoms and emotion regulation	Results indicated that participation in the mindful group did not affect depression, anxiety, or emotion regulation.
Bakosh et al. (2016)	Mindful-based social and emotional learning (MBSEL)	40 sessions of 10 min-per-day (8 weeks)	Students' grades (reading, science, math, writing, spelling, and social studies), classroom behavior, day-to-day teaching operations	The mindful training significantly predicted a difference in science and reading grades. This experimental group also showed improvements in classroom behavior, compared with the control group.
Bakosh et al. (2018)	Mindfulness-based stress reduction (MBSR)–adapted program	10-min-per-day audio-guided mindfulness program (10 weeks)	Academic achievement	Results showed that improvements in Math scores, Social Studies scores, and Grade Point Averages were generally higher for students in the intervention group. However, the results varied considerably in effects and there is a lack of consistent statistically significant results.
Bauer et al. (2020)	Calmer Choice	4 sessions of 45 min each per week (8 weeks)	Sustained attention and associated resting-state functional brain connectivity (i.e., anticorrelation between the default mode network [DMN] and right dorsolateral prefrontal cortex [DLPFC])	Participants in the mindful group preserved fewer lapses of attention and DMN–DLPFC anticorrelation (associated with better performance on a sustained-attention task) compared to children in the control group.
Britton et al. (2014)	Meditation condition formulated according to Roth's Integrative Contemplative Pedagogy	3 to 12 min each day (6 weeks)	Behavioral and emotional problems	Both groups decreased significantly on clinical syndrome subscales and affect but did not differ in the extent of their improvements. The mindful group was significantly less likely to develop suicidal ideation or thoughts of self-harm than controls.
Crescentini et al. (2016)	Mindfulness-oriented meditation based on the mindfulness-based stress reduction protocol	3 sessions per week (10 min - 1 h each) (8 weeks)	Cognitive, emotional, social, and behavioral processes	The mindful group showed positive effects in reducing attention problems. Both groups reduced their internalizing problems such as anxiety.
Bergen-Cico et al. (2015)	Yoga mindful intervention inspired by YogaKids	3 sessions of 4 min each per week (100 school days)	Self-regulation	The mindfulness group showed improvements in long-term and global self-regulation, compared with the control group**.**
Butzer et al. (2017)	Kripalu Yoga in the Schools (KYIS) curriculum	1 or 2 sessions of 45 min per week (32 sessions, 6 months)	Substance use willingness, actual substance abuse, emotional self-regulation, perceived stress, mood, and impulsivity	The mindfulness group showed improvements in their willingness to smoke cigarettes as well as improvements in emotional self-control in females), compared with the control group**.**
de Carvalho et al. (2017)	MindUP program	15 sessions of 45-60 min each + 3 min of meditation every day, 3 times a day (15 weeks)	Children's emotional regulations skills, self-compassion, and affect teachers' mindfulness, self-compassion, emotion regulation skills, and burnout	In the group of children: The mindful group demonstrated higher improvements, than the control group, in social and emotional skills, namely in positive emotions, common humanity (a dimension of self-compassion), and a significant reduction in suppressing their emotions. In the group of children teachers: The mindful group showed superior improvements than the control group, in self-kindness, personal accomplishment, and observation abilities.
Devcich et al. (2017)	Pause, Breath, Smile	1 session of 60 min per week (8 weeks)	Self-reported wellbeing (including components of subjective wellbeing and psychological wellbeing) and mindfulness	The mindfulness group showed significant increases in self-reported wellbeing, compared with the control group. Mindfulness scores were significantly increased only for the mindfulness group.

(Continued)

TABLE 3 | Continued

Study	Intervention	Duration/Intensity	Targets of intervention	Main findings
Enoch and Dixon (2017)	Acceptance and commitment therapy curriculum	6 sessions of 20 min each (2 weeks)	Attention processes	The mindful group showed that increases in attention outcomes, compared with the control group.
Flook et al. (2010)	InnerKids program	2 sessions of 30 min per week (8 weeks)	Executive functions (inhibition, shifting, emotional control, initiation, working memory, planning/organization, organization of materials, and monitoring)	The mindfulness group exhibited improvements in executive function (overall global executive control, behavioral regulation, and metacognition), when compared with the control group.
Gould et al. (2012)	Yoga-inspired mindfulness program	4 sessions of 45 min per week (12 weeks)	Depressive symptoms, positive and negative emotions, and stress responses	The mindfulness group showed a reduction in "impulsive action stress responses" (in youth who had low baseline depressive symptoms) and reduction in "Involuntary Engagement stress responses" (in youth who had low or medium levels of baseline depressive symptoms), compared with the control group.
Janz et al. (2019)	CalmSpace	Range of mindfulness activities that complement the school routine and curriculum.	Executive functioning	Compared to children in a waitlist control condition, children who participated in the mindfulness program showed improvements in measures of inhibitory control and cognitive flexibility. There were also significant gains in measures of behavior, most notably in attentional control processes.
Parker et al. (2014)	Master Mind program	1 session of 15 min each per week (4 weeks)	Executive functioning (inhibitory control, cognitive flexibility, and working memory), behavior, emotion regulation, and intentions to use substances	The mindful group significantly increased executive functioning skills (girls and boys), self-control abilities (only boys), and significantly reduced aggressive behavior and social problems (boys and girls), and anxiety (only girls), when compared with the control group.
Ricarte et al. (2015)	Mindfulness-based intervention (MBI)	30 sessions of 15 min each (6 weeks)	Mood state, attention, and concentration	The mindfulness group improved mood state, concentration, and immediate auditory-verbal memory, compared with the control group
Rodríguez-Ledo et al. (2018)	Emotional Competency Development SEA program	18 sessions of 55 min (9 months)	Emotional intelligence and mindfulness	The mindfulness group showed a significant effect in the ability to mindfully attend the interior and in the capacity of Kinesthetic attention, compared with the control group.
Schonert-Reichl and Lawlor (2010)	Mindfulness Education (ME) program	10 sessions of 40-50 min each per week + mindfulness attention exercises (3 times a day, at least 3 min each session) (10 weeks)	Optimism, school and general self-concept, positive and negative emotions, classroom social and emotional competence (i.e., aggressive behaviors, oppositional behavior/dysregulation, attention and concentration, social-emotional competence)	The mindful group showed significant increases in social and emotional competence (attention/concentration and social-emotional competence) as well as in positive emotions (i.e., optimism) when compared with the control group. Also, the mindful group demonstrated improvements in general self-concept (for preadolescents, but no for early adolescents), compared with the control group.
Schonert-Reichl et al. (2015)	MindUP program	1 session of 40 – 50 min per week (12 sessions)	Executive functions, stress physiology (through salivary cortisol), wellbeing, empathy, optimism, perspective-taking, emotional control, school self-concept, depressive symptoms, social responsibility, mindfulness, social responsibility, and pro-sociality	Compared with the control group, the mindfulness group showed (a) more improvements in executive functions and stress physiology; (b) higher empathy, perspective-taking, emotional control, optimism, school self-concept, and mindfulness; (c) greater decreases in symptoms of depression and peer aggression; (d) higher rates of prosocial behavior; and (e) increased peer acceptance.

(Continued)

TABLE 3 | Continued

Study	Intervention	Duration/Intensity	Targets of intervention	Main findings
Tarrasch (2018)	Mindfulness-based stress reduction (MBSR)	1 session of approximately 45 min per week (10 weeks)	Sustained and selective attention	A significant improvement in attentional tasks was obtained in the mindful group.
Tarrasch et al. (2017)	Call to Care-Israel	1 session of 45 min per week (24 weeks)	Visual perception, motor accuracy, anxiety, and mindfulness	The mindfulness group showed improvements in motor accuracy, visual perception, and mindfulness and reduction of anxiety, compared with the control group**.**
Thomas and Atkinson (2016)	Paws.b	6 sessions of 60 min each per week (6 weeks)	Attentional functioning	The mindfulness group had a significant positive impact on children's attentional functioning when compared with the control group.
van de Weijer-Bergsma et al. (2014)	MindfulKids	Twelve 30-min sessions (6 weeks)	Stress and stress-related mental health and behavioral problems	Prevention effects on stress and wellbeing were found directly after training. Effects on mental health problems also became apparent at follow-up.
Viafora et al. (2015)	Mindfulness activities	1 session of 45 min each per week (8 weeks)	Emotional wellbeing, and positive behaviors: self-compassion, mindfulness, psychological acceptance, and psychological inflexibility	The mindful group 1 showed significant improvements in acceptance and mindful awareness, and the mindful group 2 showed higher emotional wellbeing, more facility at dealing with difficult feelings (such as anger, stress), and learned to be more patient. Both mindful groups expressed benefits in various domains, such as concentration, stress, relaxation, patience, happiness, and in the ability to deal with difficult feelings, compared with the control group.
Vickery and Dorjee (2016)	Paws.b	12 sessions of 30 min (8 weeks)	Emotional wellbeing	The mindfulness group showed a significant increase in meta-cognition and significantly reduced negative affect when compared to the control group.
Waldemar et al. (2016)	Mindfulness and social-emotional learnings program (M-SEL)	From 8 to 12 sessions of 60 min (5 months)	Mental health problems (emotional, conduct, hyperactivity, relationship, and prosocial), quality of life, and symptoms of attention deficit hyperactivity disorder	The mindfulness group showed significant improvements in four mental health problems (i.e., emotional problems, conduct problems, interpersonal relationships, and prosocial behavior) as well as in the quality of life, compared with the control group.
White (2012)	The mindful awareness for girls through yoga program	1 session of 60 min per week + 10 min of yoga daily homework (8 weeks)	Perceived stress, coping abilities, self-esteem, and self-regulation	The mindfulness group was more likely to report a higher appraisal of stress and greater frequency of coping, compared with the control group. Self-esteem and self-regulation increased in both groups.
Wimmer et al. (2016)	Mindfulness training-based on MBSR method	2 sessions of 60 and 90 min, respectively, per week (18 weeks)	Sustained attention, cognitive flexibility, cognitive inhibition, and data-driven information processing	The mindfulness group showed improvements in cognitive inhibition and data-driven information processing when compared with both control groups (active and passive). Also, the sustained attention performance of the experimental group was better than the passive control group.
Yook et al. (2017)	New sport and mindfulness yoga (physical activity intervention)	1 new sport session of 40 min + 1 mindfulness yoga session of 40 min per week (8 weeks)	Self-esteem, resilience, and happiness	The mindfulness group exhibited significant improvements in self-esteem and resilience, and significant change in psychological happiness, compared with the control group.

TABLE 4 | Mindfulness meditation techniques and significant cognitive, social-emotional, and academic outcomes of the included studies.

		Significant outcomes		
Study	**Meditation techniques***	**Cognitive skills**	**Social-emotional skills**	**Academic skills**
Alampay et al. (2019)	(1) Body-centered meditation (2) Mindful observation	–	**x**	–
Bakosh et al. (2016)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual concentration (6) Affect-centered meditation	–	✓	✓
Bakosh et al. (2018)	(1) Body-centered meditation (2) Mindful observation (6) Affect-centered meditation	–	–	**x**
Bauer et al. (2020)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation	✓	–	–
Britton et al. (2014)	(1) Body-centered meditation (2) Mindful observation	–	**x**	–
Crescentini et al. (2016)	(1) Body-centered meditation (2) Mindful observation (6) Affect-centered meditation (7) Meditation with movement	✓	✓	–
Bergen-Cico et al. (2015)	(1) Body-centered meditation (2) Mindful observation (7) Meditation with movement	✓	✓	–
Butzer et al. (2017)	(1) Body-centered meditation (2) Mindful observation (6) Affect-centered meditation (7) Meditation with movement	✓	✓	–
de Carvalho et al. (2017)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual Concentration (6) Affect-centered meditation (7) Meditation with movement	–	✓	–
Devcich et al. (2017)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual concentration (6) Affect-centered meditation (7) Meditation with movement	–	✓	–
Enoch and Dixon (2017)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual Concentration	✓	–	–
Flook et al. (2010)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual concentration (6) Affect-centered meditation (7) Meditation with movement	✓	–	–
Gould et al. (2012)	(1) Body-centered meditation (2) Mindful observation (6) Affect-centered meditation (7) Meditation with movement	✓	✓	–
Janz et al. (2019)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual concentration (7) Meditation with movement	✓	–	–

(Continued)

TABLE 4 | Continued

Study	Meditation techniques*	Significant outcomes		
		Cognitive skills	Social-emotional skills	Academic skills
Parker et al. (2014)	(1) Body-centered meditation (2) Mindful observation (6) Affect-centered meditation (7) Meditation with movement	✓	✓	–
Ricarte et al. (2015)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual Concentration	✓	✓	–
Rodríguez-Ledo et al. (2018)	(1) Body-centered meditation (2) Mindful observation	–	✓	–
Schonert-Reichl and Lawlor (2010)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual Concentration (6) Affect-centered meditation	–	✓	–
Schonert-Reichl et al. (2015)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual concentration (6) Affect-centered meditation	✓	✓	**x**
Tarrasch (2018)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual concentration (7) Meditation with movement	✓	–	–
Tarrasch et al. (2017)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual concentration (6) Affect-centered meditation (7) Meditation with movement	✓	✓	–
Thomas and Atkinson (2016)	(1) Body-centered meditation (2) Mindful observation	✓	–	–
van de Weijer-Bergsma et al. (2014)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (6) Affect-centered meditation	–	✓	–
Viafora et al. (2015)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual concentration (6) Affect-centered meditation (7) Meditation with movement	–	✓	–
Vickery and Dorjee (2016)	(1) Body-centered meditation (2) Mindful observation (6) Affect-centered meditation	✓	✓	–
Waldemar et al. (2016)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual concentration (6) Affect-centered meditation	–	✓	–
White (2012)	(1) Body-centered meditation (2) Mindful observation (4) Mantra meditation (5) Visual concentration (7) Meditation with movement	–	✓	–

(Continued)

TABLE 4 | Continued

Study	Meditation techniques*	Significant outcomes		
		Cognitive skills	Social-emotional skills	Academic skills
Wimmer et al. (2016)	(1) Body-centered meditation (2) Mindful observation (7) Meditation with movement	✓	–	–
Yook et al. (2017)	(1) Body-centered meditation (2) Mindful observation (7) Meditation with movement	–	✓	–

Meditation techniques classified according to Matko and Sedlmeier (2019): (1) body-centered meditation, (2) mindful observation, (3) contemplation, (4) mantra meditation, (5) visual concentration, (6) affect-centered meditation, and (7) meditation with movement; ✓: significant difference found; x: significant difference not found.

"mantra meditation." Three RCTs found improvements in socio-emotional abilities and applied "body-centered meditations" ($n = 3$), "mindful observations" ($n = 3$), "affected-centered meditations" ($n = 3$), "meditations with movement" ($n = 2$), "mantra meditation" ($n = 1$), and "visual concentration" ($n = 1$). Sixteen QEDs also showed benefits in socio-emotional skills and used "body-centered meditations" ($n = 16$), "mindful observations" ($n = 16$), "mantra meditations" ($n = 10$), "visual concentration" ($n = 10$), "affect-centered meditations" ($n = 10$), and "meditations with movements" ($n = 10$) (**Table 4**).

Academic Skills

Just one QED found improvements in academic skills. This study used "body-centered meditations," "mindful observations," "mantra meditations," "visual concentration," and "affect-centered meditations" (**Table 4**).

DISCUSSION

To the best of our knowledge, this is the first review of the efficacy of specific meditation techniques used by mindfulness-based programs on the cognitive, social-emotional, and academic skills of children. A total of 29 studies (nine RCTs and 20 QED studies) met the selection criteria. Overall, results provided support for the use of mindfulness interventions to improve cognitive and social-emotional outcomes but found no support for the use of these interventions to enhance academic skills. Regarding meditation mindfulness techniques, all the interventions used "body-centered meditations" and "mindful observations." In addition, "affect-centered meditations" were also frequently applied to improve socio-emotional outcomes. Less frequent techniques were "meditations with movements," "mantra meditation," and "visual concentration." Thus, the effective techniques used in mindfulness-based programs differ in terms of activation and amount of body orientation, dimensions that highlight the role of embodied cognition in meditation. The most frequent techniques for improving cognitive and socio-emotional outcomes were active practices with a lower amount of body orientation. For socio-emotional outcomes, effective practices also included a higher abstract and conceptual focus and a neutral amount of body orientation. However, given the high risk of bias across the included studies in several domains, caution is needed in interpreting the results.

The findings of the present review support the favorable impacts of mindfulness interventions on cognitive outcomes, as expected (Flook et al., 2010). The next largest area of impact was related to socio-emotional skills. Indeed, our findings show that many of the outcomes were linked to emotional regulation processes involved in mindfulness training that also correspond to what was expected and highlighted in previous research (Bohlmeijer et al., 2010; Fjorback et al., 2011; Gotink et al., 2015; Guendelman et al., 2017).

Among the included studies, the specific techniques used to improve cognitive and socio-emotional outcomes were very similar, that is, all the interventions used "body-centered meditations" and "mindful observations." There are several ways in which this pattern of results can be explained. In fact, "body-centered meditations" and "mindful observations" may be more effective than other techniques in improving cognitive and socio-emotional outcomes given that they provide more explicit instructions, possibly making it easier for children to use upon times of strong emotions. For instance, research showed that the redirection of attention to the body can improve attention, regulate stress, and enable a deeper understanding of our emotional-motivational state (Bornemann et al., 2015; Fissler et al., 2016). The body scan (i.e., focusing attention sequentially on various parts of the body) is another meditation frequently included in these clusters of techniques. This practice was associated with the components of observing and non-reacting, promoting wellbeing, and decreasing anxiety (Carmody and Baer, 2009).

In addition, "affect-centered meditations" appear to be a good strategy for improving socio-emotional skills that includes positive feelings and kindness, cultivates self-care, or provides meaningful experiences of connection with others. Previous research has shown that after this kind of practice, adult participants revealed a significant change in brain regions previously linked with empathy, compassion, and emotion regulation (Klimecki et al., 2012). Also, it seems that practices focused on affect and perspective taking produced significant decreases in the release of cortisol (i.e., a stress hormone), suggesting that this component may be associated with a significant reduction in physiological stress (Engert et al., 2017).

Regarding academic skills, although previous research suggested positive effects (McCloskey, 2015; Lin and Mai, 2018), just three QED studies included in this review aimed at investigating this domain, which makes it difficult to draw conclusions related to mindfulness techniques. However, the effects found for cognitive and socio-emotional outcomes might be related to the measures that are typically used to assess these particular skills (i.e., self-reports versus the administrative measures used to evaluate academic achievements; Maynard et al., 2017).

Our findings highlight the need for examining the unique contribution of intervention components in mindfulness-based interventions, as suggested by previous research. For instance, Carmody and Baer (2008) reported that practicing mindfulness movement (yoga), but not sitting meditation and body scan, was associated with higher levels of nonjudgment of inner experience. Thus, indeed, different mindfulness practices may target different aspects of psychological health.

Previous research suggests that one main factor associated with the variable results across studies is the amount of mindfulness practice introduced (Zenner et al., 2014). Our findings also highlighted the idea that the optimal meditation duration, intensity, and dosage for children are still unknown. In the included studies, children meditated, approximately, from 4 to 90 min per session, from 2 weeks to 9 months. Thus, the dosage and frequency of mindfulness meditation varied significantly between studies, and the total time meditating may be related to cognitive or emotional changes. Some studies appear to have reduced the amount of meditation time when compared with mindfulness interventions for adults, which commonly involve as much as 45 min of practice per day (Teasdale et al., 2000; Segal et al., 2002). Also, some mindfulness interventions with adolescents found effects with 20 or more minutes of practice per day (Saltzman and Goldin, 2008; Biegel et al., 2009). Still, other studies have reported significant effects of mindfulness intervention in children and adolescents with just 5 min of daily meditation (Saltzman and Goldin, 2008; Zylowska et al., 2008; Britton et al., 2010). Thus, further research should examine the impact of increased mindfulness meditation time, and this issue deserves more systematic investigation (Greenberg and Harris, 2012).

Despite these results showing that specific mindfulness training techniques can have different benefits for children, limitations of our findings should be reported: (i) although we reported study characteristics that are indicators of study quality, the risk of bias assessment was conducted only for randomized studies; (ii) the heterogeneity of the studies is considerable, and due to the vast array of practices, this review only examined clusters of techniques; and (iii) the frequent lack of blinded raters, randomization, active comparison groups, and small samples of the included studies mitigate the impact of our findings. Future studies must address these issues to support empirical evidence about the effect of mindfulness techniques on the development of children. A well-designed intervention should have the following key features: (a) randomization of participants into the experimental and control groups; (b) control for participants and expectations of an informant through blinding and assessment of expectations before the beginning of the intervention to control for possible placebo effects; and (c) comparison of the performance of the experimental group to both active and passive control conditions (e.g., Kendall, 2003).

Furthermore, a content analysis across the included studies would be useful to conduct an in-depth review of specific mindfulness techniques. Through this particular approach, methodological rigor is increased as qualitative data are categorized deductively or inductively (Forman and Damschroder, 2007).

Another area to further develop is not only to examine which mindfulness techniques are effective but also to understand which components are necessary (e.g., does movement enhance mindfulness practice?) and what works for whom. Indeed, studies have found that baseline characteristics predict intervention outcomes (Cordon et al., 2009) and that mindfulness-based interventions may be ineffective (e.g., Jazaieri et al., 2012) or contraindicated for specific conditions (Ma and Teasdale, 2004; Arch and Ayers, 2013). Regarding children and adolescents, the effects of mindfulness-based training programs have been associated with preexisting characteristics, such as levels of executive function, age, and family environment (e.g., Barnes et al., 2010; Flook et al., 2010; Schonert-Reichl and Lawlor, 2010). Therefore, researchers need to be aware of the possibility of both positive and adverse effects that certain practices could have on children with different characteristics (Greenberg and Harris, 2012).

Finally, since mindfulness-based programs consist of a variety of techniques, there may be elements other than the mindfulness component that are effective. So, an important distinction to be further explored is the unique effect of specific mindfulness exercises apart from other meditative practices.

Overall, this study represents a preliminary attempt to isolate the effects of different meditation techniques on the positive outcomes associated with cognitive, socio-emotional, and academic skills. Although in the past many studies on mindfulness training can be criticized for their lack of scientific rigor (Toneatto and Nguyen, 2007; Chiesa and Serretti, 2011), more recent studies provide strong evidence for the utility of such interventions, and it is hoped that these data encourage further studies on the unique effects of different mindfulness techniques.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation, to any qualified researcher.

AUTHOR CONTRIBUTIONS

MF, SM, PA, SC, and TL contributed to the conception and design of the manuscript. MF, SM, AV, AC, and LR were responsible for the acquisition of data. MF, SM, and PA contributed to the interpretation of data. MF wrote the first draft of the manuscript. All authors contributed to manuscript revision and approved the submitted version.

FUNDING

This research was supported by the Portuguese Foundation for Science and Technology (FCT; Grants 2020.01866.CEECIND, UID/PSI/00050/2013) and was conducted within the M2S Project funded through the Operational Programme for Competitiveness and Internationalization, supported by FEDER and national funds allocated to FCT (NORTE-01-0145-FEDER-028404).

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

ORIGINAL RESEARCH
published: 18 November 2021
doi: 10.3389/fpsyg.2021.745344

Advanced Meditation Alters Resting-State Brain Network Connectivity Correlating With Improved Mindfulness

*Ramana V. Vishnubhotla[1], Rupa Radhakrishnan[1], Kestas Kveraga[2], Rachael Deardorff[1], Chithra Ram[3], Dhanashri Pawale[4], Yu-Chien Wu[1], Janelle Renschler[4], Balachundhar Subramaniam[2] and Senthilkumar Sadhasivam[4]**

[1] Department of Radiology and Imaging Sciences, Indiana University School of Medicine, Indianapolis, IN, United States, [2] Department of Anesthesia, Critical Care and Pain Medicine, Sadhguru Center for a Conscious Planet, Beth Israel Deaconess Medical Center, Boston, MA, United States, [3] Department of Radiology, School of Medicine, University of Louisville, Louisville, KY, United States, [4] Department of Anesthesia, Indiana University School of Medicine, Indianapolis, IN, United States

OPEN ACCESS

Edited by:
Sisir Roy,
National Institute of Advanced Studies, India

Reviewed by:
Xize Jia,
Hangzhou Normal University, China
Justine Megan Gatt,
Neuroscience Research Australia, Australia

***Correspondence:**
Senthilkumar Sadhasivam
ssenthil@pitt.edu

Specialty section:
This article was submitted to Consciousness Research, a section of the journal Frontiers in Psychology

Received: 21 July 2021
Accepted: 15 October 2021
Published: 18 November 2021

Citation:
Vishnubhotla RV, Radhakrishnan R, Kveraga K, Deardorff R, Ram C, Pawale D, Wu Y-C, Renschler J, Subramaniam B and Sadhasivam S (2021) Advanced Meditation Alters Resting-State Brain Network Connectivity Correlating With Improved Mindfulness. Front. Psychol. 12:745344. doi: 10.3389/fpsyg.2021.745344

Purpose: The purpose of this study was to investigate the effect of an intensive 8-day Samyama meditation program on the brain functional connectivity using resting-state functional MRI (rs-fMRI).

Methods: Thirteen Samyama program participants (meditators) and 4 controls underwent fMRI brain scans before and after the 8-day residential meditation program. Subjects underwent fMRI with a blood oxygen level dependent (BOLD) contrast at rest and during focused breathing. Changes in network connectivity before and after Samyama program were evaluated. In addition, validated psychological metrics were correlated with changes in functional connectivity.

Results: Meditators showed significantly increased network connectivity between the salience network (SN) and default mode network (DMN) after the Samyama program ($p < 0.01$). Increased connectivity within the SN correlated with an improvement in self-reported mindfulness scores ($p < 0.01$).

Conclusion: Samyama, an intensive silent meditation program, favorably increased the resting-state functional connectivity between the salience and default mode networks. During focused breath watching, meditators had lower intra-network connectivity in specific networks. Furthermore, increased intra-network connectivity correlated with improved self-reported mindfulness after Samyama.

Clinical Trials Registration: [https://clinicaltrials.gov], Identifier: [NCT04366544]. Registered on 4/17/2020.

Keywords: meditation, Samyama, Isha yoga, mindfulness, fMRI, brain networks, salience network, default mode network

INTRODUCTION

Meditation is increasingly being recognized as an effective method to improve psychological wellbeing. A 2014 meta-analysis of 47 trials found that meditation could lower depression, anxiety, pain, and stress/distress, as well as improve mental health-related quality of life (Goyal et al., 2014). Research has also revealed meditation-related structural and physiological changes in the brain and nervous system (Lazar et al., 2005; Hölzel et al., 2011; Dodich et al., 2019; Yang et al., 2019). Recently, we showed that Samyama program, an intensive meditation program significantly and effectively reduced depression, anxiety while improving physical health (Sadhasivam et al., 2021). This study aimed to demonstrate functional brain changes in Samyama meditators before and after the program, in addition to correlating the functional changes to improved mental health.

Anxiety has been associated with changes in brain activity (Bishop, 2007) such as reduction in prefrontal activity (Bishop, 2009) and alteration in the default mode network (Zhao et al., 2007). Impairment of the default mode network has also been linked to social phobia (Gentili et al., 2009). Positive emotions have also been linked to specific regions. For example, one study showed that relative happiness is correlated with rostral anterior cingulate cortex gray matter density (Matsunaga et al., 2016) and remembering happy events has been linked to activation in the anterior cingulate cortex, prefrontal cortex, and insula (Suardi et al., 2016). Functional connectivity was greater for reward, motivation and emotion regulation network in groups who were "in love" compared to those who were single or ended a relationship (Song et al., 2015). Taken together, this demonstrates the utility of neuroimaging in understanding brain processes involved in both positive and negative emotions. Neuroimaging can therefore give us further insight into brain networks affected by meditation.

The Yoga Sutras, a comprehensive set of ancient texts about yoga written by Patanjali, describe 8 limbs or branches of yoga. These include: (1) Yama (ethical standards), (2) Niyama (self-discipline), (3) Asana (postures), (4) Pranayama (breath control), (5) Pratyahara (withdrawal from senses), (6) Dharana (concentration), (7) Dhyana (contemplation), and (8) Samadhi (union). A combination of the last three is referred to as a process called Samyama. Though Samyama has been around for thousands of years, it has not been scientifically investigated until now. Samyama Program is an 8-day silent residential meditation experience offered by the international non-profit Isha Foundation. Samyama is a rigorous meditation program offered by Isha Foundation for the general population, requiring a substantial number of prerequisite programs and preparation to attend. Preparation to participate in the program requires about 2 months of vegan diet and daily practice of hatha yoga (physical postures), kriya yoga (breathing and sound), and Shoonya meditation (conscious non-doing).

In our recent study, Samyama participants had reduced depression and anxiety and improved subjective well-being scores and health biomarkers (HbA1c, body weight, and lipid profile) compared with their baseline values, and compared to their household non-meditator controls. Participants in this study also mentioned improvements in joy, mindfulness, resilience, and vitality (Sadhasivam et al., 2021). Participants at an Inner Engineering (IE) program, a comprehensive beginner-level yoga program, reported lower levels of perceived stress and higher general well-being after practice (Peterson et al., 2017). Another study demonstrated increased anandamide levels for participants in the Bhava Spandana Program (BSP), a second level meditation retreat (Sadhasivam et al., 2020). Gamma power was shown to increase during three types of meditation (Braboszcz et al., 2017), one of which is Shoonya meditation. Shoonya meditation is a conscious process of non-doing. It is taught in combination with Shakti Chalana Kriya, a breath-based yogic practice (pranayama). Other Isha yoga and meditation programs have also shown benefits such as improved visual plasticity (Braboszcz et al., 2013) and improved cardiac function (Selvaraj et al., 2008; Muralikrishnan et al., 2012). The Shoonya Program, IE and BSP are all prerequisites for the Samyama Program.

Blood oxygen level dependent (BOLD) functional magnetic resonance imaging (fMRI) is a commonly utilized technique to assess brain activity (Bandettini et al., 1992; Ogawa et al., 1992). This technique indirectly measures brain activity by detecting changes in relative blood concentrations of blood oxygen and deoxyhemoglobin (dHb). During task-related neuronal activation at localized regions, increases occur in cerebral blood flow which results in local reduction in deoxyhemoglobin and increase in local oxyhemoglobin. The blood oxygenation level-dependent (BOLD) MRI contrast is dependent on changes in dHb, which acts as an endogenous contrast enhancing agent and serves as the source of the signal for fMRI (Faro et al., 2017). However, there are spontaneous temporally synchronized fluctuations in brain neuronal activity at rest, that are referred to as the resting state networks (Biswal et al., 1997). More than 20 resting state functional networks have been described so far; amongst those, interplay between three networks – the salience, default mode, and frontoparietal (executive) networks, are thought to be important for understanding mechanisms associated with meditation (Raffone et al., 2019).

Various studies on meditative practices like Soham (Guleria et al., 2013), Buddhist tradition of Samatha (Wallace, 2001), Kundalini yoga (Yang et al., 2016), Zen (Ritskes et al., 2003), and Transcendental Meditation (Mahone et al., 2018) practices have shown differences in their brain activation centers (Mishra et al., 2017). Following various meditation techniques, activity is relatively commonly seen in the dorsolateral prefrontal cortex (dl-PFC) (Ritskes et al., 2003), anterior cingulate cortex (ACC) (Tang et al., 2015b; Mahone et al., 2018), and left prefrontal cortex (PFC) (Baerentsen et al., 2010). Brain network connectivity has been shown to be impacted by meditation (Brewer et al., 2011; Hasenkamp and Barsalou, 2012).

With the reported psychological benefits of advanced meditation retreats (Sadhasivam et al., 2020, 2021), it is important to assess the physiological impact of these programs on the brain with advanced meditation program, Samyama. This novel study focused on assessing the changes in functional connectivity before and after the Samyama Program using resting-state fMRI (rs-fMRI) besides correlating the connectivity changes with improved mental wellbeing.

MATERIALS AND METHODS

Samyama Participant Recruitment

These subjects were a subset of the participant group used for an earlier study (Sadhasivam et al., 2021). The Isha Institute of Inner Sciences (McMinnville, TN, United States) provided a registration list for the April 2018 Samyama Program. Each applicant was then individually assessed by an Isha Foundation instructor for suitability to attend the program. The requirement for participation in the Samyama retreat included prior completion of 4 Isha programs (Inner Engineering, Bhava Spandana Program, Shoonya Meditation, and Yogasanas) and a commitment to continue preparatory practices 2 months before the Samyama retreat.

Study eligibility criteria included: Samyama participant and interested cohabitating spouse/partner, at least 18 years of age. Exclusion criteria were: inability to read or comprehend the consent form; subjects with medical conditions in which blood sampling would be contraindicated (e.g., severe anemia); active use of marijuana, opioids, or related drugs; use of antibiotics or probiotic/prebiotic supplements within 60 days of enrollment; participants living outside of the country.

Study Approvals

The study was reviewed and approved by the Institutional Review Board of the Indiana University School of Medicine. Participants and controls provided electronic informed consent.

Samyama Participant Dietary Requirements

As part of the Samyama preparatory process (60 days before the program), meditators were required to follow a vegan diet with at least 50% raw foods consumed. They were encouraged to avoid foods which may be considered "negative pranic," or negative to life energy, including garlic, onion, chili, eggplant, asafoetida, coffee, and tea. Additionally, use of alcohol, cigarettes, stimulants, and illicit drugs was discouraged.

Samyama Participant Practice Requirements

Samyama participants, also referred as meditators, were asked to perform the following practices daily for the 60-day preparation period. These include kriya yoga practices (Shakti Chalana Kriya and Shambhavi Mahamudra Kriya), hata yoga (Surya Kriya and Yogasanas), Shoonya meditation twice a day, Sukha Kriya and Arda Siddhasana for at least 1 h per day. Kriya yoga practices are combinations of posture, breath, and sound that are meant to purify and enhance the flow of one's energies while simultaneously increasing general stability. Hata yoga practices consist of postures, meant to improve flexibility and strengthen the body. Shoonya meditation is a process of conscious non-doing. Sukha Kriya consists of alternate nostril breathing which leads to regulation of breath. Ardha Siddhasana is a posture in which one sits cross-legged with the heel of the left foot placed at the perineum.

Samyama Program

During the program, participants were to remain silent for the entire 8-day duration of the program. The program hall was closed to external influences. No specific instructions or programs were given to the controls, and controls did not practice any meditation.

MRI

All MR imaging was performed on a Siemens PRISMA 3.0 Tesla Scanner (Siemens, Erlangen, Germany) using a 32-channel head coil. Images acquired included anatomic T1-weighed 3D magnetization-prepared rapid acquisition with gradient echo (MPRAGE; repetition time / echo time [TR/TE] = 2010/2.91 ms, flip angle = 9°, field of view = 192 × 174 mm, 192 sagittal slices, isotropic voxel size of 1 mm) and BOLD rs-fMRI with a gradient-echo planar imaging (EPI) sequence (Axial, TR = 760 ms, TE = 29 ms, flip angle = 54°, 55 slices, field of view [FOV] = 220 × 220 mm^2, isotropic voxel 2.5 mm, simultaneous multi-slice [SMS] factor 5, 790 volumes). A spin-echo-EPI with reverse phase encoding and matched imaging parameters was also performed for geometric distortion correction.

For both meditator and control groups, the first run of the fMRI was performed at rest. The second run of the fMRI was performed with instructions to focus on their breathing technique, which is a part of the meditation practice.

Functional Magnetic Resonance Imaging Processing

After visual assessment of quality of the anatomic and BOLD data, fMRI was preprocessed using the standard pipeline with FMRIB Software Library (FSL; Oxford, United Kingdom) (Jenkinson et al., 2012). Fieldmap correction was performed using FSL topup (Andersson et al., 2003; Smith et al., 2004).

After initial preprocessing was done in FSL, the rest of the preprocessing and fMRI analysis was performed with CONN Toolbox (Cambridge, MA, United States) (Whitfield-Gabrieli and Nieto-Castanon, 2012; Nieto-Castanon, 2020). Functional MRI data was realigned using the realign & unwarp function in SPM12 (Andersson et al., 2001). For outlier detection, we used a 97th percentile with a global signal z-value threshold of 5 and subject motion threshold of 9 mm. Functional and structural MRI data were then normalized to the standard Montreal Neurological Institute (MNI) T1 template using a direct normalization process. Data was segmented into gray matter, white matter, and cerebrospinal fluid (CSF) (Ashburner and Friston, 1997, 2005). Isotropic resolution of 1 mm for structural images and 2 mm for functional images were used. Next, the data was smoothed using spatial convolution with a Gaussian kernel of 8 mm full width half maximum (FWHM) (Nieto-Castanon, 2020).

Denoising involved removing of noise from white matter and CSF (Behzadi et al., 2007; Chai et al., 2012), estimated subject motion parameters including 3 translation and 3 rotation parameters (Friston et al., 1996), scrubbing (Power et al., 2014), and session effects. For temporal band pass filtering, the lower frequency threshold was 0.008 Hz and the upper frequency

threshold was 0.09 Hz. Filtering was performed after regression to avoid mismatch in nuisance regressor procedure (Hallquist et al., 2013; Nieto-Castanon, 2020).

Connectivity was assessed between regions of interest (ROIs). ROI-to-ROI analysis was performed for structures in predetermined networks (see "Brain Networks" section). Comparisons were made within program participants (meditators) before and after the program for both resting-state and focused breathing conditions and corrected for multiple comparisons using FDR threshold of <0.05. Age, gender, and prior participation in the program were entered as co-variates of no interest.

Brain Networks

Four brain networks were studied – default mode network (DMN), salience network (SN), frontoparietal network (FPN), and dorsal attention network (DAN). The default mode network includes the medial prefrontal cortex (mPFC), posterior cingulate cortex, precuneus, and angular gyrus and is involved with reflective processes (Buckner et al., 2008; Andrews-Hanna, 2012). The salience network primarily includes the anterior cingulate cortex and the anterior insula (AI) and is involved with filtering and prioritizing signals received from external cues (Menon and Uddin, 2010). This network also plays an important role in switching between central executive and default mode networks (Sridharan et al., 2008). The frontoparietal network, also known as the central executive network (CEN), primarily includes the dorsolateral prefrontal cortex (dl-PFC), and posterior parietal cortex (PPC) and is involved with executive functions and cognitive control (Marek and Dosenbach, 2018). Finally, the dorsal attention network includes the intraparietal sulcus (IPS) and front eye fields (FEF) and is involved with voluntary attention (Kincade et al., 2005).

Psychological Factors

Psychological scores were taken from a subset from a previous study (Sadhasivam et al., 2021). Scores for anxiety (Pilkonis et al., 2011), depression (Andresen et al., 1994), mindfulness (Brown and Ryan, 2003; Osman et al., 2016), joy (Shiota et al., 2006), vitality (Bostic et al., 2000), and resilience (Smith et al., 2008) were accessed with validated surveys. Psychological data was normalized and entered as secondary co-variates in the analysis.

Statistical Analysis

Statistical analysis was performed with CONN Toolbox (Whitfield-Gabrieli and Nieto-Castanon, 2012). Connectivity between ROIs were assessed using a general linear model. Output values included a t-stat with degrees of freedom, uncorrected *p*-value (p-unc), and a false discovery rate *p*-value (p-FDR) when corrected for multiple comparisons. Greater positive t scores indicated stronger functional connectivity between regions while greater negative scores indicated weaker functional connectivity between regions.

Three sets of comparisons were performed – (A) comparisons within the meditator group before and after the program, (B) comparisons between meditators and controls at each time point, and (C) comparisons within the meditator group with psychological scores before and after the program. Before-after comparisons were performed with the after condition greater than the before. Comparisons between meditators and controls were performed with meditators greater than controls. Comparisons with psychological scores were also compared with the after condition greater than before. A corrected *p*-value of less than 0.05 was considered significant.

RESULTS

Demographics

We recruited 24 study subjects, 18 Samyama participants (meditators) and 6 controls. In the final analysis, 13 Samyama meditators (8 men and 5 women), and 4 controls (2 men and 2 women) were included (**Figure 1**). The reasons for exclusions are included in a Consort diagram (**Figure 1**). Demographic data is shown in **Table 1**.

Meditator Functional Magnetic Resonance Imaging Networks Altered After Samyama

Resting state functional connectivity between regions in the SN and DMN were significantly altered in participants after the Samyama program compared to pre-Samyama (**Figure 2A**). Intra-network connectivity (connectivity between ROIs in the same network) within the SN and DMN was reduced (**Figure 2B**) during focused breath watching after Samyama program compared to pre-Samyama. In controls, there were no significant changes in functional connectivity for both resting state and focused breathing conditions between the two time points (data not shown). Both resting state and focused breathing data is summarized in **Table 2**. These results demonstrate connectivity changes with the salience and default mode networks after

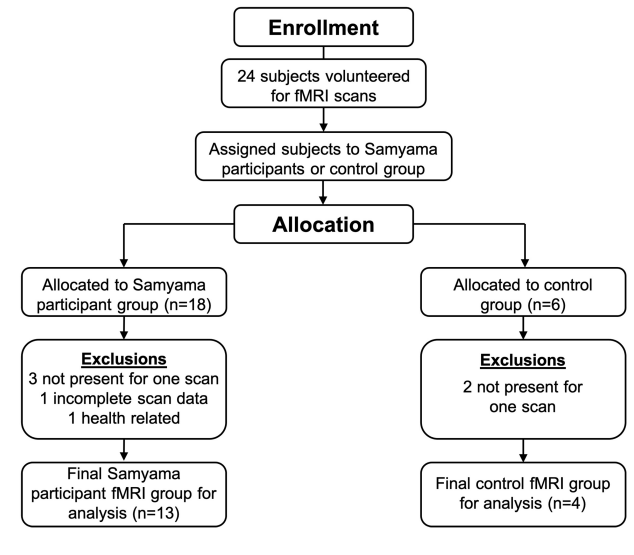

FIGURE 1 | 24 participants initially enrolled with 13 meditators and 4 controls included in the final analysis.

TABLE 1 | Demographic data of Samyama meditators and controls.

	Meditators ($n = 13$)	Controls ($n = 4$)
Gender		
Male	8	2
Female	5	2
Age in years (SE)	34.9 (3.6)	62.8 (4.3)
Prior participation		
Yes	4	1
No	9	3

Samyama and these changes differ based on the resting state and breath watching.

Meditator scans showed lower functional connectivity between the DAN and DMN and within the DAN compared to controls (**Figure 3A**). There were no significant differences between meditators and controls in the focused breath watching condition before Samyama program (**Figure 3B**). Following completion of the Samyama, resting state scans showed less connectivity between the DAN and FPN (**Figure 3C**). Focused breath watching scans showed less connectivity between the DMN and DAN and FPN. Additionally, there was reduced intra-network connectivity in the DAN (**Figure 3D**). This data is summarized in **Table 3**. This data demonstrates that meditators had less functional connectivity compared to controls between the dorsal attention and default mode networks and dorsal attention, default mode, and frontoparietal networks.

Mindfulness Score Correlates With Changes in Functional Connectivity

We previously showed that Samyama participants had reduced anxiety and depression and increased mindfulness, joy, vitality, and resiliency (Sadhasivam et al., 2021) compared to their pre-Samyama baseline values. Improved mindfulness scores correlated with increased functional connectivity within the SN between the SMG and ACC ($p < 0.05$) (**Figure 4**). We did not observe any significant correlation between the fMRI changes and scores for anxiety, depression, joy, vitality, and resilience (**Table 4**).

TABLE 2 | Comparison in meditator functional connectivity from before and after Samyama program.

ROI (Network)	ROI (Network)	T-stat	p-unc	p-FDR
Meditators resting state				
ACC (Salience)	PCC (DMN)	4.73	0.0005	0.0047
ACC (Salience)	Precuneus (DMN)	5.09	0.0003	0.0047
rPFC-R (Salience)	PCC (DMN)	5.32	0.0002	0.0017
rPFC-R (Salience)	Precuneus (DMN)	5.98	0.0001	0.0012
Meditators focused breathing				
SMG-L (Salience)	rPFC-R (Salience)	−3.8	0.0025	0.0293
SMG-L (Salience)	rPFC-L (Salience)	−3.51	0.0043	0.0293
SMG-L (Salience)	ACC (Salience)	−3.47	0.0046	0.0293
PCC (DMN)	Precuneus (DMN)	−3.9	0.021	0.0404
Precuneus (DMN)	Precuneus (DMN)	−3.9	0.021	0.0404

Regions of interest (ROI) – anterior cingulate cortex (ACC), posterior cingulate cortex (PCC), rostral prefrontal cortex (rPFC), precuneus, and supramarginal gyrus (SMG). Brain networks – salience network and default mode network (DMN). A p-FDR < 0.05 was considered significant. Positive t-stat indicates increased connectivity while a negative t-stat indicates decreased connectivity.

DISCUSSION

This novel study demonstrates that Samyama, an intensive silent meditation program, increased the resting-state functional connectivity between the salience and default mode networks. Furthermore, increased intra-network connectivity correlated with improved self-reported mindfulness after Samyama. The Samyama meditators showed significant changes in functional connectivity and while no changes were observed within the non-meditator control group. Interestingly, the changes within the meditator group differed based on task condition at resting state and focused breath watching. During the focused breath watching after the Samyama program, the meditators had less functional connectivity than controls between the DAN, DMN, and FPN (also referred to as CEN) for 3 of the 4 points tested, demonstrating specific and dynamic meditation-related changes in the brain.

In meditators, during the resting state, we found significant increases in functional connectivity between regions in the salience network and default mode networks, specifically between the ACC and PCC and precuneus. We were also able to correlate

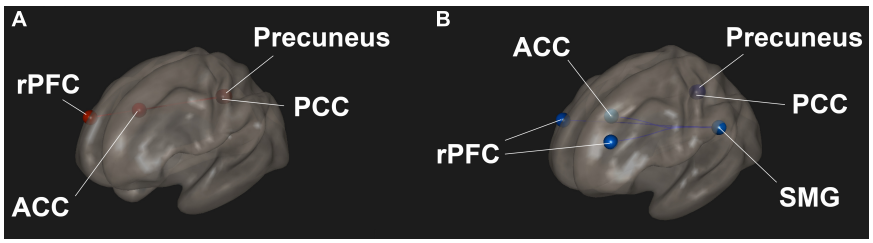

FIGURE 2 | Changes in functional connectivity was observed in meditators and comparisons were made before and after the Samyama program. **(A)** Functional connectivity was increased between the anterior cingulate cortex (ACC) of the salience network and posterior cingulate cortex (PCC) and precuneus of the default mode network (DMN) in the resting state condition. The PCC also had increased connectivity to the rostral prefrontal cortex (rPFC). **(B)** Functional connectivity was decreased within the salience network between the supramarginal gyrus (SMG) and ACC and rPFC in the focused breathing condition. Red indicates increased connectivity and blue indicates decreased connectivity.

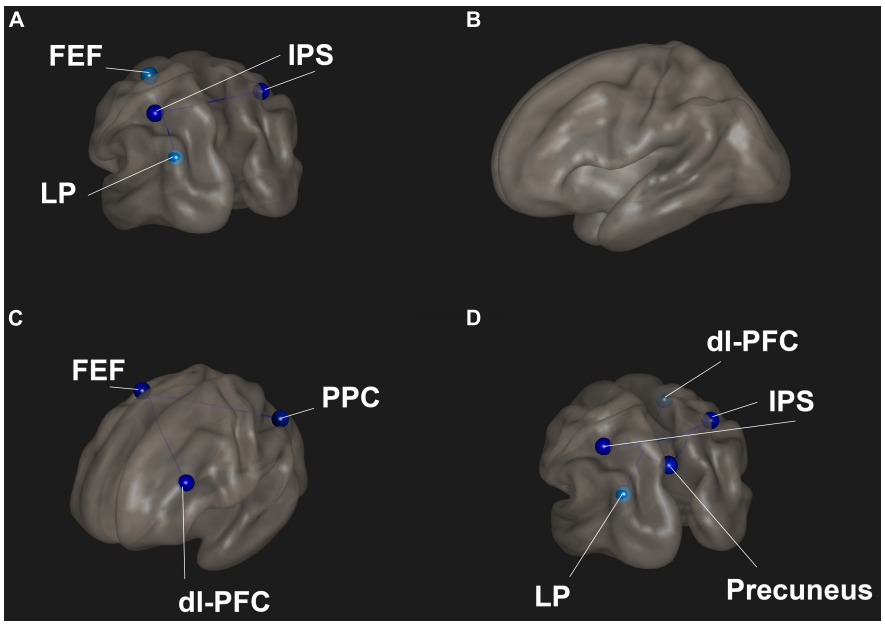

FIGURE 3 | Functional connectivities were compared between meditators and controls for each condition. **(A)** Resting-state pre-program – meditators had decreased connectivity between the front eye fields (FEF) and lateral parietal (LP) lobe and between the left and right intraparietal sulci (IPS). **(B)** Focused breathing pre-program – no significant difference between the groups. **(C)** Resting-state post program – meditators had significantly reduced connectivity between the FEF and dorsolateral prefrontal cortex (dl-PFC) and posterior parietal cortex (PPC). **(D)** Focused breathing post program – meditators had significantly reduced connectivity between the dl-PFC and LP and the IPS and posterior cingulate cortex (PCC). Red indicates increased connectivity and blue indicates decreased connectivity.

improved mindfulness scores to increased connectivity with the SN. This result corresponds with previous findings in literature where increased mindfulness from meditation was linked with increased functional connectivity between the SN and DMN (Doll et al., 2015).

TABLE 3 | Comparison between meditators and controls for functional connectivity at both time points and conditions.

ROI (Network)	ROI (Network)	T-stat	p-unc	p-FDR
Pre program resting state				
FEF-L (DAN)	LP-L (DMN)	−3.62	0.0025	0.0476
IPS-R (DAN)	IPS-L (DAN)	−3.65	0.0024	0.0447
Post program resting state				
FEF-R (DAN)	dl-PFC-L (FPN)	−4.64	0.0003	0.0033
FEF-R (DAN)	PPC-L (FPN)	−4.6	0.0003	0.0033
Post program focused breathing				
Precuneus (DMN)	IPS-R (DAN)	−3.62	0.0025	0.0405
Precuneus (DMN)	IPS-L (DAN)	−3.36	0.0043	0.0405
LP-L (DMN)	dl-PFC-R (FPN)	−3.86	0.0015	0.0294
IPS-R (DAN)	Precuneus (DMN)	−3.62	0.0025	0.0258
IPS-R (DAN)	PCC (DMN)	−3.58	0.0027	0.0258
IPS-R (DAN)	IPS-L (DAN)	−3.09	0.0074	0.0469

Regions of interest (ROI) – front eye fields (FEF), lateral parietal (LP), intraparietal sulcus (IPS), dorsolateral prefrontal cortex (dl-PFC), posterior parietal cortex (PPC), and precuneus. Brain networks – dorsal attention network, default mode network (DMN), and frontoparietal network (FPN). A p-FDR < 0.05 was considered significant. Positive t-stat indicates increased connectivity while a negative t-stat indicates decreased connectivity.

During focused breath watching, functional connectivity within the salience and default mode networks uniquely reduced after Samyama compared to the baseline and resting state, demonstrating the ability of the meditators to voluntarily and dynamically influence and control certain brain connectivity based on meditation-related specific tasks such as focused breath watching. This can potentially explain improved mindfulness, concentration, cognitive control and executive function at the resting state and ability of the meditators to focus on specific meditation-related tasks and reduce connectivity in certain brain networks compared to the resting state. The focused breathing condition is a more internalized state than the resting state. Internalized states, such as having one's eyes closed, have shown to elicit different responses in brain functional connectivity than the eyes-open state (Agcaoglu et al., 2020; Weng et al., 2020). Furthermore, there was greater connectivity within the DMN and lower connectivity within the SN in the eyes-closed group (Costumero et al., 2020). Considering that the focused-breathing condition is a more internalized state, it is interesting that our results showed less connectivity within the DMN after Samyama. Since the task was *focused* breathing, this could explain why connectivity within the DMN was reduced; the DMN has been previously linked to states of mind-wandering (Mason et al., 2007; Christoff et al., 2009; Poerio et al., 2017).

This study has shown that the ACC had increased connectivity in meditators and linked to improved mindfulness scores. The ACC is a structure that has been linked to increased connectivity due to improvements in attention in prior meditation studies

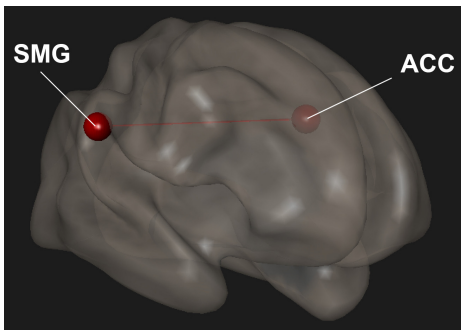

FIGURE 4 | In meditators completing surveys, changes in mindfulness scores were correlated with changes in functional connectivity. There was increased functional connectivity between the anterior cingulate cortex (ACC) and supramarginal gyrus (SMG). Red indicates increased connectivity and blue indicates decreased connectivity.

(Tang et al., 2015a). Meditative practices were also linked to increased blood flow to this region (Zeidan et al., 2014; Tang et al., 2015b; Mahone et al., 2018). While the role of the ACC has been debated, it is generally thought to be involved in cognitive control (Ridderinkhof et al., 2004), happiness (Matsunaga et al., 2016; Suardi et al., 2016), attention (Kim et al., 2016; Wu et al., 2017), and empathy (Lockwood et al., 2015). It is associated with the salience network SN but has also been linked with executive functions (Carter et al., 1999).

Another region linked with executive functions is the prefrontal cortex which is associated with concentration, decision-making and awareness (Allman et al., 1993) and is a part of the CEN (Menon, 2011). Meditation has shown to suppress DMN and increase functional connectivity between DMN and CEN (Bauer et al., 2019) and CEN and attention networks (Taren et al., 2017). Bauer et al. (2019) suggested a neural mechanism by which the CEN negatively regulates the DMN by showing gradual reconfiguration in DMN and CEN in meditation state and post meditation state (state to trait) by means of positive diametric activity (PDA); the reported psychological well-being in long-term meditators was likely due to trait changes caused by reconfiguration and recalibration of network structure, or homeostatic plasticity (Davis, 2013; Hellyer et al., 2017). This in turn causes reductions in DMN activity and stronger anti-correlated coupling between CEN and DMN (Mooneyham et al., 2017; Marusak et al., 2018).

Contrary to the early dichotomized view of the DMN and CEN regions representing dorsal-caudal "cognitive" and ventral-rostral "affective" subdivisions, both regions have been shown to make key contributions to emotional processing (Etkin et al., 2011). Positive emotions, which regulate and diminish negative emotions, have been associated with activation in the sub genual ACC, ventromedial prefrontal cortex (PFC) and pre-genual ACC (Wager, 2008). The medial prefrontal (mPFC) cortex and ACC are activated with not only negative emotions, but also positive emotions. Empathy for others experiencing pain and one's experience of pain activate the dorsal ACC/mPFC (Lamm et al., 2011). Lesions of the dorsal ACC serve in treating chronic pain (Wilkinson et al., 1999). Endogenously driven analgesia, by means of the "placebo effect," has been closely tied to the pre-genual ACC, which is presumed to modulate regions that generate opioid-mediated anti-nociceptive responses, such as the amygdala and periaqueductual gray (Petrovic et al., 2002; Eippert et al., 2009).

Interactions between the DMN, SN and the CEN are thought to be key to understanding the mechanism of action of meditative practices on the brain (Raffone et al., 2019). In this study, we demonstrate unique and different changes in functional connectivity in the resting state and focused breath watching. The latter produces a more meditation-related task-based changes in functional brain connectivity compared to the resting state; therefore, specific tasks need to be included when analyzing resting and meditation-related task-related changes in fMRI. Even opening and closing eyes has shown to impact salience and default mode networks (Costumero et al., 2020). Additionally, experienced meditators would have different regions of brain activation compared to novices (Baron Short et al., 2010) and long-term meditators have shown significant neural changes (Holzel et al., 2007; Luders et al., 2011; Fayed et al., 2013; Engen et al., 2018). We have uniquely demonstrated increased and decreased intra-network connectivity in advanced meditators during the resting state and meditation-related focused breath watching. Importantly, improved mindfulness scores correlated with the functional brain connectivity changes after the Samyama program.

We previously showed that participation in the Samyama program decreased negative psychological states and boosted positive psychological states (Sadhasivam et al., 2021). Here, we were able to observe significant changes in functional connectivity at rest and these changes could help explain the positive findings in the previous study. This is significant because it suggests that the effects of the Samyama program seem to be maintained outside of a meditative practice and provides a physiological measurement. It is also important to note that these changes occurred over a relatively short period of 8 days.

The strengths of this study are that it objectively demonstrates significant changes after the Samyama program in the meditator group. Criteria for determining significance was stringent as it accounted for multiple comparisons. It was also able to show, with significance, different changes based on task condition. Finally, it was able to correlate changes in mindfulness scores to changes in functional connectivity. Taken together, this study helps advance our understanding of the impact of meditation on brain networks.

This study did have some limitations. There were a relatively small number of meditators in this study due to a limited number

TABLE 4 | Correlation between changes in mindfulness scores and functional connectivity in meditators.

ROI (Network)	ROI (Network)	T-stat	p-unc	p-FDR
SMG-R (Salience)	ACC (Salience)	3.88	0.0019	0.0359

Regions of interest (ROI) – supramarginal gyrus (SMG) and anterior cingulate cortex (ACC). Brain network – salience network. A p-FDR < 0.05 was considered significant. Positive t-stat indicates increased connectivity while a negative t-stat indicates decreased connectivity.

of Samyama participants throughout the USA that were willing to visit Indiana University MRI scanner twice, before and after the Samyama program. Though the number of meditators in the final analysis is relatively small, we did pre- and post-Samyama MRIs in the meditators, having them as their own controls. Second, Samyama meditators were involved with 2 months of intensive preparation before experiencing the 8-day program. Therefore, the meditator group may already have some changes prior to the program which may not be reflected in the control group. We report statistically significant, objective and consistent changes in the meditators post-Samyama. The task related changes (during focused breath watching) were consistently and objectively different after Samyama compared to pre-Samyama values. Moreover, to avoid false positive findings, we used a conservative statistical approach with stringent corrections for multiple comparisons, when we observed significant differences. It was a functional study; therefore, to avoid misregistration, clear instructions were given regarding the procedure and expected patient experiences (e.g., MRI machine noise, commands to follow and for what duration) and questions were answered. The commands were given in the same way during the image acquisition to reproduce highly specific and sensitive information. Despite that, individual variations cannot be eliminated regarding patient meditation inside the scanner versus outside. Ear plugs were given during the fMRI scanning to blot out the machine noise. However, its effect on the qualitative measure of individual meditation could not be eliminated (Travis et al., 2020). The images had minimal noise, thus favoring an adequate imaging study, based on which these inferences have been made.

Another limitation was the number of consenting controls. Because of a small number of controls, they were age matched. The average age of meditators was in the mid 30 s while the average age of controls was in the 60 s. This is a significant consideration since functional connectivity has shown to change with age (Betzel et al., 2014; Geerligs et al., 2015). Therefore, findings from comparisons made between the meditator and control groups should be approached with some caution. To minimize potential differences due to other factors such as age, we used controls and meditators their own controls as we did fMRI scans before and after the Samyama program. It is important to note that the MRI scans were obtained before and after Samyama program 3 years ago. At this point, we are unable to re-create the conditions to obtain suitable controls in terms of timing of scans similar to meditators and artifacts associated with harmonization of fMRI even if we were to use the same MRI machines and protocols. Despite these limitations, this study provides novel insight into brain mechanisms before and after Samyama program during the resting state and focused breath watching and demonstrates correlations with improved mindfulness after Samyama. Future studies using a larger sample size and proper age-matched controls can further investigate functional connectivity changes in different regions during resting states and meditative practices, in addition to correlating with other psychological improvements associated with advanced meditation.

CONCLUSION

Samyama, an 8-day intensive meditation program, favorably influenced the functional connectivity between the salience and default mode networks on meditators compared to their baseline and non-meditator controls. Furthermore, specific brain functional connectivity changes were different at resting state and meditation-related focused breath watching in meditators. This study was also able to correlate changes in functional connectivity to improved mindfulness scores in meditators. Results are consistent with existing literature regarding the observed changes in functional connectivity of the anterior cingulate cortex from meditative processes. Studies with larger sample sizes can further investigate functional connectivity changes in different regions during resting states and meditative practices, in addition to correlating with longer-term and other psychological improvements associated with advanced meditative practices.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because this is a subset of a larger study group and further analysis is currently planned. Raw data will be shared after the analysis is complete. Requests to access the datasets should be directed to SS at ssenthil@pitt.edu.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by this study was reviewed and approved by the Indiana University School of Medicine Institutional Review Board. All subjects provided written or electronic consent to participate. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

RV and RR contributed to the study design, data analysis and interpretation, and manuscript drafting and editing. KK and RD contributed to the data analysis. CR and BS contributed to the study design and manuscript preparation. JR contributed to the manuscript drafting and editing. DP contributed to the research coordination, IRB approval and communications, study conduct, and data collection. SS contributed to the study design, conduct, data collection, coordination, manuscript preparation, and arranging funding for this study. All authors have approved the submitted version and have agreed both to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy and integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

FUNDING

This study was entirely funded by the Department of Anesthesia, Indiana University School of Medicine, including salary support for the medical writer, statistician, and research coordinator. No external funding was used for this research.

ACKNOWLEDGMENTS

The authors appreciate support provided by Isha Institute of Inner Sciences, McMinnville, TN and study volunteers for this prospective research on Samyama participants.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

HYPOTHESIS AND THEORY
published: 10 January 2022
doi: 10.3389/fpsyg.2021.751298

Experimental Phenomenology as an Approach to the Study of Contemplative Practices

*Lars-Gunnar Lundh**

Department of Psychology, Lund University, Lund, Sweden

During history humans have developed a large variety of contemplative practices, in many different areas of life, and as part of many different traditions and contexts. Although some contemplative practices are very old, the research field of Contemplation Studies is young, and there are no agreed-upon definitions of central concepts such as contemplative practices and contemplative experiences. The present paper focuses on contemplative practices, defined as practices that are engaged in for the sake of the contemplative experiences they afford (e.g., the contemplation of nature, or the contemplation of various aspects of being-in-the world). The purpose of the present paper is to discuss the potential of experimental phenomenology to contribute to the development of the research field of Contemplation Studies. Experimental phenomenology is defined as the investigation of phenomenological practices and their effects on experience. Phenomenological practices involve intentional variations of experiencing by means of changes in the direction of attention and the choice of attitude, typically as guided by verbal instructions or self-instructions. It is suggested that contemplative practices represent a subcategory of phenomenological practices. Two different varieties of experimental phenomenology are described and illustrated in the present paper: (1) an informal variety which involves the development of new phenomenological practices by creative variation of procedures and observation of effects; and (2) a more rigorously scientific variety, which involves the systematic variation of phenomenological practices in accordance with experimental designs to study their experiential effects. It is suggested that the development of contemplative practices during the ages is the result of an informal experimenting of the first kind; this variety of experimental phenomenology can also be used to develop personalized health interventions in a clinical setting. As to the more rigorously scientific experimental phenomenology, it is possible that it may lead not only to an improved understanding of general principles underlying contemplative practices, but also to a more systematic development of new contemplative practices. The experimental-phenomenological approach to contemplative practices is illustrated by various examples involving mindfulness, gratitude, receiving and giving.

Keywords: experimental phenomenology, contemplative practices, mindfulness, gratitude, receiving, giving, embodiment, mindful driving

OPEN ACCESS

Edited by:
Anna-Lena Lumma,
University of Witten/Herdecke, Germany

Reviewed by:
Terje Sparby,
Rudolf Steiner University College, Norway
Mark Vagle,
University of Minnesota Twin Cities, United States

***Correspondence:**
Lars-Gunnar Lundh
Lars-Gunnar.Lundh@psy.lu.se

Specialty section:
This article was submitted to Theoretical and Philosophical Psychology, a section of the journal Frontiers in Psychology

Received: *31 July 2021*
Accepted: *15 December 2021*
Published: *10 January 2022*

Citation:
Lundh L-G (2022) Experimental Phenomenology as an Approach to the Study of Contemplative Practices. Front. Psychol. 12:751298. doi: 10.3389/fpsyg.2021.751298

INTRODUCTION

The word contemplation has been defined in different ways (e.g., Komjathy, 2017), but most basically it refers to a certain form of attention and reflection, which is illustrated by some examples provided by the Merriam-Webster Dictionary (n.d.). Among these examples of how the word is used are (1) that a person makes a decision "after much contemplation," (2) is "lost in quiet contemplation of a scene," and (3) "goes to the forest to spend time in contemplation of nature." Of these three examples, the first exemplifies a highly instrumental form of contemplation where there is no need for any contemplative experience – the intention is simply to contemplate the consequences of various alternatives to take a decision. In the second example, there is mention of a *contemplative experience* (i.e., an experience with contemplative qualities), but not necessarily as the result of an intentionally undertaken contemplative practice – the example simply speaks of a person who gets "lost in quiet contemplation of a scene," which may happen quite unintentionally. In the third example, however, we find what may be called a *contemplative practice*. A person who goes to the forest to spend time in contemplation of nature can be said to engage in contemplation for no other purpose than the contemplative experience itself. In this paper, I will use this as a paradigm example of a contemplative practice, and thereby propose a first preliminary working definition of contemplative practices, which, however, may need to be revised or elaborated as the result of further considerations: *Contemplative practices are practices which are engaged in for the contemplative experiences that they afford.*

In this perspective, a contemplative experience is seen as valuable as such, whether it has any other further consequences or not. One implication, for example, is that contemplative experiences may be of considerable potential value even for a dying person, who has no future (and where future consequences are nonexistent). In terms of psychological theory, when a person chooses to engage in a contemplative practice for no other purpose than the contemplative experience itself this is an example of *intrinsic* rather extrinsic motivation. Intrinsic motivation is defined as doing something because it is inherently interesting or enjoyable or satisfying (e.g., Ryan and Deci, 2000), rather than as a means for reaching some other kind of goal.

Another more instrumental perspective on contemplative practices is to see them as serving a higher purpose than merely the contemplative experience itself. This is the position taken, for example, by Komjathy (2017) when he states that, "Contemplative practice refers to various approaches, disciplines and methods for developing attentiveness, awareness, compassion, concentration, presence, wisdom, and the like." (p. 68). In this perspective, contemplative practice is engaged in for the purpose of some form of self-improvement. At the same time Komjathy (2017) is very open regarding the definition of contemplative practices, stating that from his perspective "definitional parameters should be explored and discussed, rather than rigidly defined" (p. 69).

It may be argued that these two perspectives are complementary. Even if engaging in a contemplative practice may be intrinsically motivating because of the contemplative experiences that it affords in the moment, this is quite compatible with the assumption that a *regular* engagement in contemplative practices may have long-term consequences in the form of increased attentiveness, presence, awareness, empathy, compassion, wisdom, and other virtues. And if so, this may be sufficient reason to develop a long-term commitment to engage in contemplative practices. This is also consistent with meta-analyses and systematic reviews of existing research which suggest that attention-based forms of meditation may have effects on at least some aspects of attentional processes (Sumantry and Stewart, 2021; Yakobi et al., 2021), and that meditation (e.g., compassion-based meditation) may lead to increased empathy, compassion, and prosocial behaviors (Luberto et al., 2018).

Komjathy (2017) describes three characteristics of contemplative practice: (1) a commitment to practice; (2) a focus on personal experience from a first-person perspective (which he labels "critical subjectivity"); and (3) an ambition for personal "character development" (p. 36). Of these, it may be argued that a focus on personal experience from a first-person perspective is the most basic and essential one. For example, it is quite possible to engage in contemplative practices (e.g., going to the forest to spend time in contemplation of nature) on an irregular basis, without any commitment to practice and without any ambition for "character development." But it is hardly possible to engage in a contemplative practice without having a focus on one's present experience.

From an instrumental perspective on practicing, it is of course possible to disregard one's present experience in the service of some future goal. As stated by Komjathy (2017) in his chapter on contemplative experiences, "I believe that contemplative practice is and should be primary. . . One reason for this is because committed and prolonged contemplative practice often involves ignoring 'experience' or overcoming certain experiential patterns. That is, on a deeper level, contemplative practice often requires perseverance in the face of difficulties or in the absence of 'benefits.' One must sometimes set aside 'experience' in the name of 'practice."' (p. 105). This, however, raises the question whether a contemplative practice without contemplative experiences is still in fact a contemplative practice, or if it has now turned into something else.

At the very least, these considerations suggest that we may perhaps need to differentiate between single contemplative practices, and contemplative practice as a "life project" – which Komjathy (2017) describes as a "contemplative approach" to life, or as "following a contemplative path" (p. 72). One further implication of such a differentiation is that contemplative practice as a life project may well involve many other activities besides typical contemplative practices. As described by Komjathy (2017), contemplative practice represents "an approach that may be applied to and expressed in almost any activity" (p. 35), including art, dancing, writing, photography, etc.

From a developmental perspective it might be of interest to use longitudinal research designs to study the variety of "contemplative paths" that can be seen in different individuals. One type of path may involve an individual who starts out by exploring various contemplative practices for the sake of the contemplative experiences that they afford in the moment,

and later develops a personal commitment to contemplative practice that leads to the development of new skills and various forms of character development. Another possible type of path might involve less benign developmental processes, where an initial openness to explore contemplative practices is followed by setbacks in the form of "dark nights and spiritual emergencies" (Komjathy, 2017, p. 122). Although the research on positive and negative experiences in connection with meditation has expanded during later years it still rests on cross-sectional surveys and interviews (e.g., Lindahl et al., 2017; Vieten et al., 2018). A next more challenging task would be to use longitudinal research designs to study positive and negative developments among practitioners over the years.

During history humans have developed a large variety of contemplative practices. Much of this development originally occurred as part of various religious traditions, but more recently we have also seen the development of many contemplative practices in secular contexts. A recent development is what Komjathy (2017) has described as the emergence of a more comprehensive interdisciplinary field of Contemplation Studies. Although he describes this field as "diverse, decentralized, and experimental" (p. 4), without any dominant model or paradigm, he also discerns "some influential expressions, recurring patterns, and emerging trends" (p. 4). At the same time, he emphasizes the need for "a comprehensive, representative, and integrated discussion of the field, including a 'generous reading' and 'critical evaluation' of the contributions and limitations of its various expressions" (Komjathy, 2017, p. 4).

Some well-known examples of contemplative practices in the Western world today are mindfulness meditation and yoga; surveys indicate an increasing use of yoga and meditation during the last decades, among both adults and children (e.g., Cramer et al., 2016; Wang et al., 2019). Among the many other examples of contemplative practices that are mentioned by Komjathy (2017) in his overview are Tai Chi, Qi Gong, and various forms of contemplative prayer, as well as more recent additions to the field such as Alexander technique (Alexander, 1932), the Feldenkrais method (Feldenkrais, 1972), and Gendlin's (1978) Focusing.

In the present paper the focus lies on the specific kind of attention and attitude to one's experiences that is involved in contemplative practices. This is approached from a phenomenological perspective. More specifically, it is approached from a perspective that has previously been described as experimental phenomenology (Lundh, 2020) and has its roots in Husserl's (1938/1970) philosophical phenomenology and Ihde's (1977, 2012) experimental phenomenology.

A rigorous scientific study of contemplative practices requires a comprehensive approach in terms of an integrative conceptual framework. The purpose of the present paper is to discuss the potential of experimental phenomenology to contribute to the development of such an integrative framework. The paper has two main parts. The first part of the paper describes the conceptual framework of experimental phenomenology and gives examples of how experimental phenomenology can be used both to develop new phenomenological practices and to study existing ones. In the second part, various kinds of contemplative practices are discussed from the perspective of experimental phenomenology. To enable a certain breadth in the discussion, examples are taken from widely different traditions.

EXPERIMENTAL PHENOMENOLOGY

The purpose of this section is to describe the basic conceptual framework of experimental phenomenology and to say something about its relation to theoretical and descriptive forms of phenomenology. As phenomenology is a vast and many-faceted area, however, the relation between experimental phenomenology and other varieties of phenomenology is only dealt with very briefly here; for more detail the interested reader is referred to Lundh (2020). It should also be noted from the start that although experimental phenomenology is influenced by Husserl's (1938/1970) philosophical phenomenology, it makes no claim to follow Husserl's philosophy in any orthodox manner.

Phenomenology can be defined as the scientific study of our experience of being in the world. According to Husserl (1938/1970), doing phenomenology means to turn our attention to experience as such. This represents a shift in perspective from our usual *natural attitude* with its focus on the world (and our practical engagement with things in the world) to a *phenomenological attitude* characterized by a focus on the experience of being in the world. Instead of focusing on the objective world as it appears *from* our subjective perspective (i.e., the natural attitude), attention is turned *to* the subjective perspective as such (a phenomenological attitude).

Experimental phenomenology is a subvariety of phenomenology, which differs from theoretical and descriptive varieties of phenomenology by involving the investigation of phenomenological *practices* and their impact on subsequent experience (Lundh, 2020). The task of experimental phenomenology, as it is understood here, is (1) to increase our understanding of phenomenological practices by a systematic variation of these and a study of their effects, and (2) to develop new phenomenological practices that can have a beneficial influence on people's life quality and personal development.

It is important to note that phenomenology in this sense, including experimental phenomenology, is not some kind of "first-person science." As pointed out by Thompson (2020, p. 46) among others, "Although Husserl's phenomenology has occasionally been misdescribed as an effort to do 'first-person-science,' he didn't describe it this way, but rather presented it as a collective and intersubjective project" (p. 46-47). This is also true of experimental phenomenology, as emphasized in a previous paper:

"What makes experimental phenomenology into a scientific endeavor is the intersubjective nature of this kind of study: potential effects described by one person can be subjected to replication both by the same person, and by other persons. Also, conclusions drawn on the basis of this kind of study are hypothetical and provisional and may be modified or specified on the basis of further study" (Lundh, 2020, p. 493).

The first researcher to speak of an experimental phenomenology was probably Don Ihde (1977), although in a different context than the present one – the study of

perceptual illusions (e.g., the Necker cube) and how intentional variations of subjective experiencing can affect our experience of these illusions. What was new about Ihde's (1977) approach was that it was designed to "show how to *do* phenomenology as a *praxis*" (Ihde, 2012, p xii). Since then the term "experimental phenomenology" has also been used by other writers in a quite different sense, as for example by Albertazzi (2019) who defines experimental phenomenology simply as "the study of appearances in subjective awareness" (p. S2191), without any mention of phenomenological practices. As experimental phenomenology is understood here, however, it involves *an active experimentation* with one's subjective direction of attention and choice of attitude.

Phenomenological Practices

As defined here, phenomenological practices involve an intentional variation of subjective experiencing by changes in the direction of attention and the choice of attitude. Typically, this is guided by some form of verbal instructions and self-instructions; these instructions are what differentiate one phenomenological practice from another. To engage in a phenomenological practice is, by definition, to focus attention on one's experiences with some specific kind of attitude, according to some set of instructions.

These instructions may be given by another person (e.g., a teacher or a therapist), or they may be given by the experiencing person in the form of self-instructions, but they are always about one's attention and attitude. To follow this set of instructions means to deliberately modify one's direction of attention and/or one's attitude in a specific way. The content of these instructions is what defines the nature of each specific phenomenological practice. This also means that *verbal precision* is one of the priorities in experimental phenomenology. Different words carry different meanings, and verbal modifications often imply modifications in the phenomenological practice involved.

One example of a phenomenological practice is mindfulness meditation. Although there are many definitions of mindfulness in the literature, most of them mention at least two basic instructions: (1) to deliberately focus attention on some aspect of present experience; and (2) to do this with a particular kind of attitude, characterized as being accepting and non-judging; kind, friendly and caring; and showing openness, curiosity, and non-reactivity to experience (e.g., Bishop et al., 2004; Kabat-Zinn, 2013; Shapiro and Carlson, 2017). As a corollary, this also implies an instruction to gently bring attention back to the present moment when getting distracted by thoughts. All these instructions are about regulating our inner experiencing, and do not have to involve any publicly observable behavior.

Although phenomenological practices *need* not involve any change in observable behavior, however, some practices do. Although these practices are not *purely* phenomenological, they still are phenomenological practices to the extent that they involve instructions concerning attention and attitude. In a previous paper, this was illustrated by a comparison between different breathing exercises:

"A breathing meditation that simply involves attending to one's breathing just as it is, with no instruction to change it in any way, is a pure phenomenological practice. A breathing exercise where the individual is instructed to breathe in a particular way (for example, slowly or deeply), while at the same time paying close attention to the breathing, is not a pure phenomenological exercise because it also involves a change in overt behavior. It is still a phenomenological practice, however, because it essentially involves instructions about the direction of attention. On the other hand, if the instructions are only about breathing in a particular way, and do not say anything about attention or attitudes, it is not a phenomenological practice but a pure behavioral practice" (Lundh, 2020, p. 497–498).

One aspect of phenomenological practices is that they represent techniques that are possible to formulate in words and to describe either orally or in writing. This makes it possible to *teach* phenomenological practices. Another aspect of phenomenological practices, however, is that they cannot be *reduced* to the application of techniques, or pure routines, without losing their nature as phenomenological practices. Routinely practiced exercises may well have their value, but without an element of consciously focused attention on the practice while it is engaged in it does not count as a phenomenological practice. As emphasized by Ellen Langer (2014), such consciously focused attention involves an openness to *new* experiences, and this openness to novelty is one thing that differentiates mindful from "mindless" activity.

Contemplative Practices as a Subcategory of Phenomenological Practices

Although all phenomenological practices involve the regulation of attention and attitudes, all phenomenological practices are not contemplative. One example is hypnosis, where instructions are typically given in the form of a hypnotic induction that is designed to affect the person's attention or experiences in a specific way, while leaving little room for contemplation. This clearly represents a phenomenological practice, as defined here, in the sense that instructions of some form are given to subjects to make them modify their direction of attention and attitude. Although hypnosis has been defined in several different ways, one of the more cited definitions sees it as a "state of consciousness involving focused attention and reduced peripheral awareness characterized by an enhanced capacity for response to suggestion" (Elkins et al., 2015). Although this clearly implicates both attention and attitude (in the form of an increased suggestibility) there is nothing that implicates any contemplative experiences. It is also easy to imagine other examples of practices where attention and attitude are manipulated in some way without any contemplative purposes.

Even if all phenomenological practices are not contemplative, a working hypothesis may be that all contemplative practices are phenomenological, in the sense that they all involve instructions about the direction of attention and choice of attitude. If so, contemplative practices would represent a subcategory of phenomenological practices. But is this true? One difficulty here is the absence of an agreed-upon definition of what constitutes a contemplative practice (Komjathy, 2017). To answer this question we would have to be certain about which practices are to be characterized as contemplative, and this cannot be done

without a clear definition of what makes them contemplative in the first place.

One way of solving this problem is by defining contemplative practices as phenomenological practices that are engaged in for the sake of the contemplative experience that they afford. This would be consistent with the reasoning in the introduction to the present paper. This would, for example, rule out a variety of phenomenological practices that are used in a psychotherapeutic context.

In classical psychoanalysis (Freud, 1916), for example, the analyst instructs the patient to use "free association," which means to enter a state of quiet, unreflecting self-observation, and to report all associations that appear, trying not to censor anything. Here the instructions clearly involve both a change of attention (i.e., to attend to all kinds of associations that turn up) and of attitude (i.e., taking a non-defensive attitude to potentially disturbing associations), and thereby clearly qualifies as a phenomenological practice. Even *if* this would also result in contemplative experiences now and then, it would not be classified as a contemplative practice because it is not undertaken for the sake of the contemplative experience as such, but rather in the service of goals such as psychoanalytic insight and personal development. On the other hand, someone might argue – along similar lines as Komjathy (2017) does with regard to contemplative practice as a life project – that even if psychoanalysis is not undertaken for the sake of contemplative *experiences*, it might represent a contemplative *path* that can lead to "character development." Because the present paper focuses on single contemplative practices, rather than on contemplative practice as a life project, however, this question need not bother us further here. But it illustrates some of the definitional problems that are at issue.

Consider now the case of meditation. Meditation is often seen as the most prototypical form of contemplative practice (cf. Komjathy, 2017). But there are different forms of meditation. Are they all to be seen as phenomenological practices? In other words, do they all involve instructions about attention and attitude? Dahl et al. (2015) have proposed a classification system that categorizes specific styles of meditation into attentional, constructive, and deconstructive families. According to their classificatory scheme, mindfulness meditation belongs to the "attentional" category, whereas lovingkindness meditation belongs to the "constructive" category, and various forms of insight meditation belong to the "deconstructive family." At first sight, the very naming of these categories might suggest that only the first category involves instructions about the direction of attention. However, "attentional" in Dahl et al.'s (2015) scheme refers to the hypothetical "cognitive mechanism" that is supposed to be involved, rather than to the contents of the instructions given. Looking at the verbal instructions in lovingkindness meditation (e.g., Salzberg, 2002), these clearly speak explicitly both about direction of attention (first to specific individuals and then eventually to all beings) and about a very specific attitude (described in terms of kindness and compassion).

This also illustrates an important thing about experimental phenomenology: Experimental phenomenology is interested primarily in the specific *content* of contemplative practices, as described in the verbal instructions given, and not in explanatory mechanisms. The latter are the subject of experimental cognitive psychology and neuropsychology, rather than phenomenology. This does in no way detract from the importance of also studying questions about mechanisms, but these questions simply do not belong to the field of experimental phenomenology.

Intentional Variation of Phenomenological Practices

Experimental phenomenology as defined here involves an intentional *variation* of phenomenological practices. This includes a variation in the direction of attention and/or the choice of attitude, as guided by some set of verbal instructions or self-instructions. Such an intentional variation of phenomenological practices may take place, for example, in a therapeutic context (e.g., the development of personalized health interventions; Lundh, 2021) or in a research context (i.e., to compare different varieties of phenomenological practices as to their effects; Lundh, 2020). In other words, experimental phenomenology basically rests on an active, intentional variation of phenomenological practices, either for the purpose of developing new practices that are suited to a specific person, or for the purpose of studying the effects of these practices. In this section, these two different applications of experimental phenomenology are described and illustrated by examples.

Experimental Phenomenology as a Personalized Health Intervention

Experimental phenomenology may be used to construct personalized health interventions. One example (described by Lundh, 2020) is the construction of a mindful driving practice for a client who had problems with sleepiness while driving. In this case specific personalized instructions for mindful attention were developed successively and tested while driving shorter distances. The result was the construction of a mindful driving practice where the individual shifted, in accordance with the changing traffic conditions, between four different phases of mindful attention, each with a specific focus: the road, the traffic, the landscape, and the sitting. The client was instructed to regulate attention by shifting in a smooth way between these four phases, according to principles of second-order mindfulness (Langer, 2014). Importantly, the client in question participated actively in shaping the details of the mindful driving instructions, so that they would suit his needs and preferences and have desirable effects in this specific case.

Another example is a mindful embodiment meditation that was developed for a client with insomnia due to early morning awakenings (Lundh, 2021). A set of detailed self-instructions was developed in collaboration with the client, designed to express (1) an explorative attitude toward the body, with (2) breathing as a central component, and (3) proceeding slowly. Four parts of the body were identified where the client felt especially tense, and which were focused during the meditation: the eyes, the lips, the neck, and the chest. After having learned the basic set of self-instructions the client was also encouraged to shift freely between the different components of the meditation, in accordance with principles of second-order mindfulness (Langer, 2014), thereby

leaving room for improvisation and playfulness within the given frame of the practice.

It should be noted that these examples do not represent experimental phenomenology as a scientific method, but rather as a clinically useful strategy to develop an individually tailored health intervention. The term "experimental" is still adequate, although here it refers to a looser form of experimenting than that involved in scientific research. The latter more rigorous kind of experimental phenomenology is described in the next section.

Before leaving the topic of personalized health interventions it may be asked whether "mindful driving" and "mindful embodiment" could be characterized as contemplative practices. Here it is relevant to note that the client who practiced mindful driving noted a new and more positive experience in the sense that "he could now *enjoy* driving in a new way, as it afforded him new visual and other sensory impressions of the road, the surrounding landscape, and the traffic flow" (Lundh, 2020, p. 501). Similarly, the client who practiced mindful embodiment reported using it also in situations that were usually experienced as "boring," such as waiting for the bus or sitting in a waiting-room, and noted that the situation no longer felt boring. *If* contemplative practices are defined, as suggested above, in terms of the inherently rewarding contemplative experiences that they afford, the practices in question may well be characterized as contemplative.

Experimental Phenomenology in a Research Context

Consider again the mindful embodiment meditation that was mentioned in the previous section. What would it take to study this in terms of a more rigorous experimental approach? As outlined in a previous paper (Lundh, 2020), such an undertaking would require a *systematic variation* of the phenomenological practice itself. And what may be varied here is either the direction of attention or the attitude. In this specific practice, attention was directed to four different parts of the body (the eyes, the lips, the neck, and the chest), and the instructions contained three different attitudes that were taken successively (exploration, "breathing into," and proceeding slowly). One way to conduct a more rigorous exploration of the effects of this phenomenological practice is to systematically vary these elements according to an experimental design.

The matrix described in **Table 1** illustrates the various combinations of attention and attitude that were used for a similar purpose in an unpublished pilot study. Here two additional attitudes were entered, which both implicated a loving attitude. In the verbal instructions given, the attitudes entered in relation to each of four bodily regions were expressed in the following form: "May I explore . . .," "May I breathe into . . .," ". . .slowly . . .," "May I feel love for . . ., and "May I feel love in . . .."

TABLE 1 | The various combinations of attention (as described in columns) and attitude (as described in rows) that were used in a study with an experimental-phenomenological design.

	The eyes	The mouth	The neck/back	The chest
Explore				
Breathe into				
Go slowly				
Feel love for				
Feel love in				

In a first part of this study, the participants (who had previous experience with meditation) were asked to attend to their resulting experiences and to note these verbally on a form that was very similar to **Table 1**. A thematic analysis of these notes suggested that the five different attitudes tended to give different kinds of experiences. For example, the explorative attitude was associated with an increased awareness of bodily sensations in the attended region of the body, whereas the breathing-into instruction tended to be more associated with feelings of relaxation. There was also a differentiation in effect between the two loving attitude instructions. For example, whereas the instruction "May I feel love for my eyes" tended to be followed by feelings of gratitude for having eyes to see with, the instruction "May I feel love in my eyes" tended to be followed by feelings of warmth and kindness.

In a second part of this study the aim was to develop a questionnaire, with items based on the various responses reported in the first qualitative part of the study, and with a Likert-type response format to allow quantification of participants' experiences. This represents a phenomenological mixed methods approach (cf. Martiny et al., 2021) which combines qualitative and quantitative methods. In the first part of the study, qualitative methods with an open response format were used to generate answers from the participants about their experiences – this is of particular importance in areas where it is unknown or uncertain which kind of experiences are to be looked for. This may then generate hypotheses about the effects of different kinds of attitudes and different directions of attention, that can be tested by quantitative methods. To increase the methodological quality of the first qualitative part of this kind of study it would also be possible to use microphenomenological interviews (Petitmengin et al., 2017; for a brief discussion of the role of micro-phenomenological methods in experimental phenomenological research, see also Lundh, 2020, p. 502).

As illustrated in this example, phenomenological practices may be varied systematically both as to the direction of attention and in terms of the attitude chosen. "Attitude" here refers to how one relates to the object of attention. In the above-mentioned example the objects of attention were four different regions of the body, and five different ways of relating to it were compared: by an explorative attitude, by breathing into it, by proceeding slowly, and by two different forms of a loving attitude. It may be questioned whether "breathing into" a certain part of the body really represents an attitude. It is possible that "attitude" is a too narrow term to use in this context, but for lack of a better term it is used here in a technical sense, as defined above (i.e., in terms of how one relates to the object of attention).

Another question that may be addressed experimentally is which impact a specific part of the practice has. For example, we might want to study if the instruction to proceed slowly has any specific effect, or whether it can be removed with no loss of effect. To go slowly here may be understood as the opposite

of an intention to reach a goal as quickly as possible; here the intention rather expresses an attitude of patience and tranquility. One hypothesis is that proceeding slowly makes available more details to attend to and that it may thereby change the impact of a given practice. This also applies to the reading of verbal self-instructions. For example, a set of verbal instructions may be given more slowly, together with an (explicit or implicit) instruction to attend consciously to each word, while letting the meaning of each word "sink in." The hypothesis that going slowly has these kinds of effects is possible to test by a variation in the instructions, and/or by a variation in the speed with which the instructions are read.

So far, what has been described as experimental phenomenology represents a systematic variation of *the phenomenological practice itself*. But one and the same phenomenological practice (as defined in terms of verbal instructions, direction of attention, and attitude) may have different impact also depending on the *context* and on the *person* who is engaging in it. For example, what tends to have a given impact for one person need not have the same impact for another person, and what has certain effects in one context need not have the same impact in another context. To address these questions, context and person may also be systematically varied.

Experimental phenomenology is first and foremost a *person-oriented* form of research (Bergman and Lundh, 2015; Lundh, 2015), where the purpose is primarily to draw conclusions at the level of the individual. Person-oriented research starts from the individual person and then generalizes from individual cases to larger groups of people and contexts. In this way it differs from *variable-oriented* research, which starts at the group level and conducts statistical analyses of differences between groups (e.g., an experimental group and a control group) and of correlations between different variables.

That is, although the primary purpose is to identify regularities in personal functioning, it is generally assumed that such regularities may differ from one individual to another, and from one context to another. This, however, in no way precludes the search also for regularities that generalize across individual persons, and across contexts. On the contrary, one aim of experimental phenomenology is to search precisely for such general principles. For example, as already suggested, one possible general principle might be that proceeding slowly during a phenomenological practice tends to have more beneficial effects than proceeding quickly.

Experimental Phenomenology and Experimental Group Comparisons

One way of further clarifying the nature of experimental phenomenology is by contrasting it with experimental group comparisons (i.e., a typical variable-oriented approach). As already explained, experimental phenomenology is *primarily* a person-oriented approach. It can, however, also make use of a variable-oriented approach by analyzing statistical differences in outcome between groups of participants who receive different sets of verbal instructions.

Langer et al. (2009, 2012) for example, have carried out a series of experimental group studies of mindfulness. To exemplify, in one study (Langer et al., 2009) orchestral musicians were divided into two groups, where those in the experimental group were asked to engage mindfully in their performance by actively noticing new things about the music they played, making new distinctions, and offering new subtle nuances while playing, whereas those in the control group were instructed to try to recreate a past performance of this piece of music. The results showed not only that the musicians in the experimental group enjoyed their performance more, and rated it as better, but also that the audience preferred the music that was created in a mindful state over music that was created by musicians who were merely trying to recreate a past performance. Although this was a study at the group level, where the effects were compared in terms of group averages, the study is an example of experimental phenomenology, because both the independent and dependent variables were operationalized phenomenologically (i.e., in terms of experiencing).

Experimental Phenomenology and Religious Approaches

Experimental phenomenology is a distinctly secular and psychological approach to contemplative practices, in the sense that it focuses on psychological aspects of contemplative practices such as the regulation of attention and attitudes, and that it aims to explore the effects of such practices. This, however, in no way means that it is restricted to studying contemplative practices of a secular origin. The characterization of experimental phenomenology as "distinctly secular and psychological" means that there are no limitations to what can be studied, as long as both the independent and dependent variables are phenomenological (i.e., refer to experiences). Thereby it is quite consistent, for example, with the search for "contemplative universals" in the mystical practices of different religions (e.g., Rose, 2016). It is clearly distinct, however, from those religious approaches where contemplative practices are used not only to explore human experience but also as a way of acquiring the beliefs that characterize the religion in question (which is sometimes labeled "insight").

Experimental phenomenology is fully open to the possibility that at least for some individuals a given phenomenological practice may have the most beneficial effects when it is associated with various types of religious beliefs. The personalized focus of experimental phenomenology implies an openness to the importance of contextual factors, which may vary from one individual to another, and these may well include religious beliefs.

From the perspective of experimental phenomenology, however, it is essential to keep a focus on *experiences*, while abstaining from assumptions about the truth or falsehood of various religious beliefs (e.g., about God, eternal life, impermanence, or no-self). As argued by Brumett (2021) present-day mindfulness research partly fails to live up to this requirement, as it is partly enmeshed with Buddhist conceptualizations of the world, which are thought to represent "seeing things as they are." Thompson (2020) makes a similar point when he argues against seeing meditation as a source of empirical knowledge:

"Buddhist meditation isn't controlled experimentation. It guides people to have certain experiences and to interpret them in ways to conform to and confirm Buddhist doctrine. The claims that people make from having these experiences aren't subject to independent peer review; they're subject to assessment within the agreed-upon and unquestioned framework of the Buddhist soteriological path" (Thompson, 2020, p. 41).

It is essential here to be clear about the claims of experimental phenomenology and how these differ from claims about meditation as a form of scientific method. Experimental phenomenology is not about studying the experiences during meditation or other contemplative practices *as a source of knowledge about the world.* Experimental phenomenology relies on a systematic variation of phenomenological practices (including meditation and other contemplative practices) to establish *correlations between practices and experiences*, and in no way aspires to use experiences during these practices as a way of finding out truths about the world. The purpose of experimental phenomenology is to provide knowledge on practical and personalized ways of improving the life-quality of individuals, for example in the form of an improved health, and an increased presence, concentration, empathy, compassion, love, or wisdom.

SOME EXAMPLES FROM THE VARIETY OF CONTEMPLATIVE PRACTICES

In the foregoing section, the conceptual framework of experimental phenomenology was described, and some illustrations were given of how it can be applied to the study of contemplative practices. The present section turns the perspective around and starts from the other direction. That is, it starts from two large areas of the human existence that may be made a focus of contemplation and gives examples of how aspects of these areas can be approached by means of experimental phenomenology. The two large areas that are chosen are (1) the contemplation of our being-in-the-world; and (2) the contemplation of being-with-others, or in other words, interpersonal relations.

The Existential Contemplation of Being-in-the-World

Existential issues have had a central role in the writings of many philosophers and psychologists, and perhaps most notably among thinkers belonging to the so-called existentialist school (e.g., Kierkegaard, 1844; Sartre, 1938; Yalom, 1980). Existentialism involves the contemplation of specific themes in the life of human beings, such as (1) the inevitability of our death; (2) our basic aloneness as individuals, in the sense that no one else can share our most personal experiences; (3) the freedom we have in choosing how to live, and in making decisions and taking responsibility for our actions, as well as the anxiety and guilt that is associated with this kind of freedom; and (4) our having to find meaning in a world where there is no intrinsic meaning (e.g., Yalom, 1980).

These themes may represent important issues in the life of human beings. At the same time existentialism often appears to be biased toward those aspects of life that are associated with feelings such as guilt and anxiety (e.g., Kierkegaard, 1844), disgust (Sartre, 1938) and absurdity (Camus, 1955). There is less focus on the wonder of being, and on aspects of life that are associated with joy, love, and gratitude.

There are, however, other philosophers and religious thinkers, as well as psychologists (e.g., Seligman and Csikszentmihalyi, 2000), who have focused more on the joyous aspects of being-in-the-world. For example, the importance of cultivating gratitude has been a theme in many religions, including Hinduism, Buddhism, Judaism, Christianity, and Islam, and is also focused on by some contemporary psychologists and philosophers (for an overview, see Rushdy, 2020).

Gratitude and Gratefulness

Psychological research starting with Emmons and McCullough (2003) suggests that the practicing of gratitude may have effects on subjective wellbeing, although the results of meta-analyses (e.g., Dickens, 2017) indicate that the effects of this kind of practice tend to be rather modest. Here it is worth noting that the practices that were studied in this research are not primarily of a phenomenological kind. The participants were simply instructed to write down things for which they were grateful, on a daily or weekly basis. In terms of the verbal instructions, this may be seen as a behavioral practice, rather than a phenomenological one.

What, then, could a phenomenological practice look like in this area? To take an example, let us return to the contemplative practice that was described in the very first passage of the present paper: A person who "goes to the forest to spend time in contemplation of nature." Suppose we would want to study this practice by means of an experimental-phenomenological design, to compare a gratitude practice with a simple form of mindfulness practice. This would require the development of specific instructions that are varied in terms of both attention and attitude. For example, the direction of attention in the mindfulness condition might be varied by means of formulations such as: "Note your specific perspective on what is in front of you," "Note the forms and colors in your visual field," "Note the sounds around you," "Note any smells," "Note the wind, the air you breathe, and your own breathing," "Note your body situated in these surroundings," "Note your own thoughts as you stand here in the forest," etc. To change from mindfulness to an attitude of gratitude, the "note" part of the instructions may be changed, for example, into "thanks for" or some similar formulation. The primary research question here would be if a grateful attitude has other effects on the participants' experience than a "noting" attitude.

Another issue that may also be addressed by means of experimental phenomenology is if gratitude can only be felt in relation to a person, or whether it can also be felt in relation to some larger impersonal context that one is part of. Gratitude in relation to other persons is generally referred to as interpersonal gratitude. A possible example of a more impersonal form of gratitude is what Nakhnikian (1961) referred to as "cosmic gratitude," illustrating it by the feelings one can have

on "contemplating the vast heavens on a starry night," and then moving from awe, wonder, and reverence at that sight to a sense of cosmic gratitude (p. 158).

Formulations such as these have led to a discussion among philosophers of whether it is possible to experience gratitude without directing this gratitude to someone. Some religious philosophers (e.g., Roberts, 2014) have argued that gratitude is by necessity always felt to a benefactor of some kind, and if this benefactor is not another person it must be God. Against this, non-religious philosophers such as Solomon (2007) have argued that cosmic gratitude should not be understood on the same model as interpersonal gratitude. Whereas interpersonal gratitude is always directed to a person as benefactor, and felt for a specific gift of some kind, cosmic gratitude is something quite different, which is felt "for one's whole life" (Solomon, 2007, p. 270).

According to Solomon (2007), cosmic gratitude is an essential element of spirituality, which he defines as "a meta-emotion that transcends the merely personal by taking into account our larger (or more modest) place in the universe" (p. 268). Solomon (2007) suggests various verbal formulations to describe the nature of such an all-embracing gratitude. In one formulation, he describes cosmic gratitude as "a way of putting one's life in perspective" (p. 269) while "being properly humble about one's own modest place in the world." In another passage he describes it as a capacity of "expanding one's perspective" so that we come to "appreciate the beauty of the whole" while at the same time being "absorbed in our own limited projects and passions" (p. 270). Common to these formulations is that gratitude is felt for our life, seen as a part of something larger (the world, or universe, or "the whole").

As pointed out by an independent reviewer, this is an issue that would be possible to study by comparing the practice of gratitude with and without its being directed to a personal (divine) benefactor. In terms of experimental phenomenology, this may be done by developing and comparing two distinct forms of phenomenological practices, where the objects of attention are the same, but the attitude is formulated in personal terms in one case (e.g., by expressing gratitude to God), and in impersonal terms in the other. Again, it would be important in the first stage of such a study to use an open response format in asking about the participants' experiences, together with qualitative analyses of their reports. One possible result here is that the effects may differ between different subgroups of participants; for at least some of them the religiously framed instructions may be felt to have the most beneficial effects.

Some philosophers have suggested that we should use different words to distinguish between the gratitude we feel to other people and the cosmic kind of gratitude. Walker (1980–1981), for example, suggested that we should differentiate between gratefulness and gratitude. Gratitude, as he sees it, is what we express to another person who has given us something, whereas gratefulness need not be directed to another person. Still, even gratefulness is associated with a desire to *give* something in return; in fact, "this desire is the distinctive mark of gratefulness" (Walker, 1980–1981, p. 49). And when there is no specific person to thank, our gratefulness may be expressed in the form of a more generalized generosity and good will toward others.

Here it may be added that, if gratefulness is felt toward the world or "the whole," as suggested by Solomon (2007), such generosity need not be expressed only to other persons but may also involve a general motivation to care for animals, plants, and other things around us, including the larger world that we are part of. For example, we may think of this "cosmic gratefulness" as something that is felt in relation to all good things given to us in life, and that is expressed in a will to give good things back to the world. The latter would implicate a desire to consciously shape our life by means of an ethical contemplation of gifts and gratefulness. One role for experimental phenomenology here would be to explore various phenomenological practices focused on the experience and expression of such gratefulness as to their effects also on people's behavior in relation to other individuals.

Importantly, this kind of gratefulness does not imply any indiscriminate positive feelings to everything. For example, if some processes (e.g., environmental pollution, or global climate change) threaten to destroy the beauty of the whole, or parts of it, a grateful attitude of this kind would call for a selective shift to another attitude. If gratefulness implies caring for the world, it also means to find effective ways of working against anything that threatens to destroy it.

This points to some of the limitations but also to some of the unexplored potentials of experimental phenomenology. Experimental phenomenology is limited to focusing on people's experiences, but it is difficult to handle real physical threats without behavioral and political change. Still, experimental phenomenology may have a role also in this context if it can help us to understand how changes in the regulation of attention and attitudes can contribute to behavioral change, and how the development of phenomenological practices can contribute to behavioral and political change.

Contemplative Interpersonal Relating

Up to now the discussion has focused primarily on different aspects of the relation between the individual person and the world. Almost nothing has been said about interpersonal relations. Interpersonal relations represent a complex field, with many different aspects that can be focused on in contemplative practices.

Experimental phenomenology is not a one-person psychology but can also be developed along interpersonal lines. One example is the above-mentioned study by Langer et al. (2009) of orchestral musicians where the results showed that the audience preferred the music that was created in a mindful state over music that was created by musicians who were merely trying to recreate a past performance. Here mindfulness instructions to one group of persons (the musicians) were found to have effects on the experiences of another group of persons (the audience).

Another basic aspect of interpersonal relations is the ability of one person to take the perspective of another person, which represents a basic aspect of empathy (e.g., Davis, 1994). Empathy exists on many levels, from the most basic fact that we naturally tend to perceive other persons as experiencing, thinking, feeling, willing creatures like ourselves (Husserl, 1938/1970), to our ability to develop a more fine-tuned empathic understanding of

another person's more specific experiences, thoughts, feelings, and motives (e.g., Kohut, 1959).

Empathy implicates mindfulness to another person and cannot be reduced merely to positive response and a pretended interest. Langer et al. (2012) illustrated this in an experimental study where they compared two groups of adults who were to interview children. One group of adults were instructed to interview the children in a mindful way; their instruction was to notice what the child's voice and body language could say about the child's feelings, and to see if these things varied or remained the same during the interview. Another group of participants received the "mindless" instruction to pretend to be interested in what the child said during the interview and to be positive in everything they said to the child. The results showed that the children preferred to interact with the mindful adults, and that they tended to devalue themselves following the mindless but positively staged interaction.

Another important aspect of interpersonal relations concerns more intimate forms of giving and receiving. Betty Martin is an American chiropractor who has developed a program called *The wheel of consent* (Martin, 2021). Although this program does not make use of words such as "mindful" or "contemplative," it involves a whole series of phenomenological practices of a contemplative kind, focused on touching, and designed to develop the skills of receiving and giving, with a focus on consent. In view of the difficulties that people may have in relating to each other in an expressive and yet respectful and empathic manner, and in view of the violations of consent that do occur in such contexts, this is probably an area of great potential for developing the quality of interpersonal relations.

Apart from dealing with an important area of interpersonal relating, Martin's program is of clear interest from an experimental phenomenological perspective. The word "experimental" figures prominently in her teaching. The following quotation captures something essential about the program: "The reward is in the practice itself, and what makes any practice engaging is not the doing you do but the quality of attention you bring to it. With this practice everything is an experiment." (Martin, 2021, p. 5). In other words, there are several reasons why it is of interest to choose this specific program as an example here. It is also of interest because it represents an example of a set of newly constructed contemplative practices, and serves as an illustration of how such practices are continually constructed among various practitioners on the basis of a kind of informal experimental phenomenology.

Betty Martin's Wheel of Consent

This is a program based on three lessons and five labs, where each part builds on the previous ones and are to be followed in the given order. This section gives a brief description of the three first lessons. In the first lesson, the participants are trained in the mindful touching of ordinary things, with a focus on exploration and the pleasure of touching. In the two following lessons they are trained in mindful interpersonal touching (i.e., the touching of another person's hand), again with a focus on exploration and pleasure. Because this involves two persons, it becomes more complicated and raises issues of personal limits and consent. This part of the training involves a contemplative approach to desire, limits, and consent, where the participants are instructed (1) to slow down and contemplate both their own desires and their limits regarding what they are comfortable with in interpersonal touching, and (2) to train interpersonal skills such as the respectful expression of desire, and the clear expression of personal limits in the interpersonal give-and-take.

Lesson One: Waking up the Hands

The first lesson of Martin's (2021) program is called "Waking up the hands." Here she instructs the participants to train in touching ordinary things, such as a cushion or a pen. An attitude of curiosity is encouraged. The participants are instructed to bring their attention to the hands, and to explore the object chosen to notice everything about it (its weight, shape, texture, etc.), and to feel the pleasure in touching it. Just as in different varieties of meditation, the participants are instructed to make this choice again and again when they get distracted. They are also instructed to go slow, because the slower they move their hands the more they can feel, and the more there is to notice. It is emphasized that there is no goal, other than focusing on how it feels in the present moment to touch this object.

From an experimental phenomenological perspective, the overall attitude is explorative. The focus of attention is first on the details of the object that is touched, and then shifts increasingly to the sensations in the hands and to the feelings of pleasure in touching the object. Importantly, the attitude involved also concerns the tempo of the touching (i.e., to proceed slowly). Although this may seem to be a simple exercise, Martin (2021) gives an overview of the difficulties many people have with it. She describes large individual differences in how much practice it takes for participants to get access to a relaxed state of pleasure in the process, and to an experience of their hands as a source of pleasure. At the same time, she regards this first lesson as foundational for the rest of the program. Practicing "waking up the hands" is said to have the potential to contribute to the development of an increased quality of the person's touch also in interpersonal contexts.

Lesson Two: The Take/Allow Dynamic

In the second lesson the object to be explored by touch is not a thing but another person's hand. In other words, the situation now involves two persons instead of one person and a thing. These two persons have an equal status in the process, not only because they change roles after half the time, but also because *consent* is central to the exercise. Here several complications arise.

First, because the exploration is now directed at another person and not at a thing, the second person must *allow* the first person to do this. And is the second person really *willing* to do this? Here consent enters the scene. An essential part of the exercise is that the second person has the right to refuse, and to set limits, and to tell the first person to stop if something does not feel right.

From the perspective of experimental phenomenology it is interesting to note how precise Martin (2021) is in her instructions to the participants. Here the first person is instructed to ask, "May I feel your hand," with exactly these words, and to

wait for an answer. The second person is instructed to pause and "consider whether this is a gift you can give with a full heart" (p. 86), and not to say yes until they hear "an inner yes" and then to respond with the exact words "Yes, you may." If the second person is not willing, the instruction is to say "No, not today." If he/she is willing only within certain limits, the instruction is to clearly specify these (e.g., "only my right hand, not the left"). And if something does not feel right during the process, the instruction is to express this clearly. It is essential here that the person whose hand is to be touched feels that he/she *has a choice* throughout the exercise.

One main difficulty during this exercise is that the first person may slip into a giving attitude (e.g., by caressing or massaging the second person's hand). But what is to be trained here is not the skills of giving, but an attitude of curiosity about the other person's hand: "Respect any limits your partner has set, and then feel their hand. That's it." (Martin, 2021, p. 88). In other words, it is equally essential both to respect any limits that the other person has, and to keep an attitude of curiosity about the other's hand and how it feels to touch it. The purpose is to *explore* another person's hand in the same way that the external thing was explored in lesson one – that is, with full attention to the other's hand, to notice everything about it as well as the pleasure that goes with this. And again, the instruction is to gently bring attention back when being distracted, and to go slowly to notice as much as possible about the other's hand and how it feels.

As Martin (2021) puts it, there is a gift involved in this exercise, but it is not the actively touching partner who is the giver. The active partner, in fact, *receives* a gift by being allowed to explore and feel the other person's hand. Accordingly, when the participants are instructed to end the exercise by looking each other in the eyes and say, "Thank you" and "You are welcome," it is the actively touching partner who says thank you.

Many people have difficulties finding this attitude – an attitude which Martin refers to as *taking* and which involves a combination of two things: putting one's own desires first, and respecting the limits of the giver (Martin, 2021, p. 97). A common reason for these difficulties, she says, is that putting one's own desires first is often assumed to be somehow unkind or hurtful to the other person. In Martin's experience, however, the effects of the practice are often the other way around. When the person finally finds this attitude ("this is for me") it tends to produce a notable change in the touching, which now slows down and becomes more relaxed, explorative, and sensual, while taking in "a tremendous amount of information" (Martin, 2021, p. 93). And this may, in fact, be experienced as quite pleasurable also for the person who is being touched: "I have had many people say this was the best touch they've ever felt." (Martin, 2021, p. 102).

The two persons in this exercise are referred to as the "taking" and the "allowing" partner, and the interpersonal process is called the *take/allow dynamic* (Martin, 2021). "Taking" is a word with many meanings, but here it means taking the gift that is provided by the allowing partner – that is, taking the opportunity to explore that person's hand with full curiosity, and the joy and pleasure that comes with this, while fully respecting that person's limits. This take/allow dynamic is contrasted to another interpersonal process which Martin (2021) refers to as the *serve/accept dynamic*. This is the subject for the third lesson. Here the direction of the gift is reversed – now it is the active partner who provides the gift.

Lesson Three: The Serve/Accept Dynamic

In the third lesson the question asked is "How would you like me to touch your hands?" This means that the active person now takes a *serving* attitude. The second person is to pause for a while to contemplate how he or she really wants to be touched, and then to respond with a request of the form "I would like. . . will you do that?" The person may, for example, come up with a request such as, "I would like you to softly caress my palm with your fingertips. Will you do that?" (Martin, 2021, p.107).

Here the serving partner may follow up with further questions to become clear about exactly how the person wants to be touched. The instruction is: "Ask anything you need to clarify. Do they mean soft, light, firm, slow, deep? Gently ask for the information you need so you can give them exactly what they want." When it is fully clear what the other person wants, the serving person is to pause and contemplate whether this is something that he/she really can give with a full heart. If it is not, the request may need to be negotiated. After that the serving person says, "Yes, I will," and the process starts (Martin, 2021, p. 107–108).

Again, the two participants have an equal status in the process, not only by changing roles after half the time, but also because consent is of central importance in the process. The serving partner needs to feel that the request is within his or her limits, and the accepting partner must feel that the touch that is given is in accordance with their agreement. The serving partner is to do only what was asked for and nothing else, as well as to check with the receiving partner to make sure that this is what they had in mind.

The receiving partner is instructed not to pretend to like anything other than what was asked for, and to ask for changes at any time to make sure that they receive exactly what they want. "When you receive exactly the touch you asked for, something lands in your heart. You notice, perhaps for the first time, that this really is for you" (Martin, 2021, p. 110).

Just as in session 2, the skills that are trained are both contemplative (searching within oneself to find out about one's desires and limits, as well as pondering the other person's desires and limits and respecting these) and communicative (expressing one's desires and limits, and eliciting feedback from the other person). The sessions are similar also in that they both involve a training in how to differentiate between the attitudes of receiving ("this is for me") and giving ("this is for them"); at the same time, however, they represent a clear contrast in how these two attitudes combine with active touching and with being touched. In session 2, *receiving* is combined with doing whereas giving is combined with being done to, whereas in session 3 *giving* is combined with doing whereas receiving is combined with being done to and – together these four combinations represent the "four quadrants" in Martin's model of the Wheel of Consent. A basic principle in her thinking is that the two attitudes of receiving and giving need to be taken apart and trained separately in these two different contexts: "In order to experience them, we

have to separate them. We have to experience them one at a time, undiluted by the other" (p. 35).

To summarize, Martin's (2021) *Wheel of Consent* is an interesting example of a complex program of phenomenological practices. Although it makes no use of the terms "mindfulness" or "contemplative" it seems to have many typical characteristics of a phenomenological practice of a contemplative kind: regulation of attention (with a focus on touching) and attitudes (practicing an explorative attitude and differentiating between the attitudes of receiving and giving), precise verbal instructions, an emphasis on going slow, and clear elements of contemplation (of desire, limits, and consent). It also shares many characteristics with the kind of contemplative practice as a life project that is described by Komjathy (2017), such as a commitment to practice for the purpose of personal development. Martin (2021), for example, carefully describes the difficulties that many people have with the seemingly simple phenomenological practices that are involved, and she also describes the skills of touching, receiving and giving as something that may continue to develop all through a person's life.

Martin's (2021) *Wheel of Consent* can be seen as an example of how an informal variety of experimental phenomenology may lead to the development of a new complex program of phenomenological practices. It remains, however, to study these phenomenological practices as part of a more research-oriented experimental phenomenology; this would require a systematic variation of the attention and attitude that characterize these practices. It would also be interesting to study the long-term effects of the program; this would require the use of additional methods such as longitudinal designs and measures both of commitment and of the kind of skills that are involved.

DISCUSSION

Although some contemplative practices are very old, the field of Contemplation Studies is still young. Among other things, this means that there are no agreed-upon definitions of central concepts such as contemplative practices and contemplative experiences. This presents a difficulty for discussions in this area. On the other hand, it may be argued that it is a good thing to be open regarding such definitions at the present stage of research (cf. Komjathy, 2017, p. 69).

The present paper started from a working definition of contemplative practices as practices that are engaged in for the contemplative experiences that they afford. A paradigm example that was suggested is a person who goes into the forest to contemplate nature. In this case there need be no other purposes involved than the contemplative experience itself. Because of the beneficial effects that have been experienced as part of such experiences, however, people in many different cultures and as part of many different traditions (religious and secular) have started to cultivate specific contemplative practices by practicing these on a regular basis for the purpose of higher-order goals such as improved health, attentiveness, concentration, presence, awareness, compassion, and wisdom. This involves a commitment to practice for the purpose of some form of personal development. Komjathy (2017) has accordingly described a contemplative life path, characterized by three elements: commitment to practice, critical subjectivity, and character development.

A rigorous scientific study of contemplative practices requires a comprehensive approach in terms of an integrative conceptual framework. The purpose of the present paper was to describe the basic characteristics of an approach called experimental phenomenology (Lundh, 2020) and to discuss its potential to contribute to the development of such an integrative framework. Experimental phenomenology is defined here as an investigation of phenomenological practices and their effects on experience. Phenomenological practices involve an intentional variation of experience by changes in the direction of attention and the choice of attitude, typically as guided by some form of verbal instructions and self-instructions. Experimental phenomenology rests on a systematic variation of such phenomenological practices for the purpose of establishing causal connections, or at least correlations, between various practices and the resulting experiences.

A basic assumption in the present paper has been that contemplative practices are a subcategory of phenomenological practices. To the extent that this is true, experimental phenomenology is directly relevant both for the *development* of new contemplative practices and for the *study* of existing ones. As to the development of new contemplative practices, the hypothesis is that *an informal variety of experimental phenomenology* has been used by creative innovators during all ages when they have developed new practices in this area. That is, when new contemplative practices have been developed in different cultures and traditions, this has probably been done based on observations of correlations between various kinds of practices and the resulting experiences. Martin's (2021) Wheel of Consent represents a recent program that has been developed by its originator over the years with the help of observations of this kind. A similar kind of informal experimental phenomenology may also be used by present-day clinicians to develop personalized health interventions. Two examples that have been discussed are a mindful driving practice (Lundh, 2020) and a mindful embodiment exercise (Lundh, 2021).

This kind of informal experimental phenomenology does not, however, qualify as a scientific method. To qualify as a scientific method experimental phenomenology needs to be applied to well-defined phenomenological practices in accordance with experimental designs, where the direction of attention and the choice of attitudes are varied systematically to find correlations between variations in the practice and variations in the resulting experiences. It is possible that this kind of research may lead not only to a more systematic theoretical knowledge of general principles that underly contemplative practices, but also to the development of new practices based on this understanding.

This may be seen as analogous to the various kinds of technologies (e.g., learning to control the fire) that were developed by early humans in the form of a practical knowhow long before they had any theoretical knowledge about the combustion processes that are involved. Nowadays, however, the process within the field of technology often runs in

the opposite directions; theoretical knowledge about quantum physics, for example, has made possible the development of many new technologies such as computers and mobile phones. The question may be asked if a similar kind of development can occur with contemplative practices: Is it possible that a theoretical knowledge about the general principles underlying phenomenological practices and their effects can eventually lead to the development of new contemplative practices with a superior impact on human well-being and personal development?

One limitation of experimental phenomenology is that it primarily addresses single contemplative practices and their resultant experiences. This only represents one of the three characteristics which Komjathy (2017) sees as typical of contemplative practice as a life project – the other two being commitment to practice, and goals of character development. The study of contemplative practice as a life project, in addition to experimental phenomenology, would require other methods such as, for example, longitudinal research designs and ways of measuring regularity of practice and various aspects of personal development.

A final comment on the term *experimental* phenomenology: To avoid confusion here, it should be remembered that the word "experimental" has at least two important but different meanings, which are both relevant to experimental phenomenology. First, from a scientific perspective, controlled experiments are invaluable tools in our efforts to understand causal relationships. Conducting experimental research means to study the effect of various interventions, while trying to control other variables that may affect the outcome. Experimental phenomenology makes it possible to study the most immediate effects of variations in a contemplative practice by means of a systematic variation of the instructions given about direction of attention and choice of attitude.

The second meaning of "experimental" has less to do with science; to act "experimentally" here simply means to test something new out of curiosity or in a spirit of creativity. If this kind of experimental approach is directed at our way of paying attention to things, or to the attitude we take to things, and is followed by an observation of the experiences that follow, then we are engaging in an informal variety of experimental phenomenology. This kind of informal experimentation probably lies at the basis of a lot of the contemplative and other phenomenological practices that are around today. Further, this informal variety of experimenting represents an important first stage of exploration before we eventually engage in more controlled experiments – it may, for example, lead to the formulation of hypotheses that can be tested more rigorously in scientifically controlled studies.

A working assumption of experimental phenomenology as defined here is that this approach represents a new perspective on contemplative practices that may contribute to the development of this area of study. Although the present paper has applied this framework to the understanding of a variety of contemplative practices, this still represents a rather limited sample of such practices. There exist many other contemplative practices, and the question remains whether they can all be approached in terms of experimental phenomenology (i.e., in terms of the regulation of attention and attitudes, as defined by a set of verbal instructions). This should be seen as a hypothesis that, like all scientific hypotheses, needs to be subjected to continued critical testing and that will be strengthened to the extent that it survives such testing.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

L-GL wrote the entire manuscript.

ACKNOWLEDGMENTS

I want to thank the editor and two reviewers for valuable comments on an earlier draft of this manuscript.

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Conflict of Interest: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychology

HYPOTHESIS AND THEORY
published: 28 January 2022
doi: 10.3389/fpsyg.2021.795077

Defining Meditation: Foundations for an Activity-Based Phenomenological Classification System

Terje Sparby[1,2,3]* *and Matthew D. Sacchet*[4]

[1] Rudolf Steiner University College, Oslo, Norway, [2] Department of Psychology and Psychotherapy, Witten/Herdecke University, Witten, Germany, [3] Integrated Curriculum for Anthroposophic Psychology, Witten/Herdecke University, Witten, Germany, [4] Meditation Research Group, Center for Depression, Anxiety, and Stress Research, McLean Hospital, Harvard Medical School, Belmont, MA, United States

Classifying different meditation techniques is essential for the progress of meditation research, as this will enable discerning which effects are associated with which techniques, in addition to supporting the development of increasingly effective and efficient meditation-based training programs and clinical interventions. However, both the task of defining meditation itself, as well as defining specific techniques, faces many fundamental challenges. Here we describe problems involved in this endeavor and suggest an integrated model for defining meditation. For classifying different meditation techniques, we draw on classical, contemporary, and holistic systems of classification. We analyze different techniques and propose that all meditation techniques are based on a specific set of activities, that is: focusing, releasing, imagining, and moving in relation to an object of meditation, including fields of experience. Meditative activities can be combined and unified in the activities of observing, producing, and being aware. All meditative activities are unified in awareness of awareness. Defining specific meditation techniques may be done by specifying which activities and objects are involved. The advantage of our approach is that it can potentially account for the inner workings of all current systems of classification and hence it lays the foundation for formulating an overarching system of meditation that can guide future research and practice.

Keywords: meditation, classification, phenomenology, activity, first-person, consciousness, mental activity, taxonomy

OPEN ACCESS

Edited by:
Sisir Roy,
National Institute of Advanced Studies, India

Reviewed by:
Richard J. Davidson,
University of Wisconsin–Madison, United States
J. Shashi Kiran Reddy,
ThoughtSeed Labs, India

***Correspondence:**
Terje Sparby
terje.sparby@gmail.com

Specialty section:
This article was submitted to Consciousness Research, a section of the journal Frontiers in Psychology

Received: *14 October 2021*
Accepted: *21 December 2021*
Published: *28 January 2022*

Citation:
Sparby T and Sacchet MD (2022) Defining Meditation: Foundations for an Activity-Based Phenomenological Classification System. Front. Psychol. 12:795077. doi: 10.3389/fpsyg.2021.795077

INTRODUCTION

Classification is fundamental to science (Hoyningen-Huene, 2016). For instance, chemistry is concerned with the classification of different chemical compounds. This is done to get a clear view of what the chemical substances consist of and how they may interact with other chemical substances and other objects or phenomena. In psychology, the most well-known classification system is the *Diagnostic and Statistical Manual of Mental Disorders* (DSM–5) (American Psychiatric Association, 2013). Once a patient has been diagnosed with a mental illness according to the DSM, a clinician may select a specific treatment. Without overarching systems of classification in science there would be no agreement on what basic terms mean, and thus coordinating research efforts toward advancing knowledge would be very difficult or even impossible.

The issue of classifying meditation techniques becomes more and more pressing given the considerable and growing interest in meditation research. To date, it has been shown that different meditation techniques, such as focused attention (FA) and open monitoring (OM) techniques, may lead to both different and overlapping effects (Sears and Kraus, 2009; Perlman et al., 2010; Britton et al., 2018; Zhang et al., 2019). Different meditation techniques have also been shown to lead to different structural changes in the brain (Valk et al., 2017). The fact that there are overlapping effects across different meditation techniques may perhaps be explained by different techniques achieving the same or similar results but through different mechanisms, or rather that different techniques may share *activities* and hence involve the same mechanisms. In either case, the existence of both overlapping and unique technique effects needs to be accounted for. To pursue this kind of research it will be necessary to clearly define and differentiate different meditation techniques.

Furthermore, meditation research is expanding to include possible negative, challenging, unwanted, or harmful effects (Lindahl et al., 2017; Farias et al., 2020; Hirshberg et al., 2020), and it has been shown that some meditation techniques (e.g., insight meditation) may be associated with higher frequency of unpleasant psychological experiences than others (Schlosser et al., 2019). Again, without identifying both similarities and differentiating between and among techniques, such associations cannot be investigated. Furthermore, equating different meditation techniques that may have different outcomes could easily lead to inconsistent research results. To build this intuition, consider researching the effects of different antibiotics without differentiating between unique classes of antibiotics. The results of such research would most likely be quite inconsistent, both highly promising and disappointing at the same time and thus confusing and unhelpful, given that different strains of antibiotics are very effective for certain diseases while ineffective for others (Grayson et al., 2017). Indeed, Goyal et al. (2014), while calling into question the quality of meditation research, notes that "[u]ncertainty remains about what these distinctions [between mindfulness meditation, concentration, and automatic self-transcendence] mean and the extent to which these distinctions actually influence psychosocial stress outcomes." (p. 358). Clearly and consistently differentiating between meditation techniques is not only an important step to improve the overall quality of meditation research but also an essential part of its scientific maturation. Furthermore, agreeing on a universal framework of definition and differentiation is an important step toward going beyond the confines of the different meditative *traditions*. Though, as we will argue, the context of meditative practice may be vital to gain a full understanding of its meaning, there are also aspects of it, such as the acts that are performed, which may be understood conceptually, experientially, and physiologically without referring to any specific tradition. Clearly, this is a very important development for the modern application and understanding of meditation training.

Two concepts are central to our approach: activity and phenomenology. Regarding the concept of activity, we draw on recent work on mental action in philosophy in relation to meditation. Strawson (2003) has defined mental action as bringing content to consciousness (as in imagining, thinking, and choosing), there are evidently other mental actions as well, such as clearing the mind of content during meditation (Upton and Brent, 2019). Furthermore, we prefer "activity" to "action" since "action" implies strong agency. As we will argue, meditation as an activity may involve agency, but also forms of activity in which agency is reduced, such as "effortless doing." Furthermore, we connect our concept of activity to Aristotle's idea of *ergon*, that is, an "activity of the soul on the basis of virtue" (Aristotle, 1984, p. I 7, 1098a16–18) or an activity aimed at realizing the human good or the best human achievement (Baker, 2021). In our exposition of the meditation as an activity we view an activity in relation to a beneficial aim and the context of that aim, drawing inspiration from previous work showing that the activities cannot be made sense of fully without viewing it within the context they are enacted (Dahlberg, 2006; Holton, 2009; Noë, 2012). Note also that we do not presuppose that concepts such as "mental" and "physical" can ultimately be clearly distinguished, which is one further reason why we prefer to refer to "activity" rather than "mental action." As for the concept of phenomenology, we will rely on Lundh's recent work on this (Lundh, 2020) and pursue a largely Husserlian or theoretical phenomenological approach that investigates the fundamental structures of human subjectivity on the basis on methodological principles such as epoché and eidetic variation (Husserl, 1976; Moustakas, 2010). This approach is based on the notion that research on the effects of meditation should involve investigating what causes those effects. In the case of meditation, the causes are most directly accessible through what meditators *do*, and what they do, considering that meditators are mostly engaged in activities that are not externally observable, will have to be based on phenomenological reports and analysis.

In what follows, we consider several problems with current classification systems (see section "The Shortcomings of Current Classification Systems of Meditation") and indicate how to improve them (see section "The Way Forward"). We then give an account of differences among classical, contemporary, and holistic classification systems (see section "Classical, Contemporary, and Holistic Systems of Classification"), identify fundamental challenges for an overarching theory of meditation practice (see section "Challenges for Defining Meditation"), and, finally, outline an integrated model of meditation (see section "An Integrated Model"). Finally, we unite the problems and insights of the prior sections into a proposal for a classification of the fundamental meditative activities (see section "Overview of an Activity-Based Phenomenological Classification System").

THE SHORTCOMINGS OF CURRENT CLASSIFICATION SYSTEMS OF MEDITATION

The need for a classification system of meditation is clear. Despite this, a general consensus for defining and differentiating between meditation techniques currently does not exist. Multiple attempts have been made at classifying meditation. Lutz et al. (2015) have proposed a phenomenological classification of mindfulness meditation. According to this model, meditation

techniques can be classified according to the aspects of *object orientation, de-reification*, and *meta-awareness*; the qualitative dimensions of *aperture*, *clarity*, *stability*, and *effort*; and, finally, different *shared contextual features* (Lutz et al., 2015). Schmidt (2014a) has proposed a comprehensive system of classification ordered according to four main categories: *attention regulation*, *motivation*, *attitude*, and *practical context*. Recently, an empirically derived system of classification for meditation has been proposed by Matko and Sedlmeier (2019). Matko and Sedlmeier (2019) initially identified 309 different meditative techniques based on handbooks and research articles. Among these they chose the 20 most popular techniques and asked 100 expert meditators to rate the similarity among these techniques. This became the basis for developing a model for classifying meditation techniques according to *activation* and *amount of body orientation*. This was followed up by a study of what meditators do when they meditate. In this study Matko et al. (2021) attempted to create a comprehensive list of techniques derived from the initial 309. Following a systematic procedure based on, for example, combining similar techniques and removing vague ones, the initial 309 techniques were reduced to 50. The list of 50 techniques was presented to 635 expert meditators asking them whether they had experience with these techniques and whether any techniques should be added. The list was found to be adequately comprehensive, with only two further techniques ("sitting in silence" and "expressive practices" added to the list of 50) (Matko et al., 2021, p. 1797).

These classification systems have several shortcomings. One may ask whether the proposed definitions of meditation have been too wide, for example, if we include the aspects mentioned by Schmidt (2014b). An individual who regulates attention based on a specific motivation and attitude within a practical context may be performing progressive muscle relaxation, or other techniques that may not be strictly meditation because their primary aim is to relax rather than to heighten and cultivate awareness toward "awakening." In other contexts, the definition of mediation may be too narrow. For example, Lutz et al. (2015) only sought to classify *mindfulness* meditation and hence their model must be extended if it is to count as a universal system for classifying meditation. Furthermore, engagement with the traditional and contemporary meditation handbooks is limited, as evidenced by statements such as "all meditation techniques have a somatic component and meditation is inherently embodied" (Matko and Sedlmeier, 2019, p. 10). Such statements disregard meditation states that *are not necessarily embodied*, such as deep states of meditation, sometimes referred to as jhāna, in which there may only be pure light present, and the formless jhānas (Catherine, 2008; Snyder and Rasmussen, 2009; Yates et al., 2015). The engagement with meditation handbooks is important not only because it offers a better understanding of meditation practice, but also because such books contain descriptions of deep states (Reddy and Roy, 2018, 2019a,b, 2020). Although such states may be uncommon, they may nonetheless be significant as they represent potential realizations of the more advanced aims of meditation practice. In addition current systems of classification may not adequately differentiate between meditation techniques. For example, none of the previously proposed systems differentiate between meditation that may be practiced with eyes open, eyes closed, or different degrees of partially closed eyes. Previously proposed models also fail to specify fundamental changes of the meditative activity such as when the practice becomes non-intentional. Furthermore, they are limited in accounting for different postures (e.g., walking and sitting meditation, including different sitting postures). Finally, the classification systems are not able to account for differences in specific variations to techniques such as focusing on sensations in specific body regions, and they fail to account for how all possible variations of meditation techniques relate to an underlying principle of what meditation is. To summarize, the existing meditation classification systems: (1) either define meditation too widely or too narrowly; (2) fail to provide a way of classification that may adequately distinguish between techniques; and (3), most importantly, do not explain the connection between different aspects of meditation and the underlying principle of what meditation *is*. Advancing a scientific system of classification of meditation requires that we overcome these limitations.

These criticisms are, however, not intended to say that these previously proposed systems should be abandoned entirely. Rather, after having considered such criticisms, the different classification systems should be reviewed and synthesized, which may lead to a truly comprehensive account of different meditation techniques. Before that can take place, however, we suggest that including *phenomenological methods* is vital to understanding meditation. We argue that a phenomenological approach will provide an account of the relationship between what meditation *fundamentally* is, in addition to the different techniques that are related to it. We believe that the approach of developing classification systems that are empirically based through investigating the activities of meditators, as proposed by Matko et al. (2021), is consistent with our approach, even if preliminary.

If an effect is experienced during meditation, it is most likely associated with preceding or ongoing changes within consciousness, and the most central change that takes place when someone meditates is related to what activities they perform. However, a fundamental problem is that certain forms or techniques of meditation often, if not always, involve more than one activity. For example, Upton and Brent (2019) considered the technique of focusing attention on the sensations of the upper lip that is often encouraged in Buddhist meditation handbooks (the sensations include warmth, cold, pressure, tingling, etc.). They identified six different mental activities: (1) introducing and (2) maintaining focus, (3) background awareness, (4) noticing and (5) shifting attention when thoughts appear, and (6) removing mental content (Upton and Brent, 2019). Further adding complexity is that meditative activities may run in parallel. Consider the following descriptions of three meditation techniques from Matko et al. (2021):

1. Being mindful of the rise and fall of the abdomen while breathing.
2. Focusing on the pauses between inhalation and exhalation, carefully observing what happens.
3. Labeling mental experiences with words that describe these experiences.

Rather than being techniques that necessarily exclude each other, each of these meditations can be performed in parallel, and such combinations are even recommended in influential meditation manuals (Yates et al., 2015; Sayadaw, 2016). Variations among techniques may indeed be essential to ensure progress at specific stages of practice (Yates et al., 2015; Sayadaw, 2016; Reddy and Roy, 2019b).

Two important points can be made from these observations. First, given that the proposed meditation techniques do not exclude each other, how can they be called *different* techniques? According to traditional ways of creating taxonomies two species must be differentiated in a way so that they logically exclude each other (see section "Classical, Contemporary, and Holistic Systems of Classification" below). Second, if the practitioner is meditating according to either of these techniques, attention will eventually drift away from the meditation object or the meditator will inadvertently discontinue the meditation task (for instance as thoughts appear). At that point, the practitioner could either react as quickly and energetically as possible and return to the meditation object of focus, or one could relax inwardly, practice non-judgment, and return to the object slowly. These additional activities are clearly part of the meditation process itself and examples of opposite approaches of engaging with attention (i.e., increasing vigilance forcefully or reducing stress to the system while supporting mindfulness). Such differences in approach are highly likely to influence the effects, *or lack thereof*, that meditation has. Said another way, there needs to be a systematic method to clearly defining meditation techniques in a manner that they are adequately differentiated from one another. All activities involved in a technique need to be specified.

THE WAY FORWARD

In section "The Shortcomings of Current Classification Systems of Meditation" we highlighted the level of analysis that we believe meditation research requires in order to develop an accurate and comprehensive classification of meditation. In our view, meditation research has yet to uncover what characterizes meditation practice as such, especially the specific elements that constitute different meditation techniques. Several studies have already shown that there are several micro-gestures, that is, quick, prereflexive mental acts, involved in meditation, and the acts people perform during meditation, for example, when they begin and cease to mind-wander, may be different (Petitmengin et al., 2017; Przyrembel and Singer, 2018; Sparby, 2019c). To ensure the validity of meditation research, it is vital not only that the names of meditation techniques are agree upon, but also that the *actual activities* performed are identified. Otherwise, investigators risk either conflating techniques or failing to recognize that they are related: One may think that two individuals are performing the same technique, while, on the level or activity, they are doing something quite different. Or two individuals who label their techniques differently may rather be performing the same, or similar, activities. Furthermore, the mechanisms underlying why some practitioners experience beneficial effects from meditation, while others do not, could be related to performing, or failing to perform, several different activates and micro-gestures that are vital for specific beneficial effects to occur.

One approach to creating an initial overview of the potential types of meditations is to analyze meditation instructions. These can come from both traditional sources (Kunga Tenzin, 2014) and contemporary descriptions of meditation practice, such as normative descriptions given by teachers or expert practitioners, guided meditations, and practice reports. We have attempted such a basic classification of the description of the 50 different kinds of meditation that were identified and described in the comprehensive list created by Matko et al. (2021). A basic challenge is to specify exactly which activities can be meaningfully combined to constitute a single category. Furthermore, as already noted in section "The Shortcomings of Current Classification Systems of Meditation," several different activities can be identified and each of these activities can be combined not only with several different meditation objects or domains of experience, but the activities themselves may also be combined. The number of meditation objects can, in principle, be extended infinitely. While the actual meditation object may be considered trivial or less important, traditional literature does indeed consider different meditation objects to have different effects (Bryant, 2009; Buddhaghosa, 2010). For example, discerning the properties of different body parts may lead to heightened concentration, but it cannot lead to deep states of absorption such as jhāna, which rather requires other objects such as the breath (Catherine, 2011, p. 197).

However, it is not only necessary to analyze the different activities involved in meditation. We must also expand the investigation to include the *context* of meditation, that is, the level of the human lifeworld, traditional frameworks, and philosophical principles. First, to fully understand a human activity one needs to understand the context of the given activity. Imagine two individuals fully immersed in allocating attention toward an object. In this scenario both individuals are focusing attention with the intent of achieving a specific goal, i.e., they are not simply immersed in an experience (like when watching a move). It might seem that both are performing meditative activities. However, as it turns out, one individual is aiming a rifle at an animal with the intent of making a kill, while the other is watching their breath with the intent of increasing concentration toward understanding reality more deeply.

Clearly, the context of the activity plays an important role in defining the activity. Although the activity of attending to an object may be similar, what one (ultimately) *intends* to achieve by closely attending to experience cannot be fully separated from the activity itself, as indicated in the introduction in relation to Aristotle and pointed out in related contexts by other researchers (Dahlberg, 2006; Holton, 2009; Noë, 2012). Furthermore, to understand an activity more completely, one needs to understand other aspects of the context as well. For example, in relation to the above scenario, understanding what an animal is, and a rifle or reality and truth. Indeed, meditation can involve the deepest ontological and metaphysical questions human beings ask: What is the nature of being? What are the principles that rule phenomena? What is the self? For example, some meditations involve investigating the essence of the mind, asking whether it is existent or non-existent. Other meditations involve investigating

the essence of external phenomena, for example, aiming to realize that the mind and the world are not separate.

Whether or not the ultimate aim, or aims, of meditation are realizable is not a question that needs to be answered for developing a classification system. However, to fully understand an activity, its aims still need to be considered. For example, understanding that pressing a big red button will initiate an atomic war is essential to understanding what pressing that button actually consists of. It could be said that someone is not guilty of starting an atomic war if they did not know what pressing this button leads to, but that does not mean that pressing the button does not mean starting an atomic war. Similarly, someone performing a body scan meditation during a Mindfulness-Based Stress Reduction (MBSR) course may come to realize the non-existence of the self, the impermanence of all phenomena, and/or that suffering is all-pervasive, as such realizations are among the ultimate aims of such techniques (Anālayo, 2018, 2020). Although one may be unaware of the potential of the realizations that may occur when performing such a technique, it does not mean that the given activity (e.g., body scan meditation) does not lead to particular outcomes (e.g., insight into the nature of experience). It might be the case that a given activity requires multiple components. For example, a body scan meditation may involve at least two activities if it is to lead to realizations: observing sensations and becoming aware of how they are impermanent, not the self, and unsatisfactory. Such questions may be regarded as open research questions. The self, impermanence, and suffering are notions that hardly can be considered fully without understanding each of them within the context of the human lifeworld, that is, the world of given everyday experience.

However, although context is necessary for understanding an activity, some separation between the activity and the context is still possible. If meditation required already fully knowing the essence of the mind, external phenomena, etc., then we would *not need* meditation. When we compare two activities like meditative focus and aiming a rifle, there may very well be similarities, for example, on a physiological level. The way forward for a classification system of meditation consists of both understanding the activity *and* context of meditation. Still, as noted, an activity and its context may be treated in some isolation from each other. The performance of an activity has a phenomenological dimension beyond what it aims at. Clarifying the context of meditation involves deep and extensive reflection on topics such as "awakening" or other meditation endpoints. Here we will mostly limit ourselves to classifying the activities involved, well aware that a deep dive into such topics will be necessary to gain a comprehensive understanding of the involved activities.

CLASSICAL, CONTEMPORARY, AND HOLISTIC SYSTEMS OF CLASSIFICATION

One can distinguish between classical, contemporary, and holistic systems of classifying meditation. A classical classification system orders *genera* and *species* according to common and differentiating properties or markers. Defining something, according to Aristotle, consists of stating the proximate genera and the species of something (*genus proximum et differentia specifica*). A common marker of a genus must be found in all the species, while the differentiating markers can only be found in the species. A marker that differentiates a species can be said of that species and must be denied of the other species. This means that the species are contradictory with regards to their differentiating markers. Such a method of classification has remained influential and is used in the classification of animals. For example, the definition of the domestic dog by Linnaeus is *canis familiaris*, where *canis* is the genus, and *familiaris* the species. According to Linnaeus, the common marker of *canis* is having 42 teeth (common to both wolfs, *canis lupus*, and dogs). The differentiating marker for the domestic dog is the *cauda recurvata*, the upward turning tail. This means that you cannot predicate the differentiating marker (upturning tail) of a wolf without contradiction. While there may be other features that distinguish between a wolf and a dog, classic systems of classification require that one specific feature is selected. Genera/Species-based classification systems will result in a branching tree structure sometimes referred to as a Porphyrian tree. These kinds of classification systems have the advantage that they are simple and clear. The primary problem with such systems is often that nature is not so simple and clear as the classification system requires. For instance, there is ongoing debate regarding whether a dingo belongs to its own species or rather to *canis familiaris* (Smith, 2015) – and how should one define a wolfdog, a mix between a wolf and a domestic dog? Additionally, common markers may appear to be arbitrary – what is the necessary connection between the inner or essential nature of an animal and the number of its teeth?

For entities that are simpler than living creatures, such as geometrical figures, classification is easier. This is because the nature of the geometrical figure is fully explicated in its definition. However, when it comes to psychological phenomena, such as psychopathologies, the task of classification is considerably more difficult. According to the DSM, psychopathologies are classified according to a set of characteristics (American Psychiatric Association, 2013). If a person exhibits a number of those characteristics, sometimes over a set period of time, they may be diagnosed (classified) as having a certain psychopathology. This *contemporary* approach affords balance between the need to identify psychopathology (which may be important for choosing treatment and coordinating research endeavors) and recognizing that there is some degree of arbitrariness within the classification system (which is updated from time to time based on ongoing research, critique, and dialogue).

Both holistic and non-holistic systems may consist of wholes and parts. However, in *holistic* systems, not only are the parts contained in the whole, the whole is contained in the parts (Bortoft, 2013). Such holistic systems may seem contradictory. If a whole is contained in the parts and the parts are contained in the whole, then the whole is contained in itself. This may seem impossible. If something is to contain itself, it needs to be both separate from, while also part of, itself. A cup can

contain water, but a cup cannot contain itself. However, certain things, like self-consciousness and the concept of a concept, are characterized exactly by exhibiting self-containing relationships: in self-consciousness, that which one is aware of is that which is aware. If we take "aware of" to mean "contain" – and why should we not? If I am aware of a cup, the cup is within my consciousness – then it is certainly possible for something to contain itself. Though some will deny that a subject can be made into an object, the experience of self-consciousness or self-awareness shows that it is possible. This is an example of a dialectical relationship between subject and object (someone being conscious of something) ending in a unity of opposites (self-consciousness). Furthermore, as noted above, in classical systems, the *differentia* cannot be contained in the genus, otherwise, one would also get entangled in a contradiction. *Canis*, the genus, cannot have both upward and downward pointing tails but need to be indeterminate in relation to this. This means that genera are more abstract (indeterminate) than their species. However, as Hegel (1834) has shown, basic concepts, such as "becoming," contain the species "being" and "nothing" within itself in the shape of "coming-to-be" and "ceasing-to-be." In contrast to classical systems, as the wholes (the genera) of holistic systems contain the differentiated markers in them, they are more concrete (determinate) than their species (Sparby, 2014). As a result, in holistic systems: (1) all parts can be derived from the whole; (2) the whole can be derived from all the parts; and (3) all parts can be derived from all parts. In this way, holistic systems are thoroughly unified.

The classification system for meditative activities outlined below in section "Overview of an Activity-Based Phenomenological Classification System" will draw on all of these approaches to classification: from the classical system the ideal of clarity and simplicity are adopted. We develop from the contemporary approach the recognition that empirical phenomena may to a certain extent be arbitrary, and that a classification system needs input from many different, and continually evolving, scientific disciplines. From holistic systems of classification we integrate the idea of dialectical relationships and that wholes may consist of opposites. For clarity and simplicity, we will suggest a branching tree structure that is emblematic of classical systems. For empirical basis and input from other disciplines, we will suggest a neuroscientifically informed approach and defining specific techniques according to the emphasis of the practice. For the definition of overarching meditation techniques, and to create a unified account of complex meditative activities, we will draw on the principles of holistic systematicity.

CHALLENGES FOR DEFINING MEDITATION

Before we attempt to classify different meditation techniques, it is necessary to identify what is common to all meditation techniques. The aim of identifying the overarching genus is an aim shared by all the classification systems mentioned above – without such identification, classification is not possible. If we consider several recent publications within the field of meditation research, we can start to articulate the confusion that surrounds the definition of meditation. Many investigators state that they study meditation only involving a specific techniques, such as FA (Dasanayaka et al., 2021; Zhang et al., 2021). In other studies different forms of meditation have been lumped together without any justification of the implicit claim that they have something essential in common (Haider et al., 2021; Sumantry and Stewart, 2021). Though there is general agreement that meditation involves many different techniques, attempts have rarely been made to clearly identify common and differentiating markers. Furthermore, there may be some techniques that are not meditative, though they may be similar to those that are. Examples of such techniques include hypnosis, and some forms of intentional visualization and breathing. Making a distinction between meditative and non-meditative techniques presupposes a clear definition of meditation. However, finding a single, clear and comprehensive definition is difficult. This can be illustrated in relation to this attempt at providing a definition of meditation:

> Meditation is defined as a mind and body practice focused on interactions between the brain, mind, body, and behavior, containing four key elements: a quiet location with little distractions, a comfortable posture, a focus of attention, and an open attitude. Meditation is often used for its various health benefits, specifically the alleviation of certain mental states, such as loneliness (Saini et al., 2021).

While it seems correct to say that meditation may be a practice focused on interactions between the brain, mind, body, and behavior, this in itself is overly broad: every skilled practice, even eating a meal, or just about anything that a human being does, would be covered by such a definition. Hence, the "key elements" must be essential to the definition. However, a quiet location is not necessary for meditation. In fact, chaotic and loud places can provide the right challenge for deepening practice (Rinpoche and Graboski, 2012). While it may be more difficult to do, for instance, FA meditation under such circumstances, it is not impossible. Furthermore, practicing in a place with distractions may even be recommendable in some cases, such as when one wants to increase required effort. Similarly, though a comfortable posture may work for some, it is neither essential nor recommendable in all cases. Rather, an uncomfortable position may for example represent an opportunity for the practitioner learning about their patterns of reactivity (Didonna, 2020). Furthermore, focusing attention is only representative of certain forms of meditation. Other forms of meditation (such as non-directive meditation or OM) do not involve focusing the mind as such (at least not on something specific, which is what "focus" implies). Having an open attitude may also be essential for certain forms of meditation, but other forms, such as the four immeasurables (loving-kindness, compassion, empathetic joy, and equanimity), concentrate on cultivating specific attitudes (Wallace and Houshmand, 2010). And while it is true that meditation is currently often employed for health benefits, there is usually no mention of what meditation has been traditionally used for. To our knowledge contemplative traditions

generally emphasize the training of meditation toward certain endpoints such as "liberation," "enlightenment," or "awakening" (Rose, 2016).

Faced with such challenges, it may be tempting to give up on defining meditation in such a manner that would encompass all techniques. Alternatively, one may revert to the stance that meditation is a set of techniques that only have a family resemblance, that is, that they may share features without there being any essence to meditation (Wittgenstein, 1953). Though this might be a valid approach, reverting to a classification system based on family resemblance may fail to discover and identify the basic commonalities, and there are models that provide options beyond family resemblance. Ospina et al. attempted to define meditation using a Delphi process involving seven meditation research experts (Ospina et al., 2007). That is, the experts went through several rounds of dialogue, revising and rating a list of criteria for meditation. Three essential criteria were identified: (1) a defined technique; (2) logic relaxation; and (3) a self-induced state/mode. However, there are several problems with this definition. As Schmidt (2014a) pointed out, these criteria are fulfilled "if somebody plays the guitar in a relaxed mood" (p. 140). Furthermore, there are meditations that *do* involve logical thinking, such as Descartes's *Meditations*, Zen Koans, and Tibetan style *vipassana* practices. This issue highlights that the second criterion needs to be removed or modified, which would make Ospina et al.'s (2007) criteria for meditation even broader.

However, Ospina et al. (2007) also include mystical experiences, enlightenment, and a religious, spiritual, or philosophical context as an important though not essential criteria of mediation. Considering that meditation traditionally was conceived within such contexts, and aimed at awakening, it is vital that we find clarity regarding this issue – is the context essential or not? Can meditation still be meditation if it is aiming at relaxation? Kabat-Zinn (2018) has claimed that relaxation is not the aim of meditation – non-relaxed sensations connected to frustration and anxiety can be fruitful objects of meditation and not signs that our meditation has failed. Intuitively, it should be clear that an individual maintaining a meditation posture cannot be relaxing completely. But does this mean that the way meditation is typically conceived within contemporary research and within culture at large, as a practice leading to health benefits, is not meditation? Can a technique be detached from its original aim and arbitrarily connected to other aims?

In contemporary meditation handbooks written by spiritual teachers, we find different definitions, or at least characterizations, of meditation that may avoid the problem of bracketing the traditional aims of meditation. For example, Brahm (2014) describes the essence of meditation as follows: "In all types of mysticism and in many spiritual traditions, meditation is the path to a pure and empowered mind" (p. 1). Or, as Catherine (2008) has stated: "Meditation is designed to solve a specific problem: attachment." (p. 66). Here we see meditation defined according to its aim(s). For Wallace (2006): "Meditation is a balancing act between attention and relaxation." (p. 32). Here meditation is defined as an act that balances other mental acts or occurrences. Yates et al. (2015) have defined meditation as "the *art* of fully conscious living" (p. xv).

However, some have denied that meditation is an activity, or at least a *goal*-directed activity. For example, it has been claimed that meditation is "not a technique, but a way of being" (Kabat-Zinn, 2018), or, similarly, that "meditation is not an activity conducted while sitting on the pillow but a way of being, a way of living with complete awareness." (Brown, 2006, p. xxi). Furthermore, meditation may be understood as "*the* way of letting go" (Brahm, 2014, p. 1). Is it possible to actively let go? How can something be achieved, for instance, a certain meditation state, by letting go? Is meditation about actively "training attention and awareness to bring mental processes under greater voluntary control" (Walsh and Shapiro, 2006, p. 228) or "a natural process of coming to rest, [that] requires you to get out of the way completely [. . .] to the point that the process becomes inaccessible to the doer." (Brahm, 2014, p. 23)? As we see, some scholars and meditation teachers emphasize that meditation involves activities with specific goals in mind, while others reject this notion and do not emphasize *techniques*.

It is clear that defining meditation is indeed challenging when considering all of the various existing characterizations of meditation and their apparent differences. Given the different, and sometimes contradictory, conceptualizations of meditation it may seem that it is impossible to develop a coherent account of what meditation is. Summarizing the above, we highlight here a set of questions, or challenges, that a theory of meditation must overcome in order to answer what meditation fundamentally is:

1. Is it possible to define meditation, or is meditation rather a family of techniques with no identifiable common marker or set of markers?
2. How do we ensure that the definition of meditation is concise and does not include activities that appears to have little to do with meditation?
3. How do we include in this definition the practices that have been traditionally described as meditation?
4. How can we define meditation such that modern research on meditation-related health and other (cognitive, social, etc.) effects can still be included?
5. Is meditation a goal-oriented activity that results in more control of the mind, or rather is meditation concerned with practices of letting go of control and effort?
6. Is meditation a technique or rather a way of being?

Here we can answer these questions tentatively, and the rest of this article will deepen those answers in the manner indicated:

(1) We suggest that although there are different forms of meditation, they have an identifiable common essence. This essence consists of certain common features related to the activity of meditation (see section "An Integrated Model") as well as a single underlying activity that unifies the more specific features (see section "Overview of an Activity-Based Phenomenological Classification System").

(2) We can ensure a concise and not overly inclusive definition of meditation by considering the intentionality or the purpose of the practice and its relation to context. While playing an instrument may be similar to certain meditative activities, when it is not done with the purpose

of developing, for example, specific skills or traits that ultimately relate to a process of awakening, it is not meditation. However, playing an instrument can be done meditatively. We can differentiate meditative and non-meditative musical performance by considering the mental activities involved and their purpose. For example, one could listen to the disappearing of the sounds with the intention of coming to know the more subtle aspects of reality, the great silence or "supreme word," paravāc (Padoux, 1992, p. 78).

(3) To ensure that practices that have traditionally been referred to as meditation are included in our definition, it is important to include the *spiritual* perspective, and to consider many different forms of practice from different traditions. This is not an endeavor that will necessarily have to be finished before a definition can be established. There are many texts that need to be considered, and new texts may be found, new traditions may be established or discovered, and the definition of tradition may also change and be expanded. A sign of a useful and generative definition of meditation is its ability to encompass the various technique described in traditional texts. If the definition is not able to do this, it may have to be adjusted.

(4) Meditation can be defined in a manner that includes research on its health benefits by considering the meditative activities both in relation to, and separate from, their spiritual context. Consider the activity of pilgrimage. Pilgrimage may include the activity of walking. Walking has health benefits. Pilgrimage may include experiencing meaningfulness, which may also benefit mental health (Vos, 2016). This does not mean that gaining health benefits by walking while experiencing meaningfulness captures the significance of pilgrimage. In fact, the related health benefits may be seen as secondary or irrelevant, at least for the person participating in the pilgrimage. However, once pilgrimage is undertaken solely for the sake of health benefits, it may be questioned whether it is in fact an authentic pilgrimage. The experienced meaningfulness may be reduced, and the motivation to partake on pilgrimage may lessen. Still, there may be health benefits connected to the physical activity of walking. Similarly, although the activities involved in meditation may have inherent health benefits, meditation cannot be reduced to these effects. The health effects themselves may have to be considered in light of the context, that is, whether it is spiritual or not. Beyond this, it should be obvious that in the same way that the activity of walking within the context of pilgrimage cannot be fully understood without understanding the spiritual aim and context of pilgrimage, so too meditation cannot be understood without considering it within such a context.[1] Similarly, effects of meditation may be mediated by one's motivation. For example, an altruistic motivation may be essential for outcomes related to prosociality (Reddy and Roy, 2019a, 2020). While differences in physical relaxation responses to breath focus meditation may not be significantly impacted by one's motivation, adherence to practice, emotional responses, and life-impact may very well be. Indeed, motivation may be an important factor when explaining observed limited effects of meditation on prosociality (Kreplin et al., 2018).

(5) and (6) It should be clear that mediation is in some regard a practice, as it lead to certain basic, measurable training effects, such that attention becoming more stable over time (Sumantry and Stewart, 2021). Furthermore, working with intention in different ways (Yates et al., 2015; Sparby, 2019c), and practicing extreme forms of intention realization [such as exiting deep specific jhānas after three hours of absorption without looking at the time (Snyder and Rasmussen, 2009)], is part of traditional meditation practice. When meditation is practiced with a specific health benefit in mind, it is also an example of practicing as a technique with an intention or goal. Furthermore, meditation is motivated in a variety of different ways (e.g., stress-reduction, self-knowledge, and service; Sparby and Ott, 2018), which suggests that for many practitioners it is goal-directed. However, it is also clear that meditation is not always a practice that requires effort. Strong effort may even be detrimental either to achieving the goals or to the practice itself (Yates et al., 2015). One potential issue with effort is that this intention may turn into striving, which is thought to agitate the mind and may therefore counteract effects of meditation. As practice deepens, the meditative activity becomes effortless (Yates et al., 2015; Sparby, 2019c). This does not mean that some balancing of effort and non-effort is no longer required, but rather that the meditative activity has become easier and to some extent self-maintaining, representing a kind of "flow" state.[2] As meditative expertise develops, the practitioner may experience what is sometimes referred to as non-meditation (Kunga Tenzin, 2014). This is when practitioners "go beyond" acting in one way or another, and meditation rather becomes a continual way of being. This may be understood as activities that had previously required some effort, or subtle activity, to maintain have become habitual or spontaneous.

To define meditation, we believe that it is necessary to combine each of the above elements. Meditation can be defined based on the kind of intentional activities it involves. These activities involve certain mechanisms and effects, and the activities may

[1]However, there may be a stronger connection between the mental activities of meditation and their spiritual (awakening) effects than walking and the potential spiritual effects of a pilgrimage.

[2]There is an open question as to what extent *flow* and mindfulness or meta-awareness, in the sense of being conscious of what is going on in the present moment, exclude one another. One prior study has maintained that this is indeed the case, that is, that these processes exclude one another (Sheldon et al., 2015). However, while mindfulness/meta-awareness may potentially disturb certain flow experiences, maintaining continual introspective awareness is both recommended for entering deeper states of meditation such as jhāna and has been reported as part of the experience of such flow states (Yates et al., 2015; Sparby, 2019c). Thus, future research should endeavor to further disentangle interactions among flow and meditation.

become effortless and habitual. Although it may be practiced within secular frameworks, ultimately it has to be understood within a spiritual framework. We may represent this definition visually as in **Figure 1**, which depicts the central aspects of meditation as developed here. This figure is further explained in section "An Integrated Model." However, as indicated earlier, the essence of meditation is based in the activities performed, which are treated in detail in section "Overview of an Activity-Based Phenomenological Classification System ."

AN INTEGRATED MODEL

Figure 1 provides an overview of different aspects that are central to meditation as an activity. The primary differentiation depicted in this figure is between the context of the activity and the activity itself. The context concerns everything related to understanding what the meditative activity is *about*, while the activity concerns what is *performed*. The activity can be the same while the context changes. For instance, the activities performed within a meditation session undertaken with the understanding that the practices lead to health benefits do not have to be different from a meditation session done by a more "spiritually" oriented practitioner. We may define spiritual context as that which includes reference to transcendence, the divine, and/or awakening; within a secular context, such aspects of meditation practice are bracketed or denied. In relation to meditation, a spiritual context might include some, but not necessarily all of the following: ideas as awakening (Komarovski, 2015), the dissolution of ego (Lindahl and Britton, 2019), the unification of self with the ultimate being or good (Bryant, 2009; Chlup, 2012), dissolution of fixed concepts and/or the appearance of ineffable concepts or unities of opposites (Sparby, 2015), perceptions of true reality (Sparby, 2019a), the end of suffering (Bodhi, 2000), exalted emotions such as bliss and devotion (Sparby, 2019b), subtle energies (Lindahl, 2017), and the cessation of the cycle of reincarnation or the overcoming of death (Lott et al., 2021). Insofar as a secular context is *not* seen to deny spiritual contexts, they may be seen as complementary. For example, meditation may be understood as including relaxation (see the included Alan Wallace quote cited previously in section "Challenges for Defining Meditation"). Within a secular context, "relaxation" may be understood as a release of muscle tension, a drop in blood pressure, and so on, that is, as something that potentially alleviates negative stress responses and can lead to increased health outcomes. Within a spiritual context, relaxation may be understood as a loosening of habitual, fixed notions that may block the perception of a reality beyond human, cognitive construction. Physiological relaxation responses may be understood in this way as an external appearance of the loosening of a contracted mind and thus complement, rather than contradict, a spiritual perspective.

Between the context and the meditation practice itself is intention or motivation (Sparby and Ott, 2018; Reddy and Roy, 2019a; Sedlmeier and Theumer, 2020). Incorporating intention into the model is vital for distinguishing meditative activities from other non-meditative activities. Meditative focusing, for example, is distinct from unintentional focusing. Meditative focusing includes the intention of remaining focused on the meditation object, and self-correcting when this focus shifts from this object (Latham, 2015). Additionally, intention can be understood in a narrow and broad sense. Intention in a narrow sense refers to what the individual intends to do through the activity (one may intend to focus). In a broader sense, intention concerns the effects that the individual desires. The narrow and broad senses of intention do not exclude each other, but rather the narrow sense is a condition for considering an activity as meditation, at least until the activity becomes effortless. That is, if the intention is not included in the definition, we cannot distinguish meditation from other activities that involve focus on an object, for example, aiming a bow rifle. A meditative activity undertaken without a specific goal is less determinate compared to cases in which the goal is clear. Motivation may be the same as the latter, broad form of intention. Motivation also carries the meaning of having a "motive force," that is, something that *pulls* or *pushes* the individual toward an aim, for example through inspiration. Any potential effect of meditation, its broader aim, can function as a motivator. It is the meditative activity that is the initial starting point for realizing potential specific effects. Activities and effects acquire full meaning for human life within a specific context. Although the physical activity of walking may the same in different contexts, to human beings it makes a difference whether one is walking to get groceries, going for a leisurely stroll, or is forced to march faster to arrive at a battle in time. The motivation to, or intention for, practice lies between and connects the context and the practice itself. The context may contain a kind of blueprint, a scheme, or an idea of which activities are connected to which effects and why the practice itself is something worthwhile to perform. This blueprint provides a foundation for the development of motivation, which may then drive the practice. The practice is primarily a matter of will, while the context concerns thinking. The motivation contains both will and thinking, as there is an idea that acts as a driver, but also a felt sense of power or conviction (which may vary in strength).

As indicated in **Figure 1**, the meditation practice itself mainly consists of activity and effect. These effects are mediated by mechanisms and the way an activity unfolds an effect may be categorized into stages. There are two additional important aspects depicted in **Figure 1**: the notion of effort, and the relationship between formal and informal practice. An activity is usually something that requires at least some degree of effort. Some activities, however, are, or become, effortless. For example, riding a bicycle may be quite difficult for someone just learning to ride. Then, once the individual has gained experience riding a bicycle, it becomes much less effortful. At some point riding a bicycle may even become more or less effortless. Effortless may indeed come in degrees; mounting a bicycle and maneuvering its pedals may require some effort, but once one has gained momentum bicycling is more a matter of relaxing and letting the body do what it already knows how to do, that is, maintaining balance through small, unconscious movements (Sparby, 2019c). For a professional bicyclist, riding a bicycle may become a way of being a matter of one's being in the world. Everything, including one's daily schedule, most conversations, and food intake, may

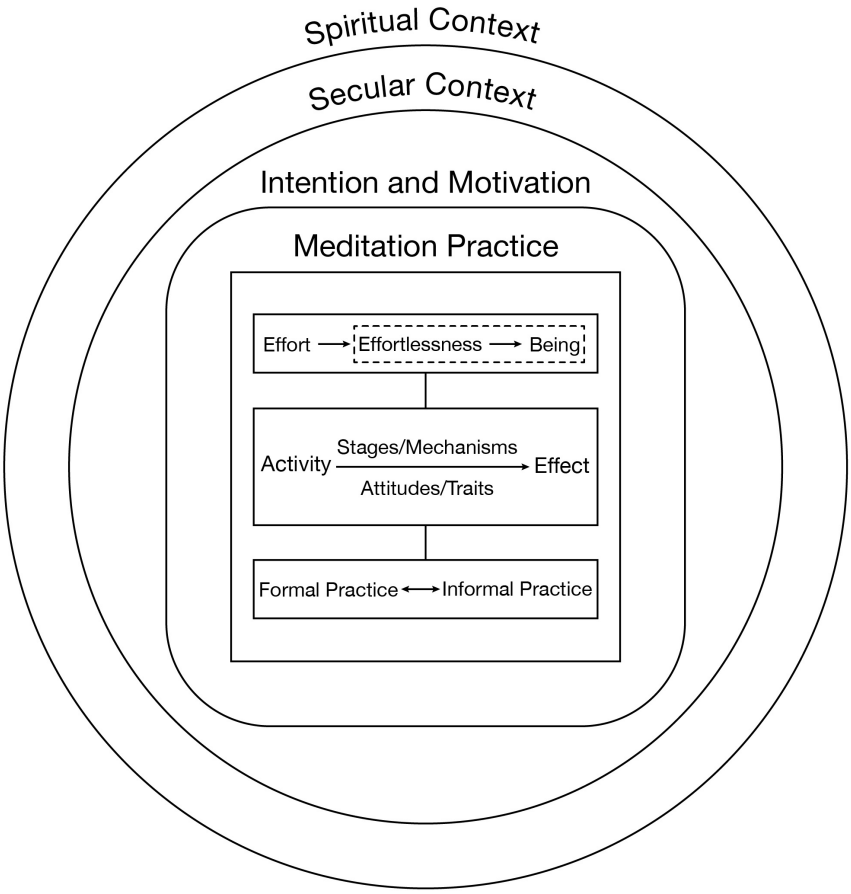

FIGURE 1 | Central aspects of meditation. The figure depicts the main aspects of meditation practice. The rectangular boxes represent aspects of meditation related to the concrete meditative activity while the circles represent the context within which the meditative activity is understood. The rectangular box with curved lines represents the intention and motivation aspect of meditative practice, which connect activity and context. The box with the dotted lines represents a transformation of effort wherein the meditative activity becomes natural and new states of consciousness arise. Further aspects of the figure are explained in the main text.

be related to the activity of riding a bicycle. In this example, riding a bicycle has undergone a general development from effort, to effortlessness, to being. It is worth noting that effort may again be required during, for instance, competitions, hence, the developmental pattern is "general." A similar developmental process can be understood in the context of meditation practice. In the early stages of meditative practice – both within a single session and also as one begins a meditation practice for the first time – meditation requires effort. The practitioner must do the activity, become mentally alert, and conduct the task at hand (including releasing any specific activities when doing forms of "non-meditation" or effortless meditation). As one becomes more proficient in meditation, or as the mind habituates to the meditative activities, these practices may become effortless. For example, the meditator's mind may stay more focused on the object of meditation. When the mind begins to stray, a correction back to the object of meditation may occur spontaneously. As meditative practice deepens, and especially as it starts to seep into daily life, it can become a way of being. The meditator's thoughts and perceptions, and their interactions, lifestyle, and so on, may all become influenced by, or merge with, the meditative activity.

Meditative activities that have become effortless, habitual, or a way of being may be the key to gaining a better conceptual understanding of deep meditative states. This notion is indicated in **Figure 1** by a dotted line around effortlessness and being. With effortlessness and being intentionality changes, that is, in "being" an activity is no longer something that necessarily contains an aim that one intends to realize. Rather, the activity and the aim have become one. For example, in a state of deep concentration (e.g., *samādhi* or *jhāna*) the practitioner does not need to focus because they *are* focus, meaning that the activity of focus is continual and self-correction is no longer needed (Snyder and Rasmussen, 2009). Similarly, in an "awakened state," fixed conceptions are either continually (habitually, effortlessly, and naturally) dropped or are completely released, though this is more a matter of the informal aspect of practice, which we turn to now.

A typical image of a meditator is of an individual sitting on a pillow. No external movement is observed, while inwardly the individual remains active. After a set period a gong signals the end of the meditation session. This is what formal practice may look like. Formal practice is limited to a time, place, specific forms of

embodiment such as sitting, lying, or walking, and one or more forms of meditation. However, the activities performed during a formal session may also be undertaken in daily life. The formal session may prepare, and perhaps condition, the practitioner for performing such activities after the formal meditation has ended. As informal practice is deepened, formal practice is likely to deepen as well. This is because the transition into formal meditation may become less effortful and quicker. Informal practice may also become effortless, or a way of being. As this transition occurs it may give rise to the development of *traits*, or "awakening." We define a meditative trait as: a habituated disposition to perform meditative activities. Meditative attitudes (e.g., acceptance, being non-judgmental, openness, etc.) may be defined in a similar manner: they consist of a set of activities that are either practiced or have become habituated (at which time they may be regarded as traits).

Secular and spiritual contexts also uniquely interact with both the motivation to meditate, and how effects are understood. For an individual who meditates strictly according to a secular practice perspective, once health benefits or the intended regulation (such as stress reduction or relaxation) is achieved, motivation may diminish. An individual who meditates with a spiritual practice perspective may experience certain effects during meditation, such as the appearance of light or the disappearance of bodily sensations, in meditation (Yates et al., 2015). They may interpret these experiences as indicators to switch the meditation object to either of those experiences in order to deepen practice. Alternatively, an individual mediating based on a secular perspective may understand such phenomena as (perhaps pleasant but also potentially distressing) side effects. Hence, although the meditative activity can be performed independently of an interpretative context, its full meaning arises within such a context, and the meaning itself may strongly impact the practice.

OVERVIEW OF AN ACTIVITY-BASED PHENOMENOLOGICAL CLASSIFICATION SYSTEM

The term "phenomenology" is currently used to designate different disciplines. Lundh has – in our view correctly – distinguished between three forms of phenomenology:

(1) theoretical phenomenology, which aims for an understanding of the nature of human subjectivity and tries to delineate basic dimensions of human subjectivity.
(2) Descriptive phenomenology, which uses methods for the description and analysis of people's actual experiences.
(3) Experimental phenomenology, which aims to study the experiential effects of various phenomenological practices, and to develop phenomenological practice that can have a beneficial influence on people's experienced life quality (Lundh, 2020, p. 494).

According to this classification, our phenomenological approach described in the subsequent text is theoretical, which has a Husserlian background. However, our approach includes indirect input from experientially based descriptions of meditation (as a way of informing eidetic variation), as indicated below.

Theoretical phenomenology starts with performing the epoché, or the bracketing of one's natural attitude toward the world. This process includes bracketing all explicit or implicit theories and ideas that one has about the world. In the context of the classification of meditation, one needs to set aside the usual or preconceived conceptions one might have about meditation, including what one practice consists of and aims toward, what meditation is or should be like, etc. Then a phenomenological reduction is performed where the investigator turns to phenomena as they are. In this case this is the activity of meditation. While in principle any meditation may be investigated, to uncover the essence (or possibly essences) of meditation, eidetic variation is necessary. How and how much can we vary the activity of meditation before it stops being meditation? Such a variation may uncover different forms of meditation. However, we need to find a minimal commonality if we are to understand meditation as one essence, rather than a collection of techniques without an inner connection or as a family of techniques with an inner connection that is conceptually inexplicable. Since the imagination of one person can be limited, it can be beneficial to make use of further sources of variation than what one can come up with alone. For the present analysis, we start with the set of 50 techniques described by Matko et al. (2021). We considered all 50 techniques and identified a few basic components, a set of activities and their potential objects. We present these components below. We unified these components within one fundamental essence, that is, the essence of the activity of meditation. This analysis is also not necessarily finished. Regardless, we believe that this system still provides a valuable suggestion and starting point for further investigations, and toward the overall project of comprehensively and definitively classifying meditation techniques.

The typical meditation techniques described by Matko et al. (2021), often involve many different activities. In the following our analysis concerns identifying the basic activities that are involved in specific meditation techniques. And later we will group different combinations into classic or well-known techniques. For instructions and examples of how these activities can be used to analyze and define meditation techniques, see **Supplementary File 2**. Specific meditation techniques can be divided into activities and the objects of those activities, as presented in **Figure 2**.[3] Typical objects of meditation include aspects of the breath, the abdomen, other parts of the body, or the whole body, thoughts, feelings, bodily sensations, light, and so on. Meditation objects can also be combinations of one or more of these experiential dimensions, for example, as various impressions of a deity during deity yoga (Eddy, 2019). The list of meditation objects is potentially infinite. **Figure 2**

[3]Note that perhaps apart from *move*, the activities may be regarded as mental activities. "Move" is physical when the physical body is moved, but not when one tries to move "energies" or "sensations" around in the body. Arguably, all activities of an agent are mental in origin. When moving the physical body, the correct analysis is that it is a mental activity directed at the physical body. Sidestepping this issue, one may refer to the activities involved as "awareness activities."

only indicates several typical objects, or subordinate domains of objects, that corresponding to several of the senses. This list can clearly be expanded to include additional domains. This is indicated by the dotted line extending from the line connecting the included objects of meditation. Furthermore, each meditation object category may be expanded to include many additional different sub-categories of objects.

Considering typical meditation techniques, we find that some techniques involve *moving* the physical body (walking, dancing, mudras, etc.), maintaining a position, or vocalizing sounds (singing, repeating a mantra). Other meditative activities involve *imagining* something (visualizing, imagining a sound or "energy" flow through the body, etc.). These imagination-based techniques, such as visualization of channels in the body (Worth, 2021), involve using the power of mental representation in relation to the senses or domains of experience of the human being. Other descriptions of meditative practices involve the cultivation of different feelings or attitudes, such as joy and compassion. What each of these meditative activities have in common is that they are all forms of willing or *producing*. These activities all intend to create, change, or in one way or another actively bring about or maintain an object of meditation. These techniques can be understood as varieties of the fundamental activity of *producing*. The subordinate activities are *moving* (for instance the body during walking meditation or when forming a mudra with a hand) and *imagining*. Moving may also be understood to include the activates of placing or continually moving and sustaining a position (like the position of the body). Movement involves imagination in the sense that imagination indicates which movement is to take place. Conversely, imagination implicitly involves movement. That is, movement in the sense of a change from potentiality to actuality, from the "potential to imagine anything" to "imagining something." In this sense, movement and imagination are unified with the fundamental activity of production.

There are, however, meditation techniques that are fundamentally different from producing, moving, or willing the experience of a mental object. For example, some techniques involve *focus* on an *already existing* object such as the breath, or the observation and mindful awareness of other aspects of our minds. These activities are in a sense passive, or, more precisely, they are *receptive*. If we consider receptivity, we find that it has two aspects. One aspect, *release*, consists of a mind like a *tabula rasa*, so to speak, or letting go of all mental activity. This aspect of release is passive. The other aspect of release, *focus*, is more active. Focus requires an already existing object of meditation. This process is active in that is requires the ongoing engagement of attention. In this way, we can use the active and passive distinction to differentiate between *focusing* and *releasing*. Of note, *focusing* includes activities such as "attending" and "zooming in" (among other activities), while *releasing* can include "relaxing," "allowing," "opening," and "remaining in silence" (among other activities).

Releasing and *focusing* can be unified under the superordinate category of *observing*, an activity central to for example the body scan technique (Anālayo, 2020). When the practitioner observes an object, the practitioner is open to it. And, if the object of meditation changes in some manner, the practitioner then is to receive it as it is. The practitioner is to *release* whatever aspect of experience may restrict their access to the object of meditation, such as thoughts and feelings. During observing practices, the meditator also attends to what is observed, though not in a manner focused on a specific aspect of the meditation object (e.g., that the practitioner may "zoom in" on). Hence, with regard to meditative activities, there is a fundamental distinction between *observing* and *producing*. With that said, both are forms of *meditative activities*. And so, we may ask, what do they have in common? And are these two activities not fundamentally opposed, as something active (produce) and passive (observe)? Receptive and spontaneous? We can indeed unify producing and observing. This unification is possible through the concept of *awareness*. When aware of something (without focusing or observing specifically), the individual is immersed in it to the extent that there is no clear distinction between awareness and *the object of awareness*. The individual's *being* is intertwined with the object of awareness. In an immersed state consciousness may be said to be "outside," that is, with the sensations, with the experience, with that which is felt, known, and sensed. Alternatively, the opposite could be stated: everything happens within consciousness. Day-to-day experience happens within such a field of awareness, or meaning, where there is perhaps an identifiable distinction between the human being and its environment, but no perceived separation. When awareness is performed as part of a meditation practice, the practitioner enters this field of experience intentionally, blurring the lines between activity and receptivity (as indicated by "activity $\approx$ receptivity" in **Figure 2**).

When analyzed, however, awareness and object may seem to be fundamentally opposed. Awareness involves awareness *of* something, that is, an object (or a field of experience), while an object as such is never of something.[4] Seemingly, awareness and object may never be fully unified, as the individual can point to at least some difference between the two. For example, an aspect of awareness must remain the same in experience, while specific objects always change (which is different from saying that awareness does not need an object). In self-awareness, however, awareness and object are fully unified. When an individual is aware of awareness, they are aware of their own production, their own activity of being aware (this is indicated in **Figure 2** by "active = receptive"). Awareness of awareness includes the other activities in itself, as well as the object of awareness. Similarly, awareness always includes an object, awareness always includes some degree of observation, observation always includes some degree of release and focus, and so on. The other activities are, however, often performed subconsciously or indirectly. When focusing, for example, there is a subtle awareness of awareness performed, that is, a kind of monitoring of whether the intended activity of focus is performed or not. However, awareness of awareness does not require a concrete object or even field of experience as an object outside of itself. Although the grammatical structure of "awareness of . . ." implies that there is

[4] An object may be a sign or a picture, and hence, in a sense be about *something*. However, an object becomes a sign, or a picture, through a *subject*.

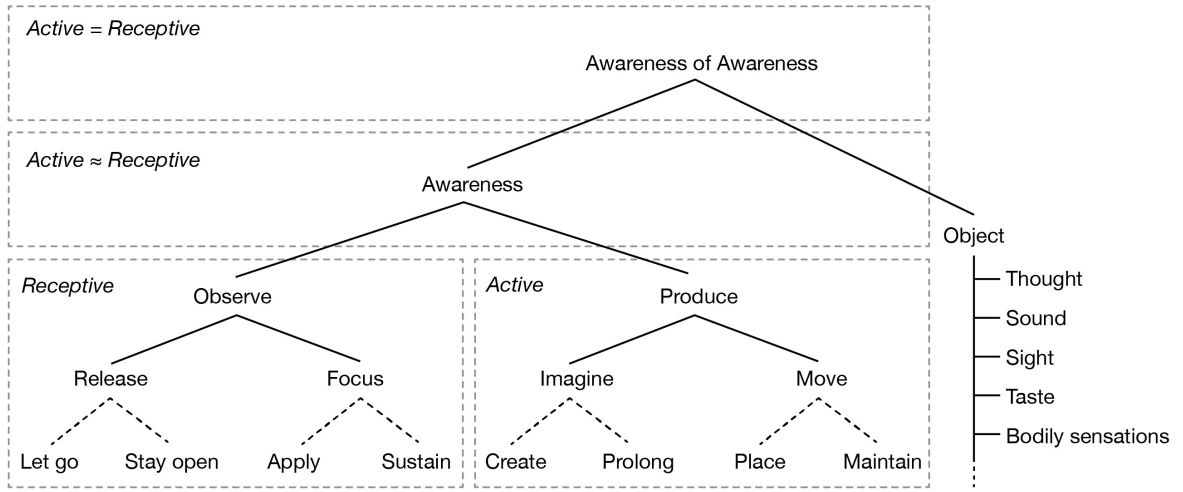

FIGURE 2 | Meditative activities and their objects. This figure depicts a classification system for different meditative activities. Except for the activities connected through dotted lines, the superordinate activities unify, that is share features, of the subordinate activities. The dotted boxes represent different modes of differentiation between active and receptive activities. See the main text for further explanation.

something that awareness is directed toward that is external to it (a subject separate from an object), when awareness is aware of itself, the subject/object structure dissolves into non-duality. The kind of awareness implied in "awareness of awareness" may be regarded as a kind of meta-awareness that is both sustained and non-propositional (Dunne et al., 2019), sometimes referred to as *samprayana*, a type of meta-awareness that is not focused on an object *per se*, but rather is an awareness of that intentional relation itself (Lutz et al., 2007, p. 504). We may to some extent distinguish between (i) awareness of awareness and (ii) awareness of the intentional relationship [having *x* (= not awareness itself) as an object of awareness]. However, (ii) depends on (i) if we conceive of awareness of awareness as a condition for maintaining awareness of the intentional relationship. Furthermore, when awareness is aware of itself, the distinction between (i) and (ii) collapses into non-duality.

Although, as noted previously, the number of objects in our model is unlimited, there may be limits as to how activities are combined with objects of meditation. For example, the practitioner may move the body, but the practitioner cannot (normally) move a visual impression. There may be exceptions to this, such as when the practice of the fire *kasiṇa* meditation results in perceived abilities of moving visual impressions (Ingram, 2018). Hence one will have to distinguish between what is logically impossible and what is typically impossible within non-meditative consciousness.

Figure 2 also contains two subcategories for each of focus, release, move, and imagine. Release, for example, can be divided into "let go" and "stay open." These have not been added with the help of the 50 techniques considered here but are rather based primarily on further analysis and traditional literature. When releasing a mental object, we can distinguish between dropping content that is already there and remaining in a state of openness that is without any (coarse) content. In general, dropping is a momentary act, and staying open is a continuous process. However, *staying* open may be a matter of quickly dropping any subtle or coarse content that might appear. "Application," one of the subcategories under "focus," means to apply focus to an object. Alternatively, "sustaining" means to maintain continuous focus on an object. Like the two subcategories under "release," "application" is momentary, while "sustaining" is continual. Here only "sustaining" may be understood to consist of, or include, "application." In the same manner we can understand "create" and "sustain" (under "imagine"), and "place" and "maintain" (under "move"): for each of the subcategories, the ones on the left ("let go," "apply," etc.) are momentary, while the ones on the right ("stay open," "sustain," etc.) are continual. Additionally, the continual subcategories involve the momentary aspects as part of them, while the momentary subcategories are not necessarily continual. Hence these categories are not strictly opposites and are not united in the next, supraordinate, categories. This (and the fact that they were not derived from the 50 techniques) is indicated by the dotted lines. See **Supplementary File 1** for an overview of which synonyms each of the meditative activities include and exclude.

Note that meditation instructions occasionally include descriptions of what the practitioner should avoid. Hence the meditative activities can be defined according to what the practitioner should do, and what the practitioner *should not do*. A classic example of this is Tilopa's Six Words of Advice: "*Don't recall. Let go of what has passed. Don't imagine. Let go of what may come. Don't think. Let go of what is happening now.*" et cetera. Here we see that a "do not" instruction may be formulated positively as well, that is, as "*let go*." According to the different categories of meditative activities described above, instructions such as "don't think" may be understood as a "release" instruction, or as do not "produce" "*thought*." Furthermore, objects of meditation may be defined according to time (past, present, and future). "*Let go of what is happening now*" could then be understood as an instruction to release (or

drop) any object currently present, and to "stay open" insofar as nothing is coarsely present. Furthermore, "object" included in **Figure 1** may also be thought of as the general domain of experience. This then allows for the interpretation of instructions such as "maintain background awareness while focusing on object X." That is, this would mean that the practitioner should be aware of the field of experience in which mental objects may appear, while focusing on a specific mental object. It is also possible to introduce transmodal fields of experience, such as time and space, though these might also be treated as objects of the awareness activities themselves. How objects of meditation are defined, or classified, is a complex matter and easily becomes entangled in questions of ontology and metaphysics. As we have stated earlier, is important to note that the "object" branch of the table can easily be expanded. If it is, this should be done based on phenomenological analysis aided by descriptions of meditation practices. See **Supplementary File 2** for an attempt to break down typical descriptions [in this case provided by Upton and Brent (2019)] of meditation instructions into activities and objects.

Meditative activities may be modified in specific ways. For example, the practitioner may attend "closely," observe "diligently," or do "fast" noting (Ingram, 2018). We have not attempted here to create an overview over such modifiers. They may be understood either as a modification of the effort involved (e.g., diligently and fast) or they may be understood as one of the activities (e.g., attending closely may be understood to mean "focus" rather than "be aware of"). Furthermore, some meditation instructions may be understood as composites of multiple meditative activities. For example, consider the instruction "explore your experience" (Ray, 2018, p. 78). This may involve becoming aware of the field of experience, focusing on a sensation, observing tension, releasing tension, becoming aware of feelings, focusing on feelings, and so on. What the meditator performs when following such an instruction can be highly individualized, and without breaking it down to specific activities, it would not be possible to track the activities and their effects. The classification of activities suggested in this section will enable such research. Since meditation techniques often involve more than one activity, the overarching techniques will have to be defined. A suggestion of how use the classification system proposed here as a basis for defining techniques is provided in **Supplementary File 2**.

CONCLUSION

We conclude with a definition of meditation: meditation is at least one of several intentional awareness activities such as observe, focus, release, produce, imagine, and move, underpinned and unified by the activity of awareness of awareness, performed in a formal or informal setting. The practice of these activities may result in altered states of consciousness, passing through stages of development, and ultimately endpoints of practices (e.g., "awakening," "enlightenment") (Reddy and Roy, 2019b). These states, stages, and experiences (or lack of experience) may be motivated by and interpreted within secular or spiritual frameworks.

This definition is, hopefully, not too broad, but also not too narrow. It is intended to encompass all aspects of mediation previously identified as well as aspects that have been overlooked. For example, "closed-eyes meditation" may be described as "maintain closed eyelids" (a form of *move* activity with the eyelids as object). Furthermore, this definition, and the classification system built into it, are intended to answer all the different challenges that arise when attempting to define mediation, such as whether it is a matter of doing or non-doing. Our definition draws on the strengths of different classification systems and is open to amendment. The way to test the validity and utility of this definition is to consider additional meditation instructions and descriptions of meditation practice. This system for defining meditation can be expanded by considering the experiential micro-dimensions of the meditative activities using applied phenomenological approaches [e.g., micro-phenomenology (Sparby, 2019b,c)]. Finally, our proposed definition can explain why both different and overlapping outcomes may arise from different meditative techniques, that is: different meditative techniques may involve some of the same activities, and will to a certain extent, this will always and necessarily be the case. Still, this definition accounts for varied outcomes that may be the result of different meditative techniques that emphasize different activities. Our activity-based definition promises to inform improved meditation training programs and interventions, and the study thereof, that will contribute to the reduction of suffering and the realization of the good.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

TS wrote the initial draft. MS commented on and revised the initial draft. TS and MS revised the final draft. Both authors contributed to the article and approved the submitted version.

FUNDING

TS was supported by Software AG Stiftung. MS was supported by the Phyllis and Jerome Lyle Rappaport Foundation, Ad Astra Chandaria Foundation, BIAL Foundation, Brain and Behavior Research Foundation, and the Center for Depression, Anxiety and Stress Research at McLean Hospital and Harvard Medical School.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2021.795077/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers | Frontiers in Psychology

ORIGINAL RESEARCH
published: 05 April 2022
doi: 10.3389/fpsyg.2022.805718

Learning Compassion and Meditation: A Mixed-Methods Analysis of the Experience of Novice Meditators

Jennifer S. Mascaro[1,2], Marianne P. Florian[3], Marcia J. Ash[4], Patricia K. Palmer[2], Anuja Sharma[1], Deanna M. Kaplan[6], Roman Palitsky[5], George Grant[2] and Charles L. Raison[2]*

[1]Department of Family and Preventive Medicine, Emory University School of Medicine, Atlanta, GA, United States, [2]Department of Spiritual Health, Emory University Woodruff Health Sciences Center, Atlanta, GA, United States, [3]Graduate Division of Religion, Emory University, Atlanta, GA, United States, [4]Department of Behavioral, Social, and Health Education Sciences, Rollins School of Public Health, Emory University, Atlanta, GA, United States, [5]Department of Psychiatry and Human Behavior, Brown University, Providence, RI, United States, [6]Department of Behavioral and Social Sciences, Brown University, Providence, RI, United States

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Edited by:
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***Correspondence:**
Jennifer S. Mascaro
jmascar@emory.edu
orcid.org/0000-0002-6199-8455

Specialty section:
This article was submitted to Cognitive Science, a section of the journal Frontiers in Psychology

Received: *30 October 2021*
Accepted: *07 March 2022*
Published: *05 April 2022*

Citation:
Mascaro JS, Florian MP, Ash MJ, Palmer PK, Sharma A, Kaplan DM, Palitsky R, Grant G and Raison CL (2022) Learning Compassion and Meditation: A Mixed-Methods Analysis of the Experience of Novice Meditators. Front. Psychol. 13:805718. doi: 10.3389/fpsyg.2022.805718

Over the last decade, numerous interventions and techniques that aim to engender, strengthen, and expand compassion have been created, proliferating an evidence base for the benefits of compassion meditation training. However, to date, little research has been conducted to examine individual variation in the learning, beliefs, practices, and subjective experiences of compassion meditation. This mixed-method study examines changes in novice meditators' knowledge and contemplative experiences before, during, and after taking an intensive course in CBCT® (Cognitively-Based Compassion Training), a contemplative intervention that is increasingly used for both inter- and intrapersonal flourishing. The participants in this study ($n = 40$) were Christian healthcare chaplains completing a 1-year residency in Clinical Pastoral Education (CPE) who learned CBCT as part of their professional chaplaincy training curriculum. Prior to and upon completion of training, we surveyed participants to assess their beliefs about the malleability of compassion, types of engagement in compassion meditation, and perceptions of the impact of taking CBCT. We also conducted in-depth interviews with a subset of participants to gain a qualitative understanding of their subjective experiences of learning and practicing compassion meditation, a key component of CBCT. We found that participants reported increases in the extent to which they believed compassion to be malleable after studying CBCT. We also found high levels of variability of individual ways of practicing and considered the implications of this for the study of contemplative learning processes. This multi-methodological approach yielded novel insights into how compassion practice and compassion-related outcomes interrelate, insights that can inform the basic scientific understanding of the experience of learning and enacting compassion meditation as a means of strengthening compassion itself.

Keywords: compassion, contemplative, meditation, individual differences, qualitative

> "Personally, I know that compassion is a *spirit* from the biblical point of view, and I'm yearning to see how compassion is manufactured *in the lab* or in the meditative class." (Chaplain Isaac).[1]

INTRODUCTION

For over 30 years, scientific inquiry into compassion and its potential psychological and physiological impacts has gained momentum and sophistication (Gilbert, 2020). In psychology and related disciplines, there is growing consensus that the fundamental components of compassion are (1) reflexive experience of benevolent emotions in response to suffering, coupled with (2) the desire to aid and/or support to the sufferer (Goetz et al., 2010; Halifax, 2012; Singer and Klimecki, 2014). In addition, features and experiences associated with empathy or emotional contagion are often included in cognitive and psychological models of how compassion arises (Gilbert, 2009; Goetz et al., 2010; Feldman and Kuyken, 2011; Strauss et al., 2016; Gu et al., 2017). In the past decade, numerous interventions and techniques that aim to engender, strengthen, and expand individual compassion have been formalized, attracting additional research interest in their mechanisms and efficacy (Graser and Stangier, 2018). Contemplative approaches to strengthen compassion are becoming increasingly common across experimental, clinical, and educational settings, often presented to first-time meditators from diverse educational and cultural backgrounds (Hofmann et al., 2011; Graser and Stangier, 2018; Sinclair et al., 2021a,b).

Multimodal evidence indicates that within an experimental group or population, compassion meditation interventions lead to both primary (e.g., compassion and altruism) and secondary benefits (e.g., hope and relationship satisfaction) for some people (Pace et al., 2009; Leiberg et al., 2011; Mascaro et al., 2012, 2016, 2021; Wallmark et al., 2013; Bach and Guse, 2015; Roeser and Eccles, 2015; Hildebrandt et al., 2017; Kirby, 2017; Kirby et al., 2017; Matos et al., 2017; Brito-Pons et al., 2018; Luberto et al., 2018; Ash et al., 2020; Austin et al., 2021). However, individual outcomes vary widely, and causal mechanisms remain obscure. Research examining the subjective cognitive and emotional experiences and the learning processes that occur during compassion training is in its infancy and has received less attention than studies on long-term meditators or novices learning mindfulness-based practices (Irving et al., 2014; Rappert et al., 2016; Petitmengin et al., 2017; Kordes et al., 2019).

Examining individual variation in the learning, practice, and subjective experience of compassion meditation is critical because quantifiable factors such as practitioner goals (Shapiro, 1992; Sedlmeier and Theumer, 2020) and cumulative practice time (Jazaieri et al., 2013; Jha et al., 2017; Rooks et al., 2017) have been shown to impact the effectiveness of contemplative interventions. However, the wider array of experiences and learning factors in contemplative training has received comparatively little attention (Gully et al., 2002; Caspi and Bell, 2004; Tang and Braver, 2020). It is vital that research into compassion practices gain insights into sources of individual variation in the subjective experience and process of training to facilitate discovery of why, when, where, and for whom compassion training and practice would be most effective.

Meditation in modern thought and culture has been closely associated with the goal of attaining unusual experiences and states of consciousness (Sharf, 2000; Tweed, 2005; McMahan, 2008; Payne, 2012; Harrington and Dunne, 2015). However, the familiar and mundane experiences of the mind and body (or mind–body) engaged in learning to meditate—frustration, difficulty, mind wandering, falling asleep, self-evaluation, physical discomfort—can also be a common part of learning to meditate and are relevant to novices' learning processes (Hasenkamp et al., 2012; Lomas et al., 2015). In an introductory course, novice meditators are generally tasked with (1) becoming familiar with the skills and strategies for practicing compassion meditation, (2) learning a framework of concepts and goals in which devoting time and energy to compassion meditation makes sense, and (3) internalizing and habituating compassionate perspectives and responses through repeated practice. Indeed, some meditation novices may initially be as concerned about learning *how to meditate*—avoiding and correcting missteps, following prescribed forms, memorizing sequences of steps—as they are about learning to change their perspectives *by means of meditating*. These constitute two distinct types of learning: skill development and adaptation on the one hand and belief revision on the other (Ohlsson, 1996). Learning processes, both deliberate and effortful or implicit and automatic, represent a key domain of individual variation in contemplative training and are highly pertinent to the context of compassion meditation interventions in which instructors convey skills and encourage repeated exercises for the trainee to master (Ozawa-de Silva and Negi, 2013; Ash et al., 2021).

To examine individual variation in learning processes that occur during compassion training, the present study explores how a group of novice meditators begin learning to practice a compassion meditation method known as CBCT® (Cognitively-Based Compassion Training). Previous research indicates that CBCT increases hope (Reddy et al., 2013) and reduces symptoms of depression in healthy populations (Desbordes et al., 2014; Mascaro et al., 2016) and attenuates the pro-inflammatory response to psychosocial stress (Pace et al., 2009, 2013). In breast cancer survivors, CBCT reduced depression and psychological stress associated with the fear of cancer recurrence (Dodds et al., 2015; Gonzalez-Hernandez et al., 2018). In a pilot study of chaplain residents, CBCT was associated with decreased burnout and anxiety (Ash et al., 2020). Our first two research aims focus on two distinct forms of cognitive change that participants may undergo while learning CBCT. First, we examined changes in beliefs about compassion, given previous research suggesting these changes may be an important component to compassion training (González-Hernández et al., 2021) and may predict its effects (Schumann et al., 2014). Second, we examined the

[1]All names are pseudonyms.

development of the techniques of CBCT meditation practice and the process of incorporating them into one's life. In addition, our third aim (3) is to understand novice practitioners' perceptions of whether and how compassion meditation training had been beneficial. These aims were evaluated using quantitative self-report measures and expounded with greater nuance using semi-structured interviews to uncover and characterize sources of individual variability.

MATERIALS AND METHODS

Research Overview

The data reported here were collected as part of a larger study, approved by the Emory University Institutional Review Board, to evaluate the effects of CBCT on chaplain residents enrolled in a clinical pastoral education (CPE) program. The parent study was a longitudinal, randomized, wait-list controlled study that was preregistered (NCT03529812), with chaplain-reported depression, anxiety, burnout, and empathy as the primary outcomes, and patient-reported reductions in anxiety and depression as well as satisfaction with the chaplain-delivered spiritual care encounter as secondary outcomes. We will report the results of this larger effectiveness study in a separate manuscript. Here, we report the results of a mixed-method examination of the learning processes and subjective experience of chaplains enrolled in the parent study. The sources of data for this study include longitudinal and wait-list controlled measures to assess beliefs about the malleability of compassion with CBCT training. In addition, we collected a chaplain-reported measure about the perceived benefits of CBCT. To provide a richer context for these quantitative self-report measures, we obtained chaplains' detailed responses to interview questions regarding their ways of enacting and personalizing CBCT meditation procedures to suit their needs and inclinations. Chaplains provided written informed consent prior to participating.

Chaplain residents were randomized to receive CBCT either in the fall or spring unit of their CPE residency year. All study participants completed a self-report measure of compassion malleability (described below) prior to and immediately upon completion of CBCT. Chaplains randomized to CBCT also completed post-CBCT self-report measures about meditation practice and perceived benefit (described below). For the qualitative interview portion of the study, we invited all chaplain residents to participate at three timepoints relative to their CBCT training: (1) prior to any training, (2) after the halfway point in the CBCT course, and (3) shortly after the end of the course. Each chaplain resident was encouraged to participate in an interview at as many time points as they were able. Chaplains were consented for each of the three interviews separately.

Participants

During the study period, participants were completing a year-long residency of an ACPE-accredited CPE program at Emory Healthcare that recently incorporated CBCT into its educational curriculum. The inclusion criterion was enrollment in the CPE program as a hospital chaplain resident to provide spiritual care to patients in acute-care hospital settings. All chaplain residents received CBCT as part of their residency training, but participation in the research described here was voluntary. There were no exclusion criteria.

Chaplain residents learn to deliver spiritual care in CPE programs, which bring theological trainees of all faiths into supervised encounters with persons in the healthcare system who may be experiencing a crisis. Although the CPE program at Emory attracts individuals from a broad array of faiths, it skews heavily to Protestant Christian, likely the effect of several Protestant seminaries in the area from which many residents matriculate. Residents' clinical work occurs in the context of formal and informal feedback from peers and educators, with the goal of developing trainees' awareness of themselves, skills in interpersonal and inter-professional relationships, and appreciation of the needs of those to whom they provide care. Their responsibilities during training include responding to cardiac arrest codes, deaths, staff requests, recent admissions, and patient or family requests. Chaplain residents also assist patients in end-of-life planning and the completion of advance directives. In addition, chaplain residents address the religious and spiritual needs of hospital staff, including bereavement from death of patients as well as distress arising from events in their personal lives. Chaplain residents in the Emory program are assigned to one of five hospital locations for most of their instructional and clinical activities.

Randomization and Blinding

Chaplain residents were randomized to receive CBCT during the fall unit of CPE or to continue standard CPE as usual (the wait-list comparison group) and receive CBCT in the spring unit. Chaplain residents were randomized by hospital location using the RANDBETWEEN function in Excel, such that within each hospital location there were a roughly equal number of chaplains randomized to the CBCT and wait-list groups. All study participants were blind to group assignment at the Time 1 assessments, and all research personnel were blind throughout the entirety of quantitative data collection, data entry, and statistical analysis.

Cognitively-Based Compassion Training

CBCT is derived from Indo-Tibetan Buddhist mind-training, or *lojong* (Tib: བློ་སྦྱོང་, Wylie: blo sbyong), techniques that combine exercises for stabilizing attention and calming the mind with contemplation of aphorisms, visualizations, self-inquiry, and related meditative exercises for reinforcing and internalizing compassionate perspectives. CBCT, however, was adapted to be accessible to those of any or no faith tradition. The meditation exercises and reflective practices that comprise CBCT are described as a "cognitive" or "analytical" style of meditation. In contrast to compassion meditation practices that primarily focus on the somatic experiences associated with compassion (e.g., sensations of warmth and caring in one's chest), the practices taught in CBCT emphasize critical thinking, mental investigation, and reflection, with the ultimate goal of arriving

at personal insights about one's own life, relationships, and experiences (Silva and Dodson-Lavelle, 2011; Ash et al., 2021).

The cognitive exercises and target perspectives of CBCT are organized into sequenced learning modules (Ash et al., 2021). The preliminary or foundational module trains practitioners to evoke a scene or memory that represents a "moment of nurturance," which becomes a touchstone experience of compassion that practitioners seek to both develop in themselves and offer to others in the following modules. In modules one and two, practitioners learn and practice fundamental mindfulness skills that correspond (respectively) with focused attention (FA) on a single object—typically the breath—and open monitoring (OM) of sensory perceptions and endogenous mental phenomena as delineated by Lutz et al. (2015). In contrast, modules three through six have a more analytical focus. In module three (Self-Compassion), students bring aphorisms, examples, and personal experiences to mind while meditating to discern habits of thought and behavior that exacerbate personal stress. This is followed by engendering a firm resolve to change those self-defeating patterns and to garner patience and tolerance of stress and suffering as universal human experiences, while simultaneously recognizing the difficulty and slow pace of achieving lasting personal change.

During modules four, five, and six, practitioners use a similar analysis of personal relationships and experiences to dislodge perspectives that inhibit compassion; however, in these modules the focus is on others rather than oneself. In module four (Impartiality and Inclusivity), practitioners learn to assess and equalize the ordinarily biased attitudes toward friends, adversaries, and those to whom we feel little connection. In module five (Deepening Gratitude and Tenderness), practitioners reflect on the recognition that our wellbeing is due to the cooperation and kindness of countless other people. The resulting feeling of thankfulness then combines with the recognition that everyone is vulnerable to experiencing suffering and hardship to form a basis for feelings of endearment toward others. From this tender regard for others, practitioners move to module six (Harnessing the Power of Compassion), which begins with wishing others to be relieved from suffering and progresses to generating the motivation and the readiness to help bring that about if the opportunity arises. While progressing through the entire sequence of modules represents a prototypical CBCT meditation session for an experienced practitioner, the CBCT teachers in this study did not set an expectation that CBCT meditation sessions should always include elements from each of the learning modules, but rather encouraged chaplains to experiment and find what worked best for them.

Chaplain residents randomized to the CBCT group met weekly for four full-day meditation workshops held in a local Protestant church. The training days focused on the sequence of CBCT modules, covering on average two modules per day with their associated contemplative steps and exercises. Between training days and in the weeks following the course, residents were encouraged to practice CBCT in their free time either by listening to recorded audio of meditation guidance by a CBCT instructor or by guiding themselves through one or more of the contemplative exercises they had learned in class. Instructors provided audio recordings tailored to each of the CBCT learning modules with options varying in duration between approximately 5–30 min.

Self-Report Measures

Compassion Malleability

To examine chaplain residents' beliefs about compassion, we used a measure originally developed to examine changes in beliefs about the malleability of empathy (Schumann et al., 2014). We made two important modifications to the published measure. First, we substituted the word "compassion" for "empathy" in all items (e.g., "A person's level of *empathy* is something very basic about them, and it cannot be changed much" became "A person's level of *compassion* is something very basic about them, and it cannot be changed much"). Second, we added two additional items to tap into and differentiate between the affective and behavioral aspects of compassion: (1) "People can learn to think and feel more compassionately and thereby become more compassionate," and (2) "People can learn to speak and behave more compassionately, and thereby become more compassionate." Participants used a Likert scale to indicate their level of agreement with each statement ranging from 1 ("Strongly disagree") to 7 ("Strongly agree"). Three items were reverse-scored. A higher score on this scale indicates a relatively greater belief that compassion is a malleable skill that can be developed. All study participants—residents randomized to CBCT and those randomized to the wait-list group—completed this measure prior to randomization. Residents randomized to the CBCT group completed the measure again immediately upon completion of CBCT, and residents randomized to the wait-list group completed it at the same time. Cronbach's alpha calculated from the current study indicates that this adapted version of the measure had good reliability: Time 1 $\alpha = 0.81$, Time 2 $\alpha = 0.87$.

Perceived Benefits of CBCT

To characterize chaplain residents' perceived benefits of CBCT, at the Time 2 assessment we asked chaplain residents randomized to CBCT ($n = 21$) to report their agreement with the statement, "I benefited from learning CBCT" using a Likert scale (1 = "Strongly disagree," 7 = "Strongly agree"). Using the same Likert scale, we also asked them to report on more specific benefits, including helping to improve personal relationships, improve physical health, improve mental health, and improve their spiritual health consultations with patients.

Practice Time

To quantify self-reported practice time, at the Time 2 assessment we asked chaplain residents randomized to CBCT to estimate (1) how often they practiced CBCT outside of class time using the online recorded meditations and (2) how often they engaged in self-guided CBCT meditation—without the use of recordings—outside of class time. For both questions, their response choices were as follows: more than once/day, about once/day, 2–3 times/week, once/week, or virtually never.

Statistical Methods (Quantitative)

Quantitative responses were analyzed using Statistical Package for the Social Sciences (SPSS) software (version 27.0 for Windows, SPSS, Inc., Chicago, IL, United States). Missing items in the beliefs about compassion scale were estimated with expectation maximization (Graham, 2009; missing items never accounted for more than 5% of total data) using other items within the scale as predictor variables. We used the Shapiro–Wilk test to assess data normality. All variables had a non-normal distribution, and therefore, we used nonparametric methods. To address our first aim of examining changes in beliefs about whether compassion is malleable, we used Mann–Whitney U tests to assess whether attitudes toward compassion differed between groups at baseline and at Time 2 after CBCT. We used analysis of covariance (ANCOVA) to determine whether the CBCT and wait-list groups differed in beliefs about compassion malleability at Time 2, controlling for Time 1 scores (Dimitrov and Rumrill, 2003). We used Wilcoxon signed-rank tests to assess within-group changes. To address our second aim of examining how novice practitioners develop and adapt the skills and techniques of CBCT meditation, we characterized self-reported practice time using recordings and adapted on one's own. To address our third aim of evaluating the relationship between participants' practice time and self-reported benefits, and changes in belief, we used Spearman's rho correlation analyses to examine whether practice time was associated with changes in compassion beliefs (calculated as a difference score) or with perceived benefits in the CBCT group. Two-tailed alpha was set to 0.05 for significance for the ANCOVA and Wilcoxon signed-rank tests. The alpha level was Bonferroni-adjusted for multiple comparisons in our correlation analysis.

Semi-Structured Interviews

All study participants randomly assigned to the CBCT group were invited to participate in semi-structured interviews about their experiences with the CBCT meditation course. Chaplains were interviewed during their normal work hours at one of four Emory Healthcare facilities or at the Protestant church facility where the CBCT course was conducted. Interviews lasted approximately 1 h and were scheduled in discrete time periods prior to, after the midpoint of, and after the CBCT course.

Interviews were conducted by a trained research facilitator with expertise in religious studies and CBCT practices specifically, and they followed a semi-structured interview guide. At the first interview, each participant was asked about their repertoires of religious and/or spiritual practices, as well as their personal understanding of the meaning and purpose of compassion. Halfway through the compassion meditation training, participants in the second round of interviews were asked about how they typically practice CBCT outside the meditation class and what the experience of doing so is like for them. They were then invited to join the interviewer in practicing CBCT for 8–10 min in silence, in the manner they would normally practice when alone. Immediately afterward, while the experience was still in working memory, they were asked to recount in detail how they had conducted their practice and what doing so was like for them. Following these subjective descriptions of compassion meditation, interviewees were then asked about any moments of insight and personal changes related to CBCT that they may have experienced. After completing the CBCT course, the third round of interviews was like the previous one. Participants were again asked to describe their typical solo CBCT practice, followed by a silent self-guided CBCT meditation period of 8–10 min, after which they described their procedure and experience of meditating while the memory of it was fresh. Further questions pertained to moments of learning, insight, and/or personal change throughout the CBCT course.

Each interview was audio-recorded and transcribed verbatim. The qualitative investigator (MPF) created a codebook of overlapping and emergent themes—e.g., meditation, compassion, subjective experience, etc.—to use when locating evidence for answering research questions. All interview transcripts were then coded and queried using thematic analysis and NVivo qualitative analysis software (Fereday and Muir-Cochrane, 2006).

RESULTS

Participant Characteristics

The social and demographic characteristics of chaplain residents ($N = 40$; CBCT: 21, wait-list: 19) are presented in **Table 1**. Most residents (50%) were African-American or Black, and 73% had resided in the United States their entire life. The majority (73%) reported having previous experience with meditation, although none of the participants had learned or practiced CBCT. Study participants came from a broad range of Protestant Christian backgrounds. A convenience sample of 12 residents volunteered to be interviewed at least once (10 for the first interview, 11 for the second interview, 10 for the third interview), eight of whom were African-American, eight of whom were women. Four interviewees grew up outside the United States—in West Africa, in East Asia, and in the Caribbean.

Compassion Beliefs

Scores on the compassion malleability belief scale at Times 1 and 2 are shown in **Figure 1**. There was not a significant difference between the CBCT and wait-list groups in compassion malleability belief at Time 2 while adjusting for Time 1 scores. However, effects were in the expected direction, indicating that residents randomized to the CBCT group may have experienced increases in compassion malleability compared to residents randomized to the wait-list group [$F(2, 36) = 3.76$, $p = 0.06$]. Mann–Whitney U tests indicated that there was not a significant baseline difference in beliefs about compassion malleability between the CBCT group ($M = 5.79$, SD = 0.60; Mdn: 6.00) and wait-list group ($M = 5.64$, SD = 0.74, Mdn: 5.81) at Time 1 ($U = 0.57$, $p = 0.587$, $r = 0.09$). However, at Time 2 there was a significant difference in beliefs about compassion malleability between the CBCT group ($M = 6.15$, SD = 0.63, Mdn: 6.25) and wait-list groups ($M = 5.69$, SD = 0.74, Mdn: 5.88) ($U = 2.08$, $p = 0.037$, $r = 0.33$). There was a main effect of time for the CBCT group ($Z = 2.60$, $p = 0.009$, $r = 0.57$), but

TABLE 1 | Sociodemographic characteristics of the chaplain residents.

		CBCT ($n=21$)		Wait-list ($n=19$)		*P*
		N	%	*N*	%	
Gender	Female	9	43	13	68	0.125
	Male	12	57	6	32	
Race	Asian	4	19	2	11	0.691
	African-American/Black	12	57	8	42	
	Afro-Caribbean	1	5	0	0	
	White	4	19	6	32	
	Missing/Unknown	0	0	3	16	
Length of time resided in the United States	Entire life	13	62	16	84	0.150
	11+ years	3	14	2	11	
	5–10 years	3	14	0	0	
	1–4 years	2	10	0	0	
	Unknown	0	0	1	5	
Relationship	Single	7	33	9	47	0.403
	Divorced	3	14	1	5	
	Single, living with someone	11	52	7	37	
	In a relationship	0	0	1	5	
	Missing/Unknown	0	0	1	5	
Previous experience with meditation	Yes	15	71	14	74	0.651
	No	6	29	4	21	

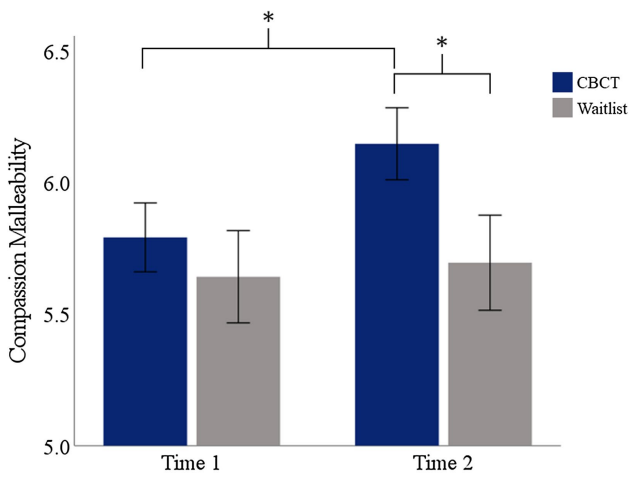

FIGURE 1 | Changes in self-reported beliefs about the malleability of compassion. Asterisks indicate a statistically significant effect of group at Time 2 and a statistically significant effect of time in the residents randomized to CBCT. Error bars indicate the SEM.

not for the wait-list group ($Z=-0.13$, $p=0.90$, $r=0.03$), indicating that the CBCT group but not the wait-list group increased the extent to which they believed compassion to be malleable. The partial Eta Squared value indicates that the effect size was small (0.10).

During the interviews, we queried residents' beliefs about the meaning and the purpose of compassion and how CBCT impacted their beliefs about compassion. Prior to CBCT, most of the residents emphasized that compassion establishes or enhances the connection and equality between people or between a person and God, especially when a person is suffering. Some indicated that the connection depends on understanding and identifying with or simply remaining near someone who is suffering, as well as through love, forgiveness, and abstaining from judgment. Modes of helping, caring, and showing concern were also commonly mentioned as important. One response focused on compassion's ability to purify, while another response defined compassion in non-naturalistic terms as a "spirit, from the biblical point of view," highlighting the contrast between a notion of compassion as God-given and predetermined with a model of compassion as a malleable trait that can be deliberately engendered or developed. After CBCT, participants reported that they felt they could become more compassionate by becoming more attuned and aware of others and through practice and effort. A common theme was the importance of self-compassion for extending compassion to others. **Table 2** contains a selection of excerpts from transcribed responses to these questions.

Developing and Adapting the Techniques of CBCT Meditation Practice

Regarding our second research aim of examining the development of meditation skills, we characterized chaplains' frequency of CBCT practice both using the accompanying audio-recorded meditation guidance and without using the recordings (**Figure 2**). We found that, of the 21 chaplain residents randomized to the CBCT group, 86% (18/21) reported practicing CBCT one or more times per week outside the meditation class *without* listening to audio-recorded meditation guidance. Thirty-eight percent (8/21) of participants practiced in this way 2–3 times per week, almost 20% (4/21) did so once per day, and 14% (3/21) virtually never engaged in self-guided practice (i.e., without using audio-recorded guidance) outside of the meditation class. In contrast, most chaplains (52%; 11/21) reported that they virtually never listened to the recordings when practicing CBCT. The remaining 48% (10/21) of participants reported

TABLE 2 | Participants' beliefs about compassion.

Theme	Representative quote
You can increase compassion	I think you can become more attuned. You become more aware. You become more compassionate, and I think most importantly, you become more present. (Vanessa)
Who you are compassionate toward can expand	I realized that I lack self-compassion, and compassion to my family, especially my dad, about what happened when I was young. And when I reflected about compassion, at first, I could not be compassionate [about] what happened in the past. And then, I kept reflecting, and then, we talked about impartiality. And then, that helped me to broaden my capacity and expand. (Nicole)
You can increase self-compassion	When doing meditation, you [can] feel like you are doing it wrong. I think being gentle with oneself during meditation is a skill—something that you learn from practice. I think that I'm learning that. (Eric)
Practice leads to improvement	There was a quote that resonates with me. I do not know where it came from, but it says, "I cannot think myself into right action, I have to act myself into right thinking." I feel like emotions fall into those kinds of categories in many ways. … I have to continue to practice this compassion with myself in order to continue to do well at it with others. (Eric)

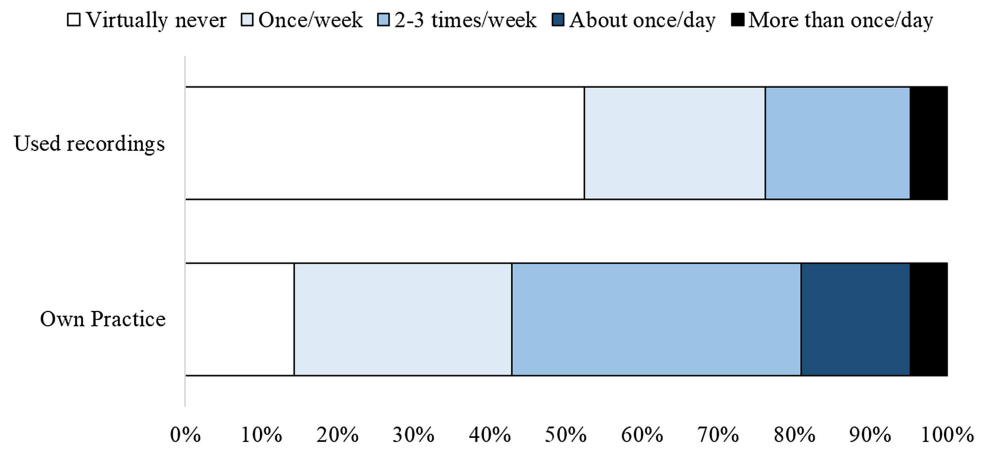

FIGURE 2 | Self-reported practice time depicted according to the frequency of practice on their own and using guided audio recordings.

using the audio recordings at least weekly, of which half (24%) reported that they used the recordings two or more times/week.

In our interviews to understand what chaplain residents reported experiencing and doing during meditation, residents reported incorporating CBCT practice into their daily work and household routines, sometimes blending elements of compassion meditation with everyday tasks, such as driving to work or walking between hospital buildings (**Table 3**). They also commonly reported blending CBCT practice in with familiar religious and spiritual activities, such as prayer and scripture study. While meditating, most interviewees described drawing upon the earliest contemplative exercises of resting in a moment of nurturance and focusing their attention on a neutral object as the most easily accessible resources to bring to mind when practicing CBCT in a spontaneous moment. Developing their knowledge of these and later analytical and compassion-specific contemplative exercises brought challenges and obstacles for residents to overcome and/or accept, described in more detail below.

Ways of Practicing CBCT

During in-depth interviews about CBCT practice, study participants reported engaging with CBCT meditation by adapting and individualizing their own procedures for practice. The training course presented a prototypical mode of CBCT practice in which the practitioner goes through a series of contemplative exercises over a sustained period of time, usually between 5 and 25 min. The exercises include visualizations, perspective-taking, introspective questioning, recollecting compassion-conducive aphorisms, and strengthening emotional and motivational states that propel compassion. Participants had the option to meditate while listening to audio-recorded meditation guidance similar to the verbal guidance provided by the instructor in class, or they could practice without outside guidance. Individuals who practiced without the use of audio recordings tended to adapt and individualize their own procedures for CBCT practice, including blending it with other spiritual and religious practices in their repertoires, as discussed below. Not all participants reported engaging with CBCT in the prototypical way, remaining still and seated. A small number of residents reported finding this type of meditation unpleasant and/or awkward and only engaged in it while in the CBCT class. Several others tried to engage in still and seated meditation initially before deciding it was not conducive for them. Still others reported that they engaged more with seated and still meditation for longer periods of time as their knowledge and experience of CBCT increased and deepened over time.

TABLE 3 | Developing and adapting skills and techniques.

Theme	Representative quote
CBCT aligns with current practice	I've been doing this, just not realizing that this is what I've been doing, you know, in some fashion, maybe not 'to the letter,' or 'to a T' …and so, that's what I mean when I say that it is comforting to know 'Oh, *this* is what I've been doing,' to have a name to go with it… (Danielle)
Engaging spiritual practice through the lens of CBCT	[CBCT is] even helping me now to be able to hear the voice of the Lord—personally. And, when I read the Bible, as a believer, as Christian, it has come alive to me. … It is making sense to me. Just this morning, after everything, when I got into my car. I took my phone—I have this Bible gate something. I was warming the car. I just wanted to know the verse of the day and they led me to the Bible verse: Jeremiah Chapter 29, Verse 11. And it said, "I have thoughts and plans for you, says the Lord. Thoughts of welfare and not harm." And so, it gives me cause to just reflect on it, just for a moment. Those words were given some meaning. It gave me reassurance and energy for the day. … God wishing me well and wishing them well—a sense of endearment. God is so endeared to me and to them. In spite their many sufferings, in spite of all their difficulties. This is God's thoughts about me. It does not mean that problems will not be there. It does not mean that pain will not be there. It does not mean that sickness will not be there. But, in their midst of all that, God's heart is so much to me. That gives me a kind of resilience. And even when I'm out of the zone [of resilience], this reassures me, and I come back. (Isaac)
Skills in letting thoughts arise and pass	The thoughts might not change, but at least I'm prioritizing them. As to what will bring me endearment, compassion, generate energy in me, and those thoughts that might be harmful: just as they are sparks, just try to push them, just let them go. It's just like a sieve—to filtrate. Let the harmful ones go, and the good ones that will help with my endearment, to generate some warm wholesome energy in me that I will also be able to give that to others. (Isaac)

Nearly all the residents who participated in the interviews also reported brief, intermittent engagement with CBCT by pausing briefly during their daily activities to bring to mind either a moment of nurturance or to breathe mindfully. They reported that the purpose of doing so is to momentarily attune to a personal intention and purpose, a spiritual or religious identity, an existential framework, such as being in God's care, or with the orientations and perspectives that facilitate compassion, according to CBCT. Interviewees reported that this momentary attunement might last anywhere from a few seconds to several minutes, that it is extemporaneous and imperceptible to others, and that it does not involve questioning and analysis. In addition to momentary yet deliberate CBCT practice, interviewees also reported inadvertent engagement with CBCT as its perspectives and aphorisms naturally came to mind in the midst of activities and interactions to which they were relevant.

Practice Blending

Most chaplains interviewed described a type of practice blending, which involves mixing CBCT with their preexisting spiritual and religious practices and consciously invoking their religious commitments and understandings during meditation practice. For example, some chaplains incorporated a period of meditation during part of the time that they usually set aside for religious devotion and prayer at the beginning of the day. Interestingly, residents also used exercises and strategies from CBCT to augment religious and spiritual practices such as scripture study and prayer, for example by using the mental stabilization strategies to help them prevent mind wandering during both study and prayer. Practice blending tended to develop over time as participants' familiarity with CBCT increased. In addition to practice blending, chaplains enthusiastically connected various concepts and ethics that they learned in the CBCT course to parallel practices and teachings from their religious traditions within Protestant Christianity, and especially ones associated with stories and quotations from the Bible.

Learning Obstacles

Residents reported three distinct obstacles to practicing CBCT to their satisfaction. First, several reported "nodding off" (falling asleep) while meditating at home and during guided meditation in the CBCT classes. In addition, many reported lacking *opportunity* to practice on their own time and gain greater familiarity with the different facets of CBCT. They needed more space, privacy, quiet, and/or free time than they could find either at home, at the hospital, or both. A small number of residents reported initial concerns about incompatibility between CBCT and their religious traditions. All participants were Protestant Christians from a wide spectrum of denominations, each with clerical and theological backgrounds. While most saw no conflict between CBCT and their religious faith, some reported that they engaged with CBCT meditation *despite* believing that their co-religionists would object to it, and others reported that they declined to participate in meditation at all in the initial stages of CBCT training. However, these residents reported that their reservations did not persist past the second training session. One chaplain who had religious misgivings and said prayers while her peers were trying out CBCT meditation for the first time reported that she resolved her concern that meditation would transgress her faith commitments by redefining CBCT as self-care and not especially relevant to her religious identity. Others reported finding strong parallels between their religious teachings and the concepts presented in CBCT, allowing them to see the practice of CBCT as in alignment with their religious identity.

In addition, many chaplains reported relying heavily on the early CBCT modules: resting in a moment of nurturance, focusing attention on an object, and monitoring the flow of mental experience and were hesitant to progress past those steps in the protocol. While any given CBCT meditation session might not cover all the learning modules, both in the CBCT manual and in the audio-recorded meditation guidance, the concepts and contemplative exercises from the two earliest learning modules are most likely to be included at the beginning

of meditation sessions, even when working on one of the later analytical modules. This suggests that the earlier modules may have felt more accessible than the later modules because they are more heavily practiced, providing participants with greater opportunity for familiarity and comfort. Several chaplains were apprehensive that combining all the modules together would make CBCT (a) too difficult to master, or (b) too cumbersome to be practiced regularly.

Awareness of Knowledge Learned

Several chaplains reported difficulty remembering the entire CBCT sequence outside of the group training context. However, despite reporting difficulties internalizing and incorporating the latter modules of CBCT, when participants were asked to describe a self-guided CBCT meditation session that they had just completed as a component of the second and third rounds of interviews, several participants were able to recall more elements from the latter analytical CBCT modules than their description of learning difficulties seemed to suggest. In addition, descriptions of subjective meditation experiences and sequences of contemplative steps and strategies differed depending on whether the respondents were recalling a meditation session they had just completed and that was still fresh in their working memory or whether they were recalling ways of practicing CBCT based on experiences of meditating the previous day or during the previous week. Recollections of having just finished meditating were much more detailed, afforded more content with which to draw connections and comparisons with the course material, and covered more of the CBCT modules.

Beliefs About Effectiveness of CBCT

A measure of chaplains' perceptions of the effectiveness of learning and practicing CBCT showed that 95% of respondents agreed or strongly agreed that they benefited from learning CBCT. In addition, a majority (81%) agreed or strongly agreed that CBCT improved their spiritual health consultations in the hospital. Sixty-seven percent agreed or strongly agreed that CBCT improved their personal relationships, 52% agreed or strongly agreed that CBCT improved their mental health, and 29% agreed or strongly agreed that CBCT improved their physical health (**Figure 3**).

There was a positive association between the frequency of CBCT practice and perceptions at Time 2 that the CBCT course was beneficial [$r_s(21) = 0.57$, $p = 0.007$], that CBCT would improve their spiritual health consultations [$r_s(21) = 0.49$, $p = 0.025$], that CBCT improved their personal relationships [$r_s(21) = 0.64$, $p = 0.002$], and that CBCT improved their mental health [$r_s(21) = 0.53$, $p = 0.014$]. After Bonferroni adjustment to account for multiple comparisons, meditation practice remains significantly associated with the perception that CBCT improved participants' personal relationships at an alpha level of 0.005. There was a positive association between changes in beliefs about compassion and perceptions at Time 2 that CBCT improved mental [$r_s(21) = 0.52$, $p = 0.015$] and physical [$r_s(21) = 0.45$, $p = 0.039$] health (**Table 4**). In interviews, residents reported that CBCT was effective in increasing self-compassion and for improving their ability to identify and understand their emotions. One resident reported the belief that CBCT will help make compassion her "second nature," making her compassion more effortless and effective. Another chaplain reported having several "ah ha" moments during training. For example, early in training, while engaging with the resting in a moment of nurturance module, she reported that she felt nurtured and protected for the first time. Two residents reported that they did not feel profoundly changed by their practice, though upon probing they both noted that CBCT had improved their ability to attune to their emotions and both expressed optimism that CBCT would bring about positive changes (**Table 5**).

DISCUSSION

Gaining a more detailed understanding of the effectiveness of compassion training requires researchers to identify variables that have not yet been considered and that may explain individual differences in outcomes and experiences. To aid in this effort, the current study reports findings related to processes of change, learning, challenge, and adaptation that occur when novices begin a compassion meditation program. Responses to the

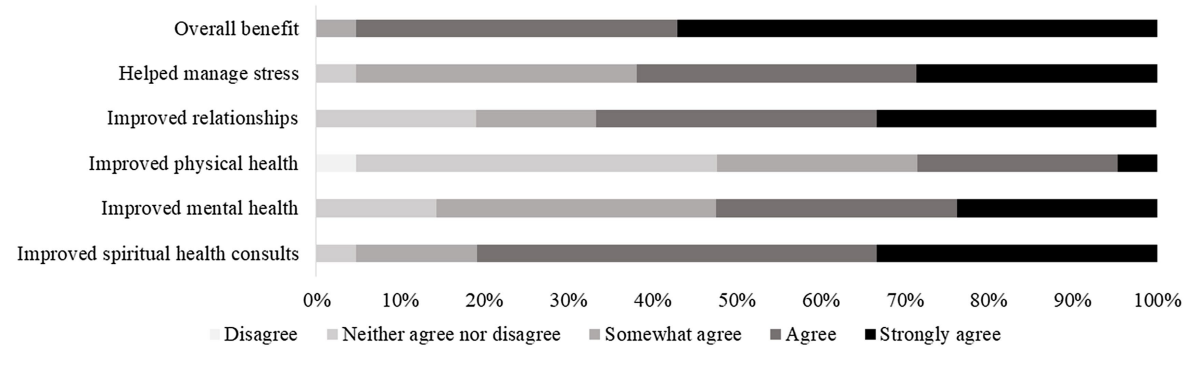

FIGURE 3 | Self-reported benefits of CBCT. Of note, no participants endorsed the "somewhat disagree" or "strongly disagree" options.

TABLE 4 | Correlation table of meditation practice time, changes in beliefs about compassion malleability, and perceived benefits of CBCT.

	Changes in compassion beliefs	"I benefited from learning CBCT"	"Learning CBCT will improve my spiritual health consults with patients"	"Learning CBCT improved my personal relationships"	"Learning CBCT improved my mental health"	"Learning CBCT improved my physical health"
Total meditation practice	0.26	0.57**	0.49*	0.64***	0.53*	0.16
Changes in compassion beliefs		0.24	0.24	0.37	0.52*	0.45*

**Correlation is significant at the 0.05 level (2-tailed). **Correlation is significant at the 0.01 level (2-tailed). ***Correlation is significant at the Bonferroni-adjusted alpha levels of 0.005 (0.05/11).*

TABLE 5 | Perceptions of whether and how CBCT was beneficial.

Theme	Representative quote
"Ah ha" moment	I think, the first day of CBCT training. When we were meditating, they told us to "look at the face of the person that has nurtured you… what did you see, what did you feel?" I can say that I really, really was into the training because my "Ah ha! moment" was that I had never felt nurtured before. I have never felt protected. I have never felt that. And so, when I began to look at a person's face and think about the things that I saw, then it's like the light bulb came on: "Wow, my husband do love me!" And, it has just been carrying on from that moment on. I think that's the only time I can say that I felt nurtured or felt protected is since I've been married with my husband. (Kim)
Emotion recognition	I learned that sometimes I felt something, and I did not realize why. And then [it would] just pass. But in CBCT, when I feel something, I kind of track [it] down, and then find the root, and kind of heal it. Not completely changing the past. It cannot change the past, but it can change my perspective or views, my interpretation. And then, actually, it liberated me. In that way, it's very beneficial. (Nicole)
Self-compassion	It started from self-compassion. Sometimes I cannot forgive myself [for] my mistakes, or my differences in the workplace. I look… less professional, and then I'm kind of blaming myself and then beating [myself] up. And then, I shoot a lot of second arrows… toward me. So, self-compassion that I'm not perfect, but it's fine. And that kind of relieved my anxiety level. (Nicole)
Compassion	One of the things that I know I was talking about is my compassion toward others has heightened greatly. Because now… where I used to see people from a certain lens, I'm learning how to view people from the lens of compassion, and warm heartedness. (Kim)
Recognizing common humanity	Have you ever heard someone say, "Some people in the world are not bad… everybody in the world is not bad!"? Well, what I've found out is, it's not so much that everyone in the world is not bad. It's just that everyone in the world has something that they are dealing with. And how they chose to deal with it may not be the way I would deal with it. So, it may appear that that person is bad or mean or inconsiderate or insensitive. But the truth of the matter is some people just deal with issues in life a little bit different than others. And I'm learning to see that. I'm learning to identify with those people who may handle or address things a little bit differently than I do, or than I would. I'm learning how to accept and respect the differences. (Kim)
Consistent access to compassion	When I'm doing [chaplaincy consultations] sometimes what'll creep in is the thought that all humans want wellbeing and not suffering. And that really changes [things] when you remind yourself of that. Especially when you are about to go into a code: "I should not only be compassionate but remember that even though this is my job and I've seen multiple codes, for this human, this family member about to engage in this moment, this is probably one of the worst things happening to them." And that has made my heart so much more tender going in… It really has been a profound thing for me. It does not matter if this is my twenty-fifth code, this person is in a unique setting, even if I'm used to this. And that's really changed the way I act. (Vanessa)

measure of belief in compassion malleability indicated that chaplain residents randomly assigned to CBCT showed significant change in their beliefs about the malleability of compassion. In our interviews, residents described how CBCT impacted their ability to cultivate and maintain compassion and warm-heartedness. Together, these findings are consistent with another recent study that found that CBCT training among breast cancer survivors resulted in altered semantic construction of the definition and concepts around compassion (González-Hernández et al., 2021), further highlighting the importance of changes in semantic knowledge and beliefs that occur during this analytical compassion-based intervention. There are several potential sources of increased compassion malleability belief. For one, CBCT content includes a discussion of the definition and nature of compassion, and it explicitly teaches that meditators can increase their compassion by practicing this style of meditation. Malleability beliefs may also be reinforced should participants observe an increase in their own or others' compassionate responses to suffering, which some residents reported during the interviews.

Previous research has found that beliefs about the malleability of empathy predict empathy and empathic behavior, especially in contexts where maintaining empathy is challenging or effortful (Schumann et al., 2014). The same original series of studies examining the scale also found that those with a more malleable theory of empathy worked harder to improve their empathic

accuracy as measured by the Reading the Mind in the Eyes task, suggesting that their beliefs about empathy influenced their willingness to pursue growth. This line of research emerges from a larger theoretical framework that links growth mindsets, as opposed to fixed mindsets, with positive psychological outcomes (Dweck and Leggett, 1988; Yeager and Dweck, 2020). Another line of scholarship highlights the importance of motivation for change for the success of compassion-based interventions (Steindl et al., 2018). Our findings are consistent with this, indicating that CBCT increases the extent to which practitioners believe that compassion growth is possible, which may be critical for the motivation for change. Interestingly, baseline scores on the belief in compassion malleability were relatively high and our sample contained less variance than was reported in the parent study of theories about empathy malleability (Schumann et al., 2014). This is not surprising, given that the sample in the current study was highly religious and training to be hospital chaplains. It is noteworthy that we were able to detect an effect of CBCT on beliefs even with the possibility of a ceiling effect. Although the change in scores among those randomized to CBCT was less than a point (on a seven-point scale) and the effect size was small, the effect was comparable to that of an intervention designed to alter beliefs about empathy (Weisz et al., 2021). While we cannot definitively link changes in beliefs about compassion to any positive outcomes of CBCT within this analysis, changes in belief were positively associated with perceptions that CBCT improved mental and physical health. These data indicate that compassion meditation may impart its effects in part by influencing this belief, and future research can further test this hypothesis. If such a hypothesis is supported, it would be consistent with recent observations that an unstated mechanism of effect in many psychotherapeutic interventions is the patient's adoption of beliefs congruent with the therapy's mental models (Goodman, 2016).

This finding is also consistent with what we know about the *lojong* tradition, from which CBCT emerged. The term *lojong* describes a process of mind training that aims to transform harmful thoughts, emotions, and behaviors into those that are beneficial to oneself and others (Silva and Dodson-Lavelle, 2011). As Geshe Thupten Jinpa writes: "whereby a process of training, habituation, cultivation, and cleansing induces a profound transformation—a kind of metanoesis—from the ordinary deluded state, whose modus operandi is self-centeredness, to a fundamentally changed perspective of enlightened other-centeredness (Jinpa et al., 2014)," CBCT was adapted from this Indo-Tibetan Buddhist tradition, and accordingly it has important differences from similar but non-analytical approaches such as lovingkindness (*metta*) meditation. While lovingkindness meditation typically involves the generation of an affective state (love and affection) that is extended outwardly to encompass ever-broadening circles of individuals, it does not typically seek to directly address cognitions that underlie hostility, prejudgment, self-focus, or bias. In contrast, CBCT focuses on teaching concepts such as interdependence and gratitude, using meditation practices and metacognitive reflective exercises to connect these concepts to personal insights. Compassionate affective states are regarded as a valuable downstream consequence of cognitive changes, but these affective states are not the primary focus. Ultimately, CBCT aims to cultivate cognitive changes that lead to an encompassing and powerful orientation of love and compassion for others. Our finding that chaplain residents report changed mindsets about the nature of compassion is in line with an understanding of how lojong and CBCT lead to meaningful change. A fruitful line of research will be to examine whether other non-analytical practices lead to similar changes in beliefs about compassion.

Chaplains' responses during qualitative interviews reflect the manifold ways that they, as novice CBCT meditators, enacted CBCT practice for themselves. Understanding variation in how individuals actually *do* CBCT itself is a somewhat narrow question within the larger domain of experiences associated with meditation. Yet, if our science proceeds according to an implicit reckoning that the participants' practice is a large part of what makes a contemplative intervention effective, then how they do so becomes a crucial link in the causal chain leading to individual differences in outcomes. This information reflects both what the novice meditator has done or experienced and their practical knowledge of the task, that is, the internal model of doing the action of compassion meditation that governs and drives how they enact it in different instances. Here, we found that participants relied more on practice that was unguided by the CBCT audio recordings. Interviews further revealed that residents commonly practiced resting in a moment of nurturance, a relational practice that has recently been highlighted as an often-neglected component of contemplative traditions that may be vital for helping practitioners overcome barriers to compassion and compassion training (Condon and Makransky, 2020). Our findings are consistent with this notion, given that chaplains in our study reported that this relational activity was among the more heavily used and effective components of CBCT.

Overall, the findings from this study have relevance for understanding meditation practice among novices for at least three reasons. First, a key finding that we wish to emphasize is that chaplains reported blending their spiritual and/or religious practices with CBCT meditation. CBCT instructions do not include representations of suprahuman beings, so the inclusion or importation of religious understandings and ways of relating to God or other divine personalities is noteworthy, though not unexpected. CBCT is presented as compatible with any (or no) religious beliefs, and practitioners are not asked to set aside their personal commitments to practice this meditation protocol. However, while CBCT removes religious symbols found in *lojong* (e.g., discussion of religious figures and related religious terminology), the goal of compatibility with many different beliefs and worldviews may be overly optimistic and may not adequately account for elements of *lojong* tradition that are implicit in the concepts taught in CBCT. It is relevant that responses to religious associations of *lojong* ranged from compartmentalizing, through mixing, and even rejection. Culture-mixing models have described how the mixing of religious components in a contemplative practice may depend on

participants' faith characteristics, such that participants who see the religious components as interacting with sacred values would be more likely to reject the intervention (Palitsky and Kaplan, 2021). As such models would predict, chaplains who initially rejected the practice on the basis of faith were able to adopt it after re-evaluating it as instrumental (self-care) rather than spiritual. Evidence suggests that participants who initially reject contemplative practices for religious reasons may become more amenable to engaging with them after further exposure (Mascaro et al., 2021). Our finding suggests that positive attitudes toward the intervention and opportunities to re-evaluate it as instrumental may support this process. Moreover, a portrayal of the intervention as secular may also obscure or underestimate (dis)connections between the tenets and practices of CBCT and those that are core to other religious beliefs, which may influence how CBCT is practiced and understood. This has important bearings on the common portrayal of contemplative interventions as secular, especially for practitioners who come to the intervention with a rich set of beliefs, rituals, and practices from a defined religion or spirituality. Providing participants with opportunities to autonomously reflect on connections and disjunctions between concepts taught in CBCT and their own religious commitments may be important for the acceptability of CBCT, as well as other contemplative interventions.

Second, our findings highlight the potential fallibility of recollection in the self-report of meditation practice. That is, chaplains regularly recalled implementing more steps from the CBCT protocol (especially the later more analytical modules) when they were queried immediately after meditating than they did when describing their typical CBCT meditation sessions, and some residents were genuinely surprised by how many of the modules they were able to complete without guidance from an instructor or a recorded voice. It is not clear why chaplain reports differed in this way. Behavioral recall is notoriously fraught and subject to cognitive and social bias as well as error in autobiographical memory (Schwarz and Oyserman, 2001; Parry et al., 2021). One possibility is that their memory of a "typical" CBCT meditation was an abstraction influenced by their notions of typical meditation as more in line with non-analytical mindfulness practices. However, it is also possible that the two methods for measuring and evaluating meditation practice capture distinct constructs. That is, perhaps the more immediate measurement captures actual practice, whereas the recall method captures the practice that was most meaningful or salient to the chaplains. It is also worth noting that most chaplains did not rely on audio recordings, potentially increasing their reliance on abstracted notions of the practices in declarative recall. An important implication of this finding is that prompting participants to describe their typical practice as a method to assess their level of learning and skill (i.e., a memory-based assessment) might underestimate the knowledge that participants acquired—and, therefore, the success of the protocol—compared to inviting them to discuss their practice immediately after engaging with it (i.e., a practice-based assessment).

Third, the most reported form of practice reported in the interviews was extemporaneous "off-the-cushion" practice incorporated into the activities of daily life. While we are hardly the first to point to the importance of such scaffolded practice (Lyddy et al., 2016; Vago et al., 2019), our findings are to our knowledge the first interventional study to highlight how important this component of compassion meditation may be. Here, we found that total practice time was associated with several self-reported benefits of CBCT, including overall benefits, improved spiritual health consultations, improved personal relationships, and improved mental health. Future fine-grained research should evaluate the effectiveness of CBCT practice incorporated into daily life as a mechanism of change.

Investigating the process of learning in meditation training is crucial because many participants in such interventions are meditation novices who are tasked with engendering contemplative target states—compassion, loving kindness, mindfulness—but who must first learn the basic conceptual framework in which enacting the meditation techniques and building proficiency in the techniques themselves makes sense. CBCT presents a manualized set of techniques in its series of learning modules (the foundational module plus modules 1–6). Trainees must interpret descriptive instructions both prior to and during the act of meditating. Yet, while the cognitive representations that a novice might internalize of how to enact CBCT practice are expected to correspond with the standard instructions, our findings indicate that practice was highly variable across individuals and depended on personal experience and knowledge, day-to-day opportunities, constraints, needs, and a range of other contingencies. What is more, we found that practice was important inasmuch as it was associated with perceived benefits. Self-reported practice time was positively correlated with overall benefits from CBCT, and with improvements in spiritual health consultations, personal relationships, and mental health. Prior research examining the impact of practice time on later benefits from CBCT has been mixed. In the first study of CBCT, college students randomized to CBCT who practiced, but not those who did not, had reduced inflammatory response to a laboratory stressor (Pace et al., 2010). In a study examining the impact of CBCT among adolescents in foster care, practice time was associated with decreases in C-reactive protein (CRP), an indicator of inflammation (Pace et al., 2013). In contrast, a study examining the impacts of CBCT on the wellbeing of medical students found no relationship between practice time and CBCT efficacy (Mascaro et al., 2016). The current study builds on this literature by highlighting significant variability in how participants practice as well as how they may conceive of what constitutes meditation practice (e.g., informal practice in daily life). As such, future research should consider innovative approaches to measuring practice time—and the variety of ways in which participants may elect to practice.

Limitations and future directions: the learning experiences of this group of chaplain residents are especially germane for understanding what meditation training is like for people with strong religious commitments and especially for professional religious leaders and pastoral workers from Protestant Christian religious traditions. Their learning experiences suggest

sub-processes, themes, and mechanisms leading to different individual outcomes of contemplative interventions and meditation in general. While this new knowledge is important for understanding how novice meditators with active religious orientations may encounter a contemplative practice, it also potentially limits the generalizability of our findings. Hospital chaplains work in religiously pluralistic settings and are often adept at reframing and refashioning prayers, rituals, and other practices to contain combinations and abbreviations, and in the clinical context these adaptations may then be imbued with new and poignant meanings (Liefbroer et al., 2017; Liefbroer and Nagel, 2021; Mealer, 2021). All of this is crucial to a hospital chaplain's clinical role. Our finding that chaplains creatively incorporated CBCT into their corpus of spiritual practices is among the most important findings of the current study, but future research will be important to examine how common this blending is among other novice meditators, especially those with a strong faith orientation.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Emory University Institutional Review Board. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JM conceived of the study, oversaw quantitative data collection and analysis, helped with qualitative interpretation, and helped write the paper. MF conducted interviews, coded the qualitative data, and helped write the paper. MA helped design the study, helped interpret the findings, and helped write the paper. PP helped design the study, helped collect quantitative data, helped with data analysis and interpretation, and helped write the paper. AS helped analyze the data. DK contributed to revised drafts and provided content and expertise on the interpretation of LIWC 2015 variables. RP contributed to revised drafts and provided expertise on religion and mindfulness-based interventions. GG and CR helped conceive of the study, helped interpret the data, and helped write the paper. All authors contributed to the article and approved the submitted version.

FUNDING

This research was supported by a 2017 PEACE grant from the Mind and Life Institute. Preparation of this manuscript was additionally supported by the National Institutes of Health under grants 5K01AT010488 (JM) and 1F32HL154751 (DK).

ACKNOWLEDGMENTS

We are immeasurably grateful to the chaplain residents for their generosity of time and open spirit of honesty and truth-seeking.

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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CONCEPTUAL ANALYSIS
published: 05 April 2022
doi: 10.3389/fpsyg.2021.800281

Contemplation: Its Cultivation and Culmination Through the Buddhist Glasses

Madhumita Chattopadhyay[1,2]*

[1] Department of Philosophy, Jadavpur University, Kolkata, India, [2] Centre for Buddhist Studies, Department of Philosophy, Jadavpur University, Kolkata, India

Buddhist account of consciousness provides a new way of looking into contemplation, where absorption into meditation does not only bring in changes in the neural level but in the very personality of the individual, turning him into a good human being. The Buddhists recommend the practice of *vipassanā*, literally meaning insight but actually standing for the realization of the supreme enlightenment breaking off all the internal fetters through the practice of seven different types of purity, such as purity of morals, mind, views, and insight, etc. In early and later Buddhist literature, it has been categorically emphasized that one should not practice solitary mindfulness but should practice enriching the higher qualities of the mind such as compassion, friendliness, etc. The point is that the contemplated individual, the Bodhisattva, should possess the perfection of wisdom (*prajñā-pāramitā*) and be equipped with the skill of *upāya*s. The practice of these *upāya*s, however, will not create any new bondage for the contemplative mind. When the individual is able to attain this broad outlook, he will be said to achieve the highest contemplation – this is the ultimate objective of Buddhist meditation. Meditation is needed for this change of outlook – transition from "I" to "we". This is the only way to bring peace of mind and peace to the whole world.

Keywords: ***dhyāna citta*, *magga citta*, *bhūmi*, *samatha*, *vipassanā*, *brahmavihāra*, *śrāvaka*, bodhisattva**

OPEN ACCESS

Edited by:
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***Correspondence:**
Madhumita Chattopadhyay
madhumitac47@gmail.com;
madhumita.chattopadhyay@jadavpuruniversity.in

Specialty section:
This article was submitted to Consciousness Research, a section of the journal Frontiers in Psychology

Received: *22 October 2021*
Accepted: *09 December 2021*
Published: *05 April 2022*

Citation:
Chattopadhyay M (2022) Contemplation: Its Cultivation and Culmination Through the Buddhist Glasses. Front. Psychol. 12:800281. doi: 10.3389/fpsyg.2021.800281

INTRODUCTION

Difference in Ordinary and Philosophical Understandings of *Yoga*

In recent years, the term "meditation" or more correctly "*yoga*" has become very popular throughout the world, especially among health-conscious people. This popular usage makes the term "*yoga*" refer to the practice of certain bodily postures (*āsana*s), certain breath-control (*prāṇāyāma*) exercises, and practice of some forms of meditation such as reciting the word "*oṃ*". Obviously, such so-called *yogic* practices have as their main aim removal of diseases through maintaining the fitness of the body. In other words, the ordinary understanding of *yoga* is body-oriented. However, this popular sense was not what was originally associated with the term "*yoga*" in Indian philosophy. There, it stood for a method of self-regulation aiming at the attainment of liberation (Gokhale, 2020).

Liberation (Bronkhorst, 1993)[1] has been described as a stage free from all sorts of suffering. From the psychological point of view, it may be regarded as a state of mind, free from all sorts of tension, sorrows, and sufferings. Naturally, such a stage is desirable by all. In modern psychological terminology, it may be regarded as the stage of well-being. Generally, meditation or contemplation (*dhyāna* or *samādhi*) is considered to be its core means, retaining the other features such as bodily postures, breath-regulation, etc. in the periphery. This meditation or contemplation stood for the concentration of the mind at its optimum for the orthodox thinkers who believed that the ascetics or the saints alone are the only eligible persons and not the ordinary people with the fleeting mind. Buddha, however, did not accept such a view. With a socialistic and equalitarian outlook, he wanted to bring liberation within the reach of the common people, and that too not by lowering the standard of liberation, but by uplifting the consciousness of the common people to such a level that they can start the process of meditation to become a holy man or a saint (*ārya*) or a noble one to attain the stage of liberation.

Definition of an Ordinary Person

An ordinary person, in the language of the Buddhists, a *pṛthagjana* (*puthujana* in Pāli), is the one who has not entered the path of seeing (*darśanamārga*) the four noble truths (*āryasatya*) or the supramundane noble factors (Nāṇamoli, 1991) (*āryadharma*). Ordinary persons, according to *Śrāvakabhūmi*, are of four varieties – (1) all the non-Buddhists; (2) those who are Buddhists in faith but whose spiritual faculties are weak; (3) those who are Buddhists and have keen spiritual faculties but whose roots of the wholesome factors are unripe; and (4) the bodhisattvas who wish to attain Bodhi awakening (that is awakening of the ultimate wisdom) not in the present life but in the future (Shukla, 1973). These four types of people can be broadly subdivided into two categories – that of ordinary people with complete bondage and that of adepts with partial bondage. Vasubandhu in his *Abhidharmakośabhāṣya* has regarded "non-possession of the noble paths" (Vasubandhu et al., 1998), as the characteristic of an ordinary person[2]. His condition is characterized as being entangled with nescience (*avidyā*) or ignorance (*ajṅāna*), delusion (*moha*), and different types of moral fault and defilements (*āsrava deṣa* and *upakleśa,* etc.) which are responsible for his rebirth and repeated existence in this world full of pain and suffering. Nescience or ignorance stands for the traditional concept of a false view of self or belief in the self and also in adherence to a thing as of one's own (*ātmātmīyābhiniveśa*). Out of this false view regarding the self, there arises attachment for worldly objects in them.

Necessity of Meditation for Ordinary Persons: Buddhist Viewpoint

For such ordinary individuals, Buddha recommended contemplative practices which can remove their attachments for mundane phenomena and help them progress in their spiritual journey. With such practices, they ultimately become successful in attaining the final stage of contemplation when they will have a direct realization of the true nature of objects and become successful in attaining liberation. In Buddha's teachings, there is an elaborate discussion of the different stages starting from the primary one, when the individual can start with the process of concentrating his mind on a fixed object. Another important feature of Buddha's analysis of contemplation is that such practice not only removes ignorance step by step but also brings advancement or progress in our cognitive system. It also brings in a change in the culmination of our emotions which according to the Buddhists is as much needed for our well-being as is knowledge. Accordingly, the Buddhist literature, both the early and later forms, provides an elaborate analysis of the different stages of consciousness and also of the processes to move from one stage to another. In short, the Buddhist analysis provides a good example of contemplative practices, which if properly carried out, can lead to the cultivation of knowledge and of good emotion at the same time.

In terms of contemplative practice, the Abhidhamma literature maintains the primary role of the witness consciousness in the alleviation of human suffering. The meditative or contemplative practices recommended in this tradition for the attainment of the state of liberation or that of well-being are to a large extent systematic and scientific in nature. This scientific character is responsible for its popularity throughout the world for eliminating suffering even today when men are passing through difficult times in respect of their personal life and professional life. Modern psychological treatment also recommends meditation as a tool to get rid of anxieties, tensions, and depression, etc., and has a feel-good sensation. This meditation can be regarded as the modernized form of ancient contemplation. The advantages of meditation or contemplation have been stated in the text entitled *The Questions of King Milinda* thus. "Meditation preserves him who meditates it, it clears him from faults, it removes from him any bad reputation going him a good name, it destroys discount in him filling him with content, it releases him from all fear endowing him with confidence, it removes sloth for from him filling him with real, it takes away lust and ill-will and dullness, it puts an end to pride, it breaks down all doubt, it makes his heart to be at peace, it softness his mind, it makes him glad, it makes him grave, it gains him much advantage, it makes him worthy of reverence, it fills him with delight, it shows him the transitory nature of all compounded things, it puts an end to rebirth, and it obtains for him all the benefits of renunciation" (Rhys, 1890)[3]. The detailed analysis of the subtle changes taking place in consciousness or in our brain

[1] Liberation has been expressed through different terminologies such as *mukti, apavarga, nirvāṇa, kaivalya,* and *mokṣa.* Different schools of Indian philosophy not only use different terminologies, and they also are not unanimous regarding the nature of this state. According to some, it is a state of profound happiness; according to others, it is a stage of supreme bliss; for some, it is a stage which cannot be described as either pleasure or pain, etc. However, in one respect all the schools are in agreement that this liberation is a stage which is completely free from all sorts of suffering.

[2] *mārgasyāptiaptir iṣyate pṛthagjanatvam*/.*Abhidharmakośa* 2.40.

[3] *The Questions of King Milinda,* p. 197.

processes or our neurological network that has been worked out in the ancient Buddhist texts is lacking in the popular practice of meditation. As such to understand the necessity of meditation, and the interrelationship of meditation with well-being, and to know how the practice of meditation helps one to become a good social being and so is ultimately conducive to the betterment of society, it is essential to take a look into the Buddhist analysis of consciousness. In this paper, the aim is to present the Buddhist formulation of the steps to be followed to initiate the process of contemplation and proceed gradually from one stage to another to reach ultimately the state of well-being, where no stains of evil mental thoughts can be found.

Consciousness: Its Analysis and Division From the *Abhidhamma* Point of View

The Buddhists apply their doctrine of causality or *pratītyasamutpāda* to find out the root cause of suffering. According to any causal principle, if A gives rise to B, then for the elimination of B, the cause of B, namely A, needs to be eliminated. Based on this principle, Buddha found that the main cause of suffering is ignorance which is there in the human mind from the beginning-less past. This ignorance proceeds from one birth to another through the flow of consciousness which leaves one body at the moment of death (*cūticitta*) and causes the beginning of another flow of consciousness which gets associated with a new body at the moment of conception and is known as the "new birth" (*paṭisandhi citta*); this flow of consciousness continues till the moment of death. Starting from the moment of conception to the moment of death flows the underlying subliminal state of consciousness (*bhavānga citta*) which often rises to the upper level of consciousness as a response to the stimulus received from outside. What we ordinarily regard as the mind along with its different functions is actually this upper form of consciousness.

Among the early Buddhist literature, the Abhidhamma (Vetter, 1988) texts provide us with a significant advanced model of consciousness. Depending on the nature of the objects toward which consciousness is directed, this mind or consciousness is regarded to be of two types – mundane and supramundane. The supramundane variety of consciousness has as its object *Nirvāṇa* or liberation, whereas the mundane variety of consciousness is directed toward mundane objects. Since *Nirvāṇa* or liberation is something very subtle and needs deep contemplation, people with an ordinary feeble mind cannot proceed to this stage without prior training. Accordingly, the Buddhists start with the process of training the mundane level of consciousness.

Contemplative Consciousness: Its Beginning and Stages

The first stage of mundane consciousness is that of the ordinary one where the mind or the *citta* belongs to the sensual realms and moves from one sensual object to another very fast. It is actually from the second stage that the practice of contemplation begins. In fact, it is regarded as *dhyāna citta* (Gunaratna, 1980). This second stage of consciousness or mind is called *rūpāvacara citta*, where the mind or consciousness is being trained not to move from one object to another but to focus on one particular object. For a lay person, it is not easy to get the fleeting mind habituated with moving from one object to another, get concentrated on a fixed object. It needs long training. So, this stage of consciousness is thought to consist of five levels or stages. At the initial stage, the task is to draw the mind toward a definite object. Since ordinarily, the concentration is weak, the mind could fluctuate and the meditator could be subjected to frequent distractions. The sign may be lost due to any form of physical or mental disturbances and with it, the ability to recall the visual image sometimes becomes difficult. One-pointed, calm, and equanimous concentration on the learning sign is necessary and that subsequently leads to the "counterpart sign," which is a far more vivid and clarified image than the previous one. This counterpart sign is not merely a clearer reproduction of the learning sign but is imbued with its own characteristic. With its arising the meditation attains access level concentration. At the access level, the frequency of distracting thoughts begins to decrease and the object of meditation starts to dominate his mental field; still, the possibility remains that intrusive sensory signals can divert the attention of the meditation from the object.

This second stage of consciousness consists of five constituents – *vitarka, vicāra, piti, sukha, and ekāggatā* – which can, respectively, be regarded as the initial application, sustained application, pleasure, happiness, and one-pointedness. This stage actually leads one to the ascent from the initial stage to the stage of absorbed meditation, through different intermediary stages. As one proceeds in the process of meditation gradually, one constituent part or factor of each stage lessens, except that in the fifth-stage happiness or *sukha*, gets replaced by equanimity, indifference, or *upekkhā*.

Let us take a brief look at the five constituent factors helping the individual proceed in the stage of absorption in meditation. "*Vitakka*" or initial application is the process by which the fleeting mind is driven toward a fixed or definite object. *Vicāra* or sustained application is the continuous exercise of consciousness to keep it fixed on that object and merged therein. *Piti* or pleasure is that constituent that elates the mind. Where there is pleasure, there is happiness or *sukha*. The difference between these two constituents is explained in the Abhidharma philosophy with the simile of a thirsty traveler who sees a transparent stream from a distance and the satisfaction that he gets after drinking the water. Here, his feelings excited by the sight of the stream is called pleasure, and the satisfaction that the individual gets after attaining the object is regarded as happiness (*sukha*). *Ekāggatā* or one-pointedness is that which deepens and develops into ecstatic meditation.

As one proceeds from one stage to another gradually, the constituents get dropped one after another, and ultimately, there remains one-pointedness and indifference which is the changed form of happiness. For example, in the initial stage, the *vitakka* or initial application is required as it was necessary to train the mind not to move from one object to another, but to get it fixed on any particular object. When the individual is successful in his practice of applying the mind to one object, rather than passing from one to another at a time, he is promoted

from the first stage to the second one. In this second stage, then, there is no longer any need for the element of initial application. Accordingly, that element or constituent is dropped and what becomes important and necessary is the training for sustained application of the mind to the fixed object for a longer time. So, in the second stage, *vicāra* or sustained application of the mind is required. It helps the individual to concentrate on the object without "*vitakka*." When one ascends to the third stage, one already has achieved success in attaining sustained concentration on an object. Therefore, there is no necessity for the first two factors or constituents; when they have dropped accordingly, they become defunct. In this stage, there exist only three factors, pleasure, happiness, and one-pointedness. When one attains the fourth stage, one enjoys the object by his sustained application of mind or concentration and so one gets the feeling of satisfaction which produces happiness. Accordingly, in the fourth stage of meditation, there remain only two factors operative which is happiness and one-pointedness. When one proceeds further and reaches the fifth stage, one becomes absorbed in the object completely. At this stage, the meditator is not at all concerned with any sort of feelings, happiness, or sorrow. He is rather engulfed with a kind of indifference. The mind is wholly absorbed in the object of meditation and becomes finer, subtler, and more tranquil than the former four. Absorbed in deep meditation, the mind is fully awake but remains undisturbed by objects and events happening outside, since the process of receiving data through sense faculties and transforming those data to be objects of knowledge is no longer operative. In other words, in spite of seeing, hearing, smelling, tasting, and touching, organs such as the eye, ear, nose, etc. are not able to see, hear, smell, taste, and touch their respective objects. The absolute concentration of the mind on the object of meditation paralyzes the function of the sense organs to give rise to sensory cognition which leads to attachment. On the contrary, the potentiality of the mind is increased to such an extent that it is capable of penetrating into the real nature of an object (Bannerjee and Chatterjee, 2018).

Attaining the final level of the second stage of contemplation, the progressive mind of the meditator does not want to remain contented with this attainment, rather feels a sort of dissatisfaction for the gross object of meditation. He has the feeling that the physical body is the source of all pain and suffering and because of this physical frame, there is no end to human suffering. Since the present object of meditation has similarity with the human body in having a physical frame, the contemplative mind gives up such coarse, gross things as his object of meditation and looks for something formless as the object for his contemplation. For this development of the mind, he ascends to the stage of formless contemplation, where the object of meditation is no longer anything gross but is subtle, formless. The first formless object that comes to the mind is that of space (*ākāśa*). Accordingly, the primary stage of this higher level of meditation starts with contemplating the infinity of space. Being absorbed in meditation on the notion of the infinity of space, the meditator finds his mind identified with infinity and no longer does the material object produce any effect on him in spite of the fact that his sense organs get related to the respective objects by the natural course of action. In the depth of his meditation, he feels his mind to be identified with infinity. The notion of duality ceases. The notion of oneness with the infinity of space brings in the concept of the infinity of consciousness. Generally, following the natural law of objects, consciousness or mind originates in one moment and dissolves in the next moment, giving rise to the idea of finite consciousness. But when through meditation, the meditator proceeds toward meditating on the infinity of consciousness, he appears to develop a feeling of indifference toward the idea of finite consciousness. His mind seems to transgress the limit of this state of finite consciousness and proceeds to the idea of infinite consciousness which is as if nothing and even the fraction thereof does not exist. In pursuance of the concepts of non-existence, there grows a feeling of nothingness – everything is void. This voidness or emptiness is manifested more and more. It is called "*akiñcana,*" that is, a nothingness that becomes the object of meditation. In this stage, the individual becomes more exalted and serene. Still, the individual wants to proceed further without being complacent. In the depth of serenity and calmness, consciousness along with all its faculties loses its grossness and acquires subtlety. Because of this subtleness, consciousness in this level cannot be regarded as perception (since it is no longer determinate); it cannot also be regarded as a case of non-perception (since here, consciousness is present, but because of its subtlety, it cannot be asserted). At this stage of contemplation, the level of consciousness is regarded to be such which is neither perception nor non-perception. We have seen that the individual through the practice of contemplation is able to attain that level of consciousness that is absorbed in the object of meditation and is able to enjoy tranquility and serenity. In spite of the fact that the mind is completely absorbed in contemplation, the object, however, subtle it may be, is something of the mundane nature. As he advances further, his mind or consciousness proceeds from the mundane to the supramundane one because the object turns out to become subtle from the gross, from the subtle to the subtler one, and no longer remains in the level of the mundane one and turns toward the supramundane to attain the concept of Bodhi.

Supramundane Consciousness: Its Different Stages

When the focus of his mind has been elevated toward this supramundane he attains the stage of "*magga citta*" which will lead to *Nirvāṇa*. This *magga citta* is of four varieties – consciousness relating to the path of **stream-attainment** (*sotāpanna*), consciousness relating to the path of **once-returning** (*sakadāgāmī magga citta*), consciousness relating to the path of **never-returning** (*anāgāmī magga citta*), consciousness relating to the path of ***arhat*-ship** (*arahatta magga citta*) (Nārada Thera, 2013).

The distinction of the four stages of supra-mundane consciousness is not based on the objects of contemplation but on the result, namely decrease in the number of rebirths, which

actually indicates how much one is progressing in his journey toward the ultimate goal. One who plunges into this stream of contemplation cannot revert and is destined to attain his goal of Nirvāṇa in due course by maintaining steady progress. The progress of oneself in the journey depends on the degree of the removal of the bad roots (*mūla*) which stand as hindrances in his way and on the degree of the cultivation of the illimitable good qualities, which are technically known as *Brahmavihāra*. As such in the text, *The Questions of King Milinda*, the monk Nāgasena tells the king that "... the Tathāgatas, O king, long for the enjoyment of the bliss of attainment, of the joy of the tranquil state of Nirvana, that they devote themselves to meditation, with their minds fixed on the end they aim at" (Rhys, 1890)[4].

The Buddhists admit ten fetters which are (1) dogma of the self (*satkāyadṛṣṭi*), (2) attachment to mere rules and rituals (*śīlavrataparāmarśa*), (3) doubt (*vicikicchā*), (4) excitement for sensuous pleasure (*kāmacchanda*), (5) hatred (*vyāpāda*), (6) lust for the world of forms (*rūparāga*), (7) lust for the formless world (*arūparāga*), (8) excitement (*auddhatya*), (9) conceit (*māna*), and (10) misconception (*avijjā*). Of these ten, the first five are called lower fetters as they belong to the world of sensual objects. The remaining five are regarded as upper fetters as they operate in the higher worlds of the form (*rūpa*) and formlessness (*arūpa*). In the formless stage, the lust for the world of form (*rūpaloka*) does not remain, but lust for formlessness or the *arūpaloka* and the other higher fetters may remain.

Contemplation is the initial stage of this supramundane consciousness. The misconceptions are removed there and all doubts are set at rest. Though the ego-sense and desire continue to exist, they lose their potentiality to hinder his upward journey and bind him down to the world of material objects. Because of the removal of misconceptions and doubts, the immoral consciousness that has its roots in misconception and doubts gradually get removed from his mind. Out of the twelve immoral qualities, five get eliminated as a result of contemplation in the initial stage of supramundane consciousness. Thus, the stream-entrant contemplator (*sotāpanna*) has been able to exhibit advancement in moral perfection, mental development, and insight. With this, the individual proceeds to a further step of advancement in respect of supramundane consciousness which is known as the *Sakadāgāmī* stage or the stage of once-returning. Attaining this stage of consciousness, all the desires regarding sensual material objects and also the ill-will associated with them gradually lose all their strength, as a consequence of which immoral consciousness rooted in greed and hatred become impotent to culminate into action. Further progress in following the eightfold noble path of moral perfection, mental development, and insight leads the individual to the third stage of contemplation which is known as the *anāgāmī magga citta* or stage of never-returning. This is called so because the practice of meditation in this stage leads to the complete removal of the two evils of sensual desire and ill-will. Consequently, the chance of returning to the world of sensual desires (*kāmaloka*) through rebirth gets completely stopped. In this advanced stage of contemplation, sensual desire and ill-will are completely removed, but other fetters, such as ego-sense, ignorance, etc. still remain, though they turn to be weak.

Continuous practice of the noble eightfold paths enables one to reach the fourth stage of supramundane consciousness, known as the *arhatta magga citta.* At this stage, the remaining fetters which had all lost their strength become very weak by constant contemplation and get completely removed. Just as at the advent of dawn, the darkness of the night is removed and the whole sky gets brightened by the golden rays of the morning sun; similarly, with the promotion of consciousness to the fourth stage, the mind shines in the full glory of the light of the supreme state. There remains no darkness, no impurity, and no ignorance. This unfettered free supramundane stage is called the *arhatta magga citta*. It is so-called because the individual has been able to "kill" (remove) all the "*ari*"-s, the enemies standing as a bar to the path of the attainment of the ultimate stage of liberation. In fact, attainment of this state is the goal of one's spiritual development and the highest attainment of life. In Buddhism, this stage is also regarded as *nirodha samāpatti.*

Process Consciousness and Resultant Consciousness

The *Abhidhamma* account of contemplation thus provides a description of the process and also the consequences which result from following the process of contemplation. In the Abhidhamma terminology, they are known as *magga citta* and the *phalacitta,* respectively. Through gradual practice of the different stages of supramundane consciousness one after the other, all the fetters or impurities get weakened; there arises immediately the respective resultant consciousness. The occurrence of the resultant consciousness from the practice of the process consciousness has often been compared with the lightening which flashes in between clouds for a second and then ceases. Contemplation starting from the second stage of mundane consciousness to the last stage of supramundane consciousness is called the "*jhāna citta vīthi*" or the contemplative process consciousness. It is also regarded as "*appana javana vīthi*." The term "*appana*" stands for ecstatic contemplation where the mind or consciousness along with all the mental faculties is absorbed in the state of perfect *samādhi*-ecstasy. The question of clarity or indistinctiveness of an object does not arise, for ecstatic concentration cannot occur without the clarity of the object. However, identifying or registering the object as so and so does not happen in their contemplative procedure as the function of registering or identifying is operative in the case of consciousness of sensible objects (*kāmāvacara citta*) only. Thinkers of the Sarvāstivāda and Yogācāra schools describe the stage of practice in the following manner. After a certain number of preparatory steps such as *aśubhabhāvanā* "the realization of an impure body" which means the practice of meditating on the progressive deterioration of corpses, one enters the stage of *catvāri smṛtyupasthānāni,* where a practitioner first observes that the body (*kāya*) is impure (*aśuci*), that the sensations (*vedanā*) are suffering (*duḥkha*), that the mind (*citta*) is transient (*anitya*), and that the existent elements (*dharma*)

[4] *The Questions of King Milinda*, p.198.

are self-less (*anātman*), respectively, and then further observes in a unified way that the body, the sensation, the mind, and the existent elements are all impure, suffering, transient, and selfless. After this two-fold mindful observation which constitutes *mokṣabhāgīya* together with the above mentioned preparatory steps such as *aśubhabhāvanā,* etc., the practitioner next enters into what is called *nirvedhabhāgīya* (*kuśalamūla*) stage (Funayama, 2011)[5] which, according to Vinītadeva and also the Śravākayāna tradition, is such that the object of meditation is the four noble truths (*caturārya satya*). This process of *abhisamaya* or "full comprehension" comprises four stages, which may be described simply in the following manner.

First is the preparatory steps such as *aśubhabhāvanā* and *ānāpānasmṛtibhāvanā* followed by mindful observation or the establishment of mindfulness (*Smṛtyupasthāna*) leading to *uṣmagata* (the heated), then *mūrdham* (summit), and then *kṣānti* or acceptance leading to highest worldly elements. The condition of being an ordinary person (*pṛthagjana*) is retained through these stages. From the next moment starts the new phase as a holy being (*ārya*) which in the Śrāvakayāna tradition is regarded as the path of seeing (*darśanamārga*) and the path of contemplation (*bhāvanāmārga*) and in the case of Mahāyāna, as the Bodhisattva's ten stages (*bhūmi*) (Funayama, 2011)[6].

The Notion of *Bhūmi*

The word "*bhūmi*" means field or jurisdiction. In the *Abhidharmakośabhāṣya,* it has been pointed out by Vasubandhu that field means the object or region of movement (*gativiṣaya*). Whatever be the object (or region) of movement of something is called its field. Those who have a great field are called "*mahābhūmika*" as they are present in all types of minds[7]. According to Vasubandhu, one-pointedness of mind or *ekāgratā* which is the same as *samādhi* is regarded as *mahābhūmika*, in the sense of having a great jurisdiction since all minds will have to be regarded as one-pointed. This is not so in another sense, because (in other states) one-pointedness may be weak[8].

Florin[9] (Florin, 2012), holds that *bhūmi* means foundation. He refers to Sthiramati's interpretation as found in *Yogācārabhūmivyākhyā* that the *pañcavidhā yogabhūmi* refers to the five types of stages of spiritual practice due to their being the basis (*āśraya*) and the ground (*adhiṣṭhāna*) of the cultivation (*bhāvanā*) of spiritual practice[10].

The Buddhists hold that when a practitioner wants to attain a meditative stage of a higher plane or field (*bhūmi*), he has to develop detachment toward objects belonging to lower planes. This is regarded by Vasubandhu as *adhobhūmivairāgya*[11]. So, when the practitioner reaches the highest top, he has developed detachment toward all objects belonging to all the levels. Detachment is the conscious mastery over desire by one who is free from craving for empirical or mundane and also other-worldly or supramundane objects. It can be attained by one whose long *abhyāsa* or practice results in the accumulation of the wealth of merit and knowledge (Pradhan, 1950)[12].

Notions of *Samatha* and *Vipassanā*

Buddhist meditation is always associated with the two terms *samatha* and *vipassana. Samatha* is usually equated with contemplation or meditation (*samādhi*) and the purification of emotions. The *dhyāna citta* that we described earlier starting with the *rūpāvacara* and the *arūpāvacara citta*-s constitute the *samatha* practice. In short, the practice that aims to develop the concentration of the mind before the occurrence of insight is regarded as *samatha.* Depending on the personality of the individual, the practices of *samatha* vary. Some of the practices are not necessarily linked to a secluded practice. Others, such as the *kasiṇa*s and the *aśubha*s, require sustained attention that needs seclusion and tend to be practiced in a monastic context or on a period of extended meditation practice. Breathing mindfulness and body mindfulness, as parts of *samatha* practice, can be developed in daily life and also a meditative practice. Mindfulness of the body is said to lead to the start of meditation if pursued as a *samatha* practice whereas mindfulness of breath leads to the later four stages of meditation. The cultivation of the *brahmavihāra*s in activities in the world is encouraged, but they may be developed as a meditative practice also. That is, there is great variety and scope among the meditation subjects – each is assigned according to the temperamental needs of the mendicant and each is admitted in the canonical literature and followed in traditional practices. All the *samatha* practices are aimed at arousing the enlightenment factors and making the mind concentrated (*samāhita*), manageable (*kammanīya*), and purified (*pariśuddha*); accordingly, *samatha* is compared with the process of purification of gold which when purified and melted can be shaped in any way. The person practicing the mundane path attains a series of even deeper levels of serenity and increasingly attains a state of consciousness which is regarded to be a state of tranquility meditation known as *samatha*. This meditation or contemplation cannot, however, lead the individual to transcend the cycle of birth and death and attain the stage of liberation. *Samatha* is actually a method of contemplation by which the individual can get rid of evil emotions and stress of mind. *Vipassanā,* on the other hand, stands for the spiritual culture by minute observations of the activities of body and mind. It works on ignorance and volitional activities, through the way that the world is viewed and understood. The three facts of impermanence (*aniccatā*), the unpleasantness (*dukkhatā*), and non-self (*anattatā*) are being taken account of. The aim of *vipassanā*, therefore, is not the attainment of *rūpa*-meditation or *arūpa*-meditation, but the realization of the

[5]Notion of this *nirvedhabhāgīya* stage has changed in the hands of later Buddhist thinkers like Kamalaúīla.

[6]T. Funayama – "Kamalaúīla's view on Yogic perception and the bodhisattva path", p.99.

[7]*Yo hi yasya gativiṣayaḥ sa tasya "bhūmiḥ" ityucyate/tatra mahatī bhūmireṣām iti mahābhūmikāḥ ye sarvatra cetasi bhabanti/Abhidharmakośabhāṣya* II.23.

[8]*Abhidharmakośabhāṣya* VIII.1.

[9]Florin, D – "Far from the Madding Strife for Hollow Pleasures: Meditation and Liberation in the *Śrāvakabhūmi*" pp 1-2 *Journal of the International College for Buddhist Studies* vol XVI, Year 2012, pp. 1–39.

[10]Ibid, p.2.

[11]*Abhidharmakośabhāṣya* VIII.14.

[12]*Abhidharmakośabhāṣya* VII. 34, VIII.35, Asanga *Abhidharmasamuccaya* p. 96.

supreme *Nibbāna* removing all the internal fetters through the sevenfold purity like purity of morals (*śīla viśuddhi*), purity of mind (*citta viśuddhi*), purity of views (*diṭṭhi viśuddhi*), the purity of transcending doubt (*kaṇkhā-vitaraṇa-viśuddhi*), purity of vision in distinguishing between the right path and wrong path (*maggāmagga- ñānadassana-viśuddhi*), and the purity of insights (*ñāna-dassana-viśuddhi*). In some schools of Buddhism, the *samatha* is emphasized whereas, in some other *vipassanā,* practices are emphasized. In the canonical literature, we find evidence of both. Both these practices help the individual to eradicate all sorts of mental defilements and approach the attainment of *vijjā* (*vidyā,* knowledge), *magga-ñāna* (knowledge of the path leading to well-being) (Nandamālābhivaṃsa, 2003)[13].

Notion of *Bhāvanā*

In Buddhism, two paths are recognized for attaining the stage of liberation – the path of perception or realization, technically called *darśanamārga*, and the path of cultivation of the mind through meditative practices, technically known as *bhāvanāmārga*. The term "*bhāvanā*" means practice. This practice, according to the Buddhists, aims at (1) arousing or producing those good qualities which were not there, (ii) retaining those produced qualities without any failure also, (iii) increasing the qualities to a greater extent, and (iv) removing all the bad, immoral qualities present in the mind and taking steps for their non-occurrence in the future (Pradhan, 1950; Shaw, 2006)[14]. The path of realization enables one to realize that all the mundane objects are of the nature of suffering. Out of such realization, one takes steps to get rid of attachment. But to be successful in abandoning attachment, one has to follow the path of practice. According to the Buddhists, four defilements, namely attachment (*rāga*), hatred (*dveṣa*), conceit (*māna*), and misconception (*avidyā*), stand as a hindrance to the attainment of well-being[15]. These hindrances can be overcome only through the repeated practice of meditation or contemplation[16]. As a result, of such practices arise detachment (*vairāgya*) toward objects. Progress in the practice of meditation has equal influence in the development of detachment toward objects as also in the occurrence of knowledge regarding the true nature of objects.

The later Buddhist thinkers hold that ignorant people wander in the cycle of rebirth because of their attachment toward worldly objects. The "*yogi*" or the person who meditates is able to overcome this delusion and by directing his great compassion toward all beings in the world, which proceeds to meditate further on *vipaśyanā* to realize the true nature of things. *Vipaśyanā* consists in the examination of the *bhūta*s or phenomena; *bhūta* stands for both *pudgala-nairātmya* and *dharma-nairātmya*, that is the notion of non-self and the notion of non-substantiality of everything. When this knowledge arises, the individual is able to realize the delusive nature of the concepts of "I," "mine" and attains proficiency in removing all the dirt of mind. Proficiency in washing all the dirt or faults, he attains proficiency in meditating on *śūnyatā* for the removal of all illusory apprehension (*prapañca*). Hence, the *yogi*, with his eye of knowledge wide open, is able to overcome his *kleśa* foes with the weapon of *prajñā* and subsequently can wander about without fear, unlike a frightened coward with the eyes closed (Bhāvanākramaḥ of Ācārya Kamalaśīla, 2020)[17].

Later Buddhist Thought on the Cultivation of *Bhāvanā*

Later Buddhist works such as *Bhāvanākrama* have not only recommended the development of human consciousness to the optimum level so that all sorts of ignorance can be removed; they have also stressed finding out the factors that make our life miserable. The objective is to eliminate those factors and make human life happy and worth-living. Two root causes have been identified as responsible for human suffering – one is the past *karma* of the individual and the other is the disturbing emotions of love, hatred, and ignorance. Of the three, no doubt the latter is the most harmful one and dominates over the other two; it is responsible for the cycle of existence in this world and has simultaneous occurrence with consciousness itself. Generally, we love our friends and near ones and feel attached to them, out of the belief that they have done something good for us – they are our beneficiaries; on the other hand, we develop hatred and detachment toward our enemies out of the belief that they have done harm to us. This love for the friend and hatred for the enemy is very natural. However, the notions of friend and enemy are not fixed – the best friend today may turn out to be the worst enemy tomorrow; similarly, the much-hatred enemy may be found to be a benevolent friend later. Naturally, the emotions of love and hatred are not reliable; they are products of our narrow-minded attitude borne out of temporary and fleeting views of things and situations. If this narrow-mindedness can be transformed into a broader perspective with a more far-sighted attitude toward entities, futility of the hostile attitude and attachment will develop in the individual and this will give rise to the feeling of equanimity toward all. With the advent of the same feeling of equality toward friends, foes, and strangers, the individual will be regarded as successful in his contemplative practices. As he gradually progresses in this direction in meditation, he will extend his feeling of equanimity toward his neighbors, fellow beings gradually and ultimately toward all beings. At a certain point, all sentient beings in the world will be included as objects of his meditation. But to start with this attitude may be detrimental to his spiritual journey. Hence, the Buddhist masters of the past have advised the technic of gradually extending the scope of meditation from specific individuals to all beings.

[13] *Dve me bhikkhave dhammā vijjā bhāgiyā.* Quoted in *Samatha and Vipassanā: Concentration and insight meditation* by Ashin Dr. Nandamālābhivaṃsa, Dhammavijjālaya, Centre for Buddhist Studies, (English Version) Sagaing, 2003 p.21.

[14] *Anuttpannānām kuśalānām dharmānām utpādāya yā bhāvanā… utpannānām kuśalānām dharmāòām sthitaya asaṃmoṣāy bhūyobhāvāya vṛddhivipulatayai yā bhāvanā… utpannānām papakānām akuśalānām dharmānām prahānāya yā bhāvanā… anutpannānām pāpakānām akśakunām dharmānām anutpādāya yā bhāvanā*/*Abhidharmasamuccaya* pp 70–71.

[15] *catvāro bhāvanāheyā tad yathā rāgah pratigtio māno vidyā ca. Abhidharmakośa* V.5.

[16] *dīrghakālābhyāsah nirantarābhyāsah satkṛtyābhyāsaś ca Abhidharma kośabhāṣya* VII 34.

[17] Tasmād visphārita-jñānacakṣuḥ prajnāúāstreṇa kleúārīn nirjitya nirbhayo viharan yogī, na tu kātarapuruṣa iva vinimīlitākṣaḥ/*Bhāvanākramaḥ* p.265.

Consequent to the cultivation of this feeling of equanimity toward all sentient beings, one can start meditating upon loving-kindness (*mettā bhāvanā*) which will help to develop the feeling of compassion in a swift and smooth manner. In the text *Bhāvanākrama,* it has been advised "Moisten the mental continuum with the water of loving-kindness and prepare it as you would a piece of fertile ground. When the seed of compassion is planted in such a mind, germination will be swift, proper, and complete. Once you have irrigated the mind-stream with loving-kindness, meditate on compassion" (Dalai, 2001)[18]. Meditation on compassion for a long time with great admiration will help to purify the mind-stream and get it ripened (Sharma, 2004). Then, the mind will get prepared for meditating on the perfect reality, just as it is possible to get fire by rubbing two pieces of wood only when the woods are dried. With such a purified mind, one will be able to get an extremely clear knowledge of phenomena free from conceptual elaboration[19]. Thus in the later, Bodhisattvayāna literature wisdom, and practice of compassion go hand in hand. It is believed that "the practice of compassion and the knowledge of emptiness will lead the individual to realize that the impurities of the mind can be removed and the state of omniscience can be achieved" (Dalai, 2001)[20].

Uniqueness of Buddhist Contemplation: Contemplation A Means to Well-Being for All

The Buddhists, starting from the earlier phase to the later one, believe that ordinary persons are eligible for attaining liberation. From the fact that the mega-encyclopedic text of spiritual journey, *Yogācārabhūmi*, (Asanga, 1957) consists of two parts *Śrāvakabhūmi* and *Bodhisattvabhūmi*, (Asanga and Nalinaksha, 1966) it seems that in the process of spiritual progress, a hierarchy of practice is admitted, namely first of following the *śrāvakayāna* path, then following the *pratyekabuddhayāna* path and then proceed to the course of spiritual cultivation as a Bodhisattva. Modern scholars like Florin think that if any form of hierarchy is to be admitted, that is not in terms of practice but in terms of religious ideals. From that point of view, *śrāvakayāna*, the lowest vehicle is to be placed first; this is followed by the path of the solitary Buddhas and finally the Mahāyāna. The *Śrāvakabhūmi* refers to three levels of practitioners (*yogācāra*) – beginners (*ādikarmika*), adepts (*kṛtaparicaya*), and practitioners who have transcended the practice of contemplation (*atikrāntamanaskāra*) (Florin, 2012)[21]. In other words, this text delineates the practices and the requirements of a contemplative, as he passes through the stages of a *śrāvaka, pratyekabuddha,* and Bodhisattva. The path of spiritual cultivation thus developed consists of two phases – one a preparatory phase which is more mundane in character and the other an advanced phase which is more of supramundane nature. When the practitioner first enters the preparatory stage, he is an ordinary person who is full of attachment, hatred, and other shortcomings. It is through undergoing a series of practices in restraint of morality (*śīlasaṃvara*), restraint of sense organs, moderate eating, mindful conduct, etc., that the novice is eligible to start with the process of meditation under the guidance of a master (Nyānaponika, 2017). It is after a thorough assessment of the psychic maturity and spiritual progression of the disciple that the preceptor chooses as the object of his meditation, any one of the following five – impurity (*aśubhā*), friendliness (*maitrī*), dependent origination (*idaṃ pratyayatāpratītyasamutpāda*), analysis of the elements (*dhātuprabheda*), and mindfulness of breathing (*ānāpānasmṛti*). Later, Mahāyāna thinkers emphasize two aspects of the gradual path leading to the attainment of the highest goal. The first one is acting for the benefit of others through the cultivation of virtues. This is the path of cultivating the qualities generally known as *pāramitā*s. The second one is related to the accumulation of gnosis or wisdom which will discern the nature of reality (*bhūtapratyavekṣā*). That is, for the Mahāyāna thinkers, both *dhyāna* and *prajñā* are important for reaching the state of ultimate well-being. In this respect, their view has been different from the earlier schools which one-sidedly championed for *prajñā* alone or for *dhyāna* over *prajñā.* The śrāvakayāna people put emphasis on the attainment of wisdom, without giving stress to compassion. Naturally, the goal aimed is *Nirvāṇa* for himself without thinking of the well-being of others. Later, Mahāyāna thinkers (Martin, 2002) or the Bodhisattvayāna thinkers recommend both cultivation of compassion and attainment of wisdom out of the belief that because of wisdom, these practitioners will be able to attain a stage where there is no chance of getting involved in mundane affairs. Again, because of the force of compassion, there is no chance of his staying on the stage of *Nirvāṇa*. Embracing the beings of the world without compassion is regarded to be bondage, and embracing all sentient beings with compassion is liberation. Thus, this later form of Buddhism provides a method of contemplation that leads to the accumulation of merit and wisdom with the determination to bind all sentient suffering beings of the world through the force of compassion. Being the epitome of wisdom and compassion, such practitioners aiming always for the welfare and happiness of other suffering beings will be the life-support for them. Thus, the essence of Buddhist contemplation (Wynne, 2007) is not to avoid the world, but to remain in this *saṃsāra* with a mind free from all sorts of attachment involving the thoughts of "I," "mine," etc. Such contemplation will widen his eyes to such an extent that he will no longer look for his own selfish pleasure and happiness, but will long for the happiness of all, well-being for all. The whole world will turn out to be his home and all mankind his brethren. Their suffering will be his own suffering, their happiness his happiness, and their well-being his own well-being. When the individual is able to attain this broad outlook, he will be said to achieve the

[18] *Stages of Meditation* p.54.

[19] Tasyaivaṃ karuṇām upāyaṃ bodhicittaṃ ca satataṃ satkṛtya dīrghakālam abhyāsyataḥ krameṇa cittasantatiparipākād ativiśuddhakṣaṇotpādāt araṇimanthanodbhūtāgnivat bhūtārtha-bhāvanā-prakarṣa-paryanta-gamane sakala-kalpanā-jālarahitaṃ sphūṭataraṃ niṣprapañca-dharma-dhātvadhigamaṃ vimalaṃ niścala-nirvāta-dīpavat niścalaṃ pramāṇabhūtaṃ lokottarajñānaṃ sarvadharmanairātmya-svabhāva-tattva-sākṣātkāri darśana-mārgasaṃgṛhītaṃ paramārtha-bodhicittaṃ svarūpata utpadyate/*Bhāvanākramaḥ,* p.252.

[20] *Stages of Meditation* p.154.

[21] Florin – "Far from the Madding Strife" p.10.

highest contemplation – this is the ultimate objective of Buddhist meditation. Meditation is needed for this change of outlook – transition from "I" to "we". This is the only way to bring peace of mind, peace to the whole world. Meditation or contemplation is the means to such well-being.

AUTHOR CONTRIBUTIONS

This manuscript tries to show following the original Buddhist texts available in Pali and Sanskrit, how the Buddhists provided an analysis of consciousness. In course of such analysis, they gave a quite novel account of how to progress in contemplation. The target group of this account was the ordinary people, the layman. The novelty of this analysis lies in the fact that through undergoing stages of such contemplation, the ordinary individual not only learns how to focus his attention on a particular object and get rid of all the factors that distract his attention and create different types of hindrances to disturb his mental peace and bring agony and discomfort. At the same time, it broadens his outlook so much that he feels for other sentient beings as much he feels for himself. The transition from the "I-consciousness' to the "we-consciousness" is the uniqueness of Buddhist contemplation. This has been highlighted in this manuscript, which is not found in any other existing literature.

ACKNOWLEDGMENTS

I would like to thank Arindam Chakraborty, Hawaii University, Sisir Roy, National Institute of Advanced Study, Bangalore, Amita Chatterjee, Jadavpur University, and Bimalendra Kumar, Benaras Hindu University for their continuous guidance.

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Conflict of Interest: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers | Frontiers in Psychology

HYPOTHESIS AND THEORY
published: 18 April 2022
doi: 10.3389/fpsyg.2022.778817

Knowing the Knowing. Non-dual Meditative Practice From an Enactive Perspective

Daniel Meling[1,2]*

[1]Department of Psychiatry, Psychotherapy and Psychosomatics, University of Zurich, Zurich, Switzerland, [2]Department of Psychosomatic Medicine and Psychotherapy, Medical Center – University of Freiburg, Faculty of Medicine, University of Freiburg, Freiburg im Breisgau, Germany

Within a variety of contemplative traditions, non-dual-oriented practices were developed to evoke an experiential shift into a mode of experiencing in which the cognitive structures of self-other and subject–object subside. These practices serve to de-reify the enactment of an observing witness which is usually experienced as separate from the objects of awareness. While several contemplative traditions, such as Zen, Mahāmudrā, Dzogchen, and Advaita Vedanta emphasize the importance of such a non-dual insight for the cultivation of genuine wellbeing, only very few attempts in contemplative science have turned toward the study of non-dual-oriented practices. This article starts from a recently developed theoretical cognitive science framework that models the requirements of a temporary experiential shift into a mode of experiencing free from cognitive subject–object structure. This model inspired by the enactive approach contributes theoretically grounded hypotheses for the much-needed rigorous study of non-dual practices and non-dual experiences. To do so, three steps are taken: first, common elements of non-dual-oriented practices are outlined. Second, the main ideas of enactive cognitive science are presented including a principled theoretical model of what is required for a shift to a pure non-dual experience, that is, an experiential mode that is unbound by subject–object duality. Third, this synthesized theoretical model of the requirements for the recognition of the non-dual is then compared with a specific non-dual style of meditation practice, namely, *Mahāmudrā* practice from Tibetan Buddhism. This third step represents a heuristic for evaluating the external coherence of the presented model. With this, the aim is to point toward a principled enactive view of non-dual meditative practice. In drawing the implications of the presented model, this article ends with an outlook toward next steps for further developing a research agenda that may fully address the concrete elements of non-dual practices.

Keywords: meditation, non-dual, enaction, consciousness, awareness, Mahāmudrā, Buddhism, contemplative science

OPEN ACCESS

Edited by:
Sucharit Katyal, University College London, United Kingdom

Reviewed by:
Jed Forman, University of California, Berkeley, United States
Brentyn John Ramm, Witten/Herdecke University, Germany
Stefano Poletti, INSERM U1028 Centre de Recherche en Neurosciences de Lyon, France

***Correspondence:**
Daniel Meling
daniel.meling@uzh.ch

Specialty section:
This article was submitted to Theoretical and Philosophical Psychology, a section of the journal Frontiers in Psychology

Received: *17 September 2021*
Accepted: *21 March 2022*
Published: *18 April 2022*

Citation:
Meling D (2022) Knowing the Knowing. Non-dual Meditative Practice From an Enactive Perspective. Front. Psychol. 13:778817. doi: 10.3389/fpsyg.2022.778817

INTRODUCTION

Over the past few decades, meditation has gained increasing interest from the scientific community. As Van Dam et al. (2018) put it, "mindfulness meditation has gone from being a fringe topic of scientific investigation to being an occasional replacement for psychotherapy, tool of corporate wellbeing, widely implemented educational practice and 'key to building more resilient soldiers'"

(Van Dam et al., 2018, p. 1). Accordingly, the number of mindfulness-related papers published per year increased tremendously since the late 1990s in an exponential rate (Williams and Kabat-Zinn, 2011). This increasing interest in mindfulness is often referred to as the *mindfulness movement*. While research into *mindfulness* had gained more and more scientific interest, there is a major need to expand scientific research beyond a narrow focus on mindfulness meditation. One of these styles of meditation that has yet received little attention in scientific research but is highly relevant is non-dual meditative practice (Dahl et al., 2015). The aim of this article is to point toward a principled enactive view of non-dual meditative practice and comparing this enactive approach to structural requirements of non-dual experiences with concrete practice instructions from a certain non-dual practice tradition.

Non-dual-Oriented Practices Within a Variety of Meditation Practices

In order to make the variety of contemplative practices accessible to scientific research, an overview of different contemplative practices is critical. One way to map the variety of contemplative practices has been valuably provided by Dahl et al. (2015). There, contemplative practices have been clustered into three different classes of meditation practices: (1) the attentional family, (2) the constructive family, (3) the deconstructive family.

While attentional practices are designed to train a practitioner's self-regulation of attentional processes, and in particular meta-awareness, constructive practices target at actively cultivating certain patterns of cognition and emotion that may promote wellbeing, in particular through perspective-taking and cognitive reappraisal (Dahl et al., 2015, 2020).

In contrast, the deconstructive family is a set of meditation practices that are designed to undo maladaptive cognitive patterns. They do so by exploring one's perception, emotion, and cognition while targeting at generating insights into one's notion of the self, others, and the world (Dahl et al., 2015). This style of meditation is of special interest in this article. It is driven by an epistemological interest for insight and knowledge: Rather than simply maintaining awareness of certain experiential aspects (as in the attentional family), the goal in the deconstructive style of meditation is to gain direct, experiential insight into one's experience. Accordingly, the central mechanism of the deconstructive style of meditation is *self-inquiry*, that is, investigating the dynamics and nature of conscious experience (Dahl et al., 2015). Compared to the other two families of contemplative practice, the deconstructive family involves a strikingly similar target as Western scientific inquiry into cognition and consciousness: insight and knowledge. This striking overlap renders the deconstructive family of contemplative practices not only a valuable object of scientific research but also a potential source of inspiration for addressing methodological challenges of a scientific inquiry into the nature of cognition and consciousness.

Non-dual-oriented practices are an important part of the deconstructive family and of central relevance to this article's research question. These practices aim at eliciting an "experiential shift into a mode of experiencing in which the cognitive structures of self/other and subject/object are no longer the dominant mode of experience" (Dahl et al., 2015, p. 519). Thereby, non-dual oriented practices aim at eliciting and sustaining non-dual experiences, that is, experiences that lack a structuring into subject and object. What is special about non-dual oriented practices? This special set of practices serves to undo the habitual reification of an observer being separate from the observed objects of awareness. Different than most other practices, non-dual oriented practices put special emphasis on effortlessness and on releasing tendencies to control or alter the mind (Dunne, 2011; Josipovic, 2014, 2019; Josipovic and Miskovic, 2020). In conclusion, the aim of non-dual practices is to gain a direct experiential insight into the ultimate nature of experience. The target is a direct recognition of consciousness as that which recognizes: knowing the knowing.

While this non-dual style of deconstructive meditation is of special importance across a range of contemplative traditions, it has yet received only little attention in scientific research:

> *[t]o date, the scientific study of insight has not investigated forms of insight that may arise through self-inquiry; neither has there been a systematic investigation of the relation between insight and well-being. This is an area that calls for future research, especially since a variety of meditative traditions hold that specific forms of insight, such as insight into the nature of the self, are of particular importance when it comes to the cultivation of well-being* (Dahl et al., 2015, p. 520).

This points out an important future direction in the scientific study of contemplative practices: expanding the scientific study of meditation to self-inquiry practices, such as non-dual-oriented styles of meditation. An important starting point for this may be found in the conceptual framework of enactive cognitive science.

An Enactive Perspective on Non-dual Experiences

The enactive approach is a cognitive science paradigm that has become increasingly influential. It consists in a meshwork of ideas about life, the living body, self-organization, experience, and the world. What connects all these ideas from the enactive approach is the emphasis on their co-dependent arising: mind, body, self, and the world lack any substantial ground. However, these ideas are not radically new. Rather, the enactive approach *combines* several new and old ideas that mutually support each other (Di Paolo et al., 2010). It is to highlight that its ideas have their origins in various disciplines and traditions some of which may appear as rather untypical from a perspective of classical cognitive science (Walter, 2014). Some of the most important roots of the enactive approach include the autopoiesis theory by Maturana and Varela, Merleau-Ponty's *Phenomenology of Perception*, Hans Jonas' philosophy of life, dynamical systems theory and complex system science (Thompson, 2007). Especially important in the context of this article, the enactive approach

has been significantly inspired by *Buddhist* philosophies, such as Nāgārjuna's *Mūlamadhyamakakārikā* (Varela et al., 1991).

Inspired by this variety of traditions, the enactive approach knits a meshwork of ideas about life, self-organization, experience, the living body, and the world which makes it arrive at a position very different from more conventional perspectives in cognitive science: anti-representationalism. A world is not pregiven but enacted through embodied sense-making. As Varela et al. (1991) put it, "[e]nactive cognitive science […] require[s] that we confront the lack of ultimate foundations" (Varela et al., 1991, p. 233). This is what makes the enactive approach so unique within the landscape of paradigms in cognitive science.

Core Ideas of the Enactive Approach

At the core of the enactive approach lies the connection of its two key concepts *autonomy* and *sense-making*, leading to a notion of *groundlessness*.

An *autonomous* system generates and sustains its identity. By doing so, it establishes a perspective from which interactions with the world gain normativity: some interactions help for continuing the organism's autonomy, other interactions with the environment endanger it. This is the basis for all regulating activity of interactions with the environment. Therefore, autonomy is the root of sense-making and thereby of cognition (Varela, 1997; Thompson, 2007).

Sense-making is how an organism, based on the characteristics of its individuation activity, makes meaning and constitutes a world of significance for itself. In the enactive approach, cognition is exactly this creation and appreciation of meaning. Cognition is sense-making (Di Paolo et al., 2010, p. 39–40).

Moreover, sense-making requires both, *autonomy* and *adaptivity*. Autonomy provides an identity that is the center of a perspective. It does so through a precarious network of processes which generates an "either-or" normative condition. Adaptivity, on the other hand, allows the organism to appreciate its encounters with respect to this "either-or" normative condition in a *graded* manner. It does so while it is still alive (Di Paolo, 2005). Therefore, for sense-making "[w]hat is required is not autopoiesis but adaptive autonomy" (Thompson and Stapleton, 2009, p. 25).

These core ideas of the enactive approach on autonomy, sense-making and adaptivity all taken together, imply that the world and ourselves are dependently arising processes. They lack any substantial ground. Both, the world and ourselves are *groundless*. Groundlessness (like emptiness or śūnyatā in Buddhist philosophy) can here be preliminarily defined as the flipside of co-dependent arising: whatever appears springs from a complex dynamic of relations, without substantial ground.

For a more comprehensive but brief overview of the key concepts in the enactive approach see Di Paolo et al. (2010), Meling (2021), or Thompson and Stapleton (2009). For a more extensive introduction see Varela et al., 1991 and Thompson, 2007).

Importantly however, the enactive approach since its origin in *The Embodied Mind* has shown to be open for correctives. In its revised edition, Evan Thompson and Eleonor Rosch elaborated their correctives to the enactive approach since its first publication. This openness for correctives is to be seen as "vital signs" or "indicators of the vitality of the evolutionary arc of thinking and praxis" inherent in the enactive approach (Kabat-Zinn, 2017, p. xiii). Accordingly, the enactive approach since then has significantly evolved (Thompson, 2007; Di Paolo et al., 2010).

In progression of its vital evolution, the enactive approach has been recently explored *via* the development of an enactive account that unfolds its central notion of groundlessness toward the domain of lived experience (Meling, 2021): what is it to *experience* groundlessness and how can a living system get in touch with such an experience?

As an important basis for the aim of this article, the unfolding of the central notion of groundlessness into the domain of lived experience has brought forth an enactive principled theoretical model of what is required for a shift to a mode of experience that is unbound by subject–object duality: a pure non-dual experience (Meling, 2021).

This prior work applied the conceptual toolset of the enactive approach and brought forth a consistent principled theoretical understanding of a direct experience of "groundlessness" and what such a direct experience would require. Importantly, this "knowing groundlessness" is to be directly translated into a mode of knowing that is free from structures, such as self-other or subject–object: a potential state of recognizing non-dual awareness. This is a central stepping stone toward the main aim of this article: an analysis of actual non-dual practice from an enactive perspective.

In approaching this central stepping stone, a starting point for a definition of "knowing groundlessness," that is, "non-dual experience" is found at Varela et al. (1991): "[k]nowing śūnyatā (more accurately knowing the world as śūnyatā) is surely not an intentional act. Rather (to use traditional imagery), it is like a reflection in a mirror—pure, brilliant, but with no additional reality apart from itself" (Varela et al., 1991, p. 225). This is elaborated in Rosch's (2017) introduction to the revised edition of *The Embodied Mind*. She argues that groundlessness is a mode of enaction different from usual sense-making. For this, Eleonor Rosch distinguishes two phases of enaction: *phase 1 enaction* (sense-making) and *phase 2 enaction*.

Phase 1 enaction corresponds to the aforementioned common enactive notion of *sense-making*. It comprises a knowing of a world that is related to performing actions relevant to maintaining the living body. It is dualistic and involves a subject–object distinction (Rosch, 2017).

Phase 2 enaction is an alternative mode of knowing. It not based on a subject–object distinction. It lacks a distinction between observer and observed. In this mode of knowing the mind is "neither absorbed nor separated but simply present and available" (Rosch, 2017, p. xl). Most importantly, phase 2 enaction is a *non-dual* mode of knowing that allows for a direct experience of groundlessness: "this is the mind that can actually know firsthand the groundlessness of the enacted edifice in which humans live" (Rosch, 2017, p. xl). Importantly, this conception of phase 2 enaction corresponds to the recent discussion on the construct of *sustained, non-propositional meta-awareness* as proposed by Dunne et al. (2019).

This conceptual distinction between phase 1 enaction and phase 2 enaction has been used as a starting point for the development of a more comprehensive enactive conception of knowing groundlessness. While phase 1 enaction involves intentionality, cognitive subject–object structuring, affect and adaptivity, phase 2 enaction lacks these aspects. Accordingly, phase 2 enaction is non-discerning and self-known. Therefore, when phase 2 enaction is unobscured by other mental contents it can recognize itself. This self-recognition of phase 2 enaction is to know groundlessness (see Meling, 2021, p. 8 for more details).

Moreover, a *processual* description of the *transition* toward a moment of non-dual experience is provided. This prior analysis is distinguished into two forms of analysis: a *first level of analysis* and a *second level of analysis*. The first level of analysis is distinguished into four steps which are elaborated in the section "Mahāmudrā Practice Instructions and the Enactive Model of Non-dual Practice." As a result, the first level of analysis brought forth two principled requirements for the shift to a direct experience of the non-dual: non-adaptivity and non-dual reflexive knowing (phase 2 enaction). Non-adaptivity means that one does not regulate itself regarding the limitations of its viability. It does not judge its experiences as good, bad, or neutral. Therefore, it does not approach, avoid, or ignore any aspect of its experience. This might be referred to as a state of unconditional acceptance. Non-dual reflexive knowing (or non-propositional meta-awareness; phase 2 enaction) means that one is just aware *via* phase 2 enaction. One effortlessly recognizes one's current acts of sense-making as acts of sense-making. This recognition, importantly lacks sense of observer and observed and is non-dual. In the transition from toward a purely non-dual experience, these two requirements are met: Current acts of sense-making are experienced. Through the unconditionally accepting attitude, no further adaptivity is added. Therefore, sense-making is not added. In continuation of this process, sense-making progressively ceases. As a consequence, the reflexive knowing capacity (phase 2 enaction) is less and less obscured. This may lead to a moment when phase 2 enaction is not obscured anymore. Then this awareness can recognize itself: "[e]xperience experiences itself, non-dually. This is a moment of knowing groundlessness" (Meling, 2021, p. 10).

Moreover, a second level of analysis is added which involves a critical perspective shift. This second level of analysis redirects the attention toward the context-dependent enactment of the first level of analysis itself as it also origins from acts of sense-making. The first level of description holds only in a certain context and for a certain community of observers (see Meling, 2021 p. 10 for more details).

In acknowledging that "knowing groundlessness" refers to a non-dual experience, these descriptions provide a principled enactive account for what a non-dual experience could correspond to in enactive terminology and what such a direct experience would require.

This overview of an enactive principled theoretical model of what is required for an experiential shift to a non-dual experience now lays the foundation for an analysis of the non-dual-oriented Mahāmudrā practice instructions from an enactive cognitive science perspective. This brings us to the main research question and central contribution of this paper: *how does this enactive conception of non-dual experiences and practices compare to actual meditation instructions from the non-dual Mahāmudrā tradition*?

Research Questions and Aim

The most important ideas from this introduction can be summarized in five steps: first, there is a variety of meditation practices. It can be clustered into three classes of practices: the attentional family, the constructive family, and the deconstructive family. Second, meditation research has focused on the attentional family and constructive family whereas the deconstructive family has received little attention as a subject of scientific research. Third, especially the non-dual-oriented practices are of critical interest for potential scientific research into the nature of consciousness. Fourth, the enactive approach provides the conceptual tools for integrating non-dual experiences and practices into a larger theorical cognitive science framework. Fifth, a recent development in the enactive approach provides theoretically grounded hypotheses of what is required for an experiential shift to a non-dual experience. Two critical experiential gestures are suggested: non-adaptivity and non-dual reflexive knowing (non-propositional meta-awareness; phase 2 enaction).

As these hypotheses are derived from a *theoretical* analysis based on concepts from the enactive approach, it remains yet open to which extent these hypothesis are *viable*. A method for evaluating the coherence of these concrete hypotheses is required. This is the purpose of this article.

However, the scientific method has only limited access to matters concerning consciousness: "Consciousness itself has not been and cannot be observed through the scientific method, because the scientific method gives us no direct and independent access to consciousness itself. So the scientific method cannot have the final say on matters concerning consciousness" (Thompson, 2015, p. 94).

Therefore, this article follows a more heuristic path toward estimating the viability of the hypotheses on what is required for an experiential shift to a direct non-dual experience: an assessment of the hypotheses' external validity. Therefore, the aim of this paper is to compare this enactive approach to structural requirements of non-dual experiences with concrete practice instructions from a certain non-dual practice tradition. More specifically, a practice tradition from Tibetan Buddhism is chosen, namely, Mahāmudrā practice.

Three clarifying remarks regarding the aim of this article need to made. First, the aim of this paper is *not* to compare the enactive *view in general* with a Buddhist *view* or philosophy. As aforementioned, the enactive approach is importantly inspired by Buddhist philosophy. Such a comparison might simply trace back the historic origins of the enactive approach rather than providing additional insights. However, this article follows a different aim. It does not compare the general enactive view with a Buddhist view. Instead, it compares new hypotheses generated from a recently developed conceptual expansion of the enactive view with *practice* instructions from a particular Buddhist style of meditation practice. Accordingly, the purpose of this paper is to

contribute to a *coherent* expansion of the enactive view to the understanding of groundlessness and non-dual experience.

Second, the aim of this paper is *not* to use the enactive approach to prove Buddhism's *scientific* viability. Instead, it aims at a comparative approach between a recent extension of the enactive *view* and a specific Buddhist *practice*. What are then its validity criteria? The validity of this comparison's outcome does not follow *scientific* validity criteria but rather those validity criteria that also hold in philosophical discourses, such as *coherence* and *transparency* (Høffding et al., 2022).

Third, the aim of this paper is *not* to normatively argue for the necessity of experiencing a non-dual mode of experience. Rather than turning the enactive theory's description into a normative practice, this paper does not aim at deriving a comprehensive conclusion on whether non-dual experiences and practices are generally adaptive or maladaptive.

In conclusion, this paper aims at comparing recently developed hypotheses from an enactive theoretical discourse on structural requirements of non-dual experiences with concrete practice instructions from Mahāmudrā practice, a non-dual practice tradition in Tibetan Buddhism.

The aim of this paper fulfills two purposes. First, it provides an approximate quality assessment of the first two hypothesized steps by comparing it to actual non-dual-oriented practice instructions. Second, it supports a coherent enactive view of a specific style of non-dual meditative practice (Mahāmudrā practice). These are important steps for non-trivially expanding the theoretical study of meditation to non-dual oriented practices.

Accordingly, this article's research question is in direct correspondence to the aforementioned aim: *To which extent does the recently developed enactive view of the conditions for a shift into a non-dual mode of experience match the actual practice instructions from the Mahāmudrā tradition?*

This central research question is approached *via* a rigorous comparison between the enactive theoretical model of the performative requirements for a non-dual experience with the specifics of non-dual-oriented *Mahāmudrā* practice instructions from Tibetan Buddhism. In the following, both levels of analyses from the recent enactive model are compared to Mahāmudrā practice.

MAHĀMUDRĀ PRACTICE INSTRUCTIONS AND THE ENACTIVE MODEL OF NON-DUAL PRACTICE

In the previous section, we explored theoretically the transition process from sense-making to knowing groundlessness (i.e., pure non-dual experience). It appears that this transition process can be practiced by human beings. Indeed, there are practices in several human cultural traditions that aim at exactly this momentary transition from sense-making to a pure non-dual experience.

Accordingly, the guiding question of this section concerns the plausibility of the results from the first and the second level of analysis from the perspective of a specific non-dual practice tradition that aims at non-dual experiences: does the enactive description of the transition into a temporary non-dual experience match meditation instructions from non-dual traditions? In this article, rather than targeting Buddhist *practice* or Buddhist *thought* in general, we are going to focus on a very specific style of non-dual practice: *Mahāmudrā*.

Mahāmudrā practice instructions are especially designed for guiding a practitioner into a "recognition of the non-dual" which is equivalent to "knowing groundlessness." Therefore, those instructions can indicate the extent of the theory's plausibility from an explicitly practice-oriented point of view. This is crucial for evaluating the *external* coherence of the recent enactive development on what a shift into a potential non-dual experience requires.

One philosophy that underlies *Mahāmudrā* practice is *Yogācara*, a *non-dual* philosophy. One important guiding question in this non-dual style of philosophy is about the *experience* of groundlessness: what does it mean to *experience śūnyatā* (emptiness; groundlessness)? Moreover, this non-dual Buddhist philosophy can be regarded as being grounded in the lived experiences of actual practitioners. Therefore, the answers from various strands of this non-dual Buddhist approach can provide a hint at the context-dependent plausibility of the conclusions from the model of what a shift into a potential non-dual experience requires from within a purely conceptual enactive perspective. This comparison has important potential for additionally grounding an enactive understanding of a non-dual style of meditation practice.

Accordingly, the guiding question for this section concerns the degree to which the presented enactive approach of non-dual experience and Mahāmudrā practice instructions match: is there a correspondence between the enactive description of what a shift to a non-dual experience requires and practice instructions from the Mahāmudrā tradition?

First Level of Analysis

The aim of this subsection is to compare each stage of the first level of analysis of the enactive account of a shift to a non-dual experience (*cf*. Meling, 2021) with analogous instructions from Mahāmudrā practice. This comparison is divided into four parts. These four parts correspond to the four steps from the first level of analysis of the enactive model toward knowing groundlessness (*cf*. Meling, 2021): (1) the point of departure: adaptive sense-making; (2) stage 1: less sense-making; (3) stage 2: reflexive knowing; (4) the point of arrival: non-dual experience.

Point of Departure: Sense-Making

In the transition process toward a pure non-dual experience (i.e., knowing groundlessness), adaptive sense-making has been chosen as the point of departure. It is what the enactive approach refers to as cognition. This sense-making is always based in its underlying activity of approach and avoidance that is coined "adaptivity" (Di Paolo, 2005).

In Buddhist contexts, a corresponding notion is the one of *samsara*. The conceptual correspondence between adaptive sense-making (or phase 1 enaction) from the enactive approach and the Buddhist notion of *samsara* is summarized by Eleonor Rosch in her introduction to the revised version of *The Embodied Mind*:

> *[f]rom the Buddhist point of view, both phase 1 enaction and the skandhas are portraits of the confused and ignorant body, mind, and world that is called samsara, that is, the wheel of life through which sentient beings cycle in ignorance and suffering (see chapters 4 and 6). The good news is that there is an alternative. There is another mode of knowing not based on an observer and observed. This ushers in phase 2 of enaction, what in the book we call groundlessness (chapter 10) (*Rosch, 2017, p. xxxix).

This short passage also already hints at the correspondence between a "knowing groundlessness" or the recognition of "phase 2 enaction" and a Buddhist view of an experienceable non-dual awareness that lacks a separation between observer and observed. However, from a certain Buddhist view, this underlying non-dual awareness is usually obscured by a dualistic mind and its conceptualizations (i.e., by adaptive sense-making). This point is reflected in the following statement by Chökyi Nyima Rinpoche, a contemporary Buddhist teacher in the Mahāmudrā and Dzogchen tradition:

> *[u]nless we allow every single kind of conceptualization – of forming a notion of something, whether it is in a coarse way or a subtle way, shallow or profound - unless we allow all of that to dissolve, to simply evaporate, we do not clearly see our innate nature (*Chökyi Nyima Rinpoche, 2002, p. 41).

The term "innate nature" in this quote translates into our previously used term "knowing groundlessness" and points toward a non-dual experience. Thereby, this quote once again exemplifies the notion that "knowing groundlessness" is a recognition of an underlying non-dual mode of knowing. This non-dual awareness can only be recognized when one lets go of conceptualizations (i.e., of ordinary intentional sense-making).

What is important for now is that phase 1 enaction or adaptive sense-making translates directly into the notion of *samsara*. In order to transition to "knowing groundlessness" one is required to simply let go of phase 1 enaction. This directly corresponds to the direction proposed in the recently developed enactive model for a shift into "knowing groundlessness" (*cf.* Meling, 2021): decreasing sense-making.

This sets the stage for a comparison between the transition process as described in Meling (2021) with Buddhist practice instructions. What are some notions from the Buddhist literature and practice for transitioning from samsara to that other mode of knowing or non-dual awareness? How is it related to the enactive synthesis of a procedural structure of such a transition?

Stage 1: Less Sense-Making

With respect to the inner logic of the enactive approach, in Meling (2021) it was hypothesized that "knowing groundlessness" is a moment in which an underlying mere experiencing is recognized when there is a *gap* of adaptive sense-making, that is, adaptivity and sense-making as embodied actions are temporarily not executed, one stops *doing* sense-making. This can be understood as analogue to experiencing the non-dual. Therefore, the model described how an according decrease in sense-making could occur. As sense-making is described as being dependent of adaptivity, Meling (2021) hypothesized that a decrease in adaptive activity necessarily leads to a decrease in sense-making activity. Adaptivity, in this context consists in the judgment whether something is good, bad, or irrelevant. On this basis, it comprises regulating one's inner dynamic and behavior as an active agent. This corresponds to seeking the good, avoiding the bad, and ignoring the irrelevant. Hence, a decrease in adaptive activity means that the organism decreases the extent to which it appraises its experiences and acts on them as an active agent. The hypothesis is that when such adaptivity activity ceases, sense-making ceases (Meling, 2021). Does this hypothesis make sense in the context of *actual* practice? Is there a correspondence to Mahāmudrā practice instructions?

Mahāmudrā instructions emphasize that in this particular practice context nothing is to be abandoned and nothing to be accomplished: "one important rhetorical theme (and an explicit instruction in formal practices) is that Mahāmudrā does not involve anything to be abandoned (heya) or anything to be accomplished or adopted (upādeya)" (Dunne, 2015, p. 262). This is echoed in the translation of one of the most important texts on Mahāmudrā meditation *Moonbeams of Mahāmudrā*: "Do not entertain thoughts of reality or non-reality, what should be abandoned or cultivated. Simply meditate without any discursive thoughts" (Kyabgon, 2016, p. 261). A further reference to this is found in Karmapa Wangchug Dorje's instructions on Mahāmudrā "Leave appearances as they are, neither negating nor affirming them. If there is neither rejection nor grasping, what appears and exists is freed in Mahāmudrā" (Karmapa Wangchug Dorje, 2009, p. 136).

The reason for such a need of non-abandoning and non-accomplishing is that judgments of that kind lead to further thought as it is reflected in another Mahāmudrā instruction: "If you really investigate this meditation approach, you will realize that to judge discursive thoughts as either good or bad is merely to engage in further discursive thinking" (Kyabgon, 2004, p. 148). In other words, "the typology of negative mental states to be abandoned and virtues to be cultivated has been set aside, since in this context judgments of that kind will simply proliferate and ensnare the practitioner further in thought" (Dunne, 2015, p. 265).

These two quotes clearly reflect a standpoint in which tendencies of approach and avoidance are a requirement of thought. Moreover, the meditation practitioner is given tools to inhibit those tendencies in order to allow those thoughts to vanish: "[t]o aid in cultivating present-centered awareness, the novice is given other tools that also *inhibit* another

requirement for thought to operate, namely, the *approach/avoidance stance* of an agent acting in the world" (Dunne, 2015, p. 264, emphasis added). It is astonishing how directly this translates into the hypothesis that sense-making requires adaptivity. Moreover, it also echoes that inhibiting adaptivity makes sense-making cease. This hints at a clear correspondence between the model's first requirement "non-adaptivity" and Mahāmudrā practices which aim at recognizing the non-dual. By inhibiting the "approach/avoidance stance," thoughts can cease. In enaction speak, by inhibiting adaptivity, sense-making can cease. This decay of thought shall aid in cultivating present-centered awareness which is central to "knowing groundlessness" and therefore to a non-dual recognition. Therefore, Mahāmudrā practice involves an inhibition of appraisal. One simply sustains awareness that is not goal-oriented or structured by any approach/avoidance tendency: "[m]editation is neither something unknown to you, nor something you have to seek elsewhere. Rather it is continuously maintaining the present awareness with undistracted mindfulness" (Karmapa Wangchug Dorje, 2009, p. 165). Accordingly, in Mahāmudrā practice one does not evaluate what is appearing in the mind nor focus on an object of awareness. Rather, "one simply remains undistracted in the present, where 'mere non-distraction' in part means that one sustains an awareness that is not caught by the goal-oriented, approach/avoidance structures that pull one into a chain of thoughts" (Dunne, 2015, p. 264).

This statement exemplifies that the shift to knowing groundlessness not only requires non-judgment (or non-adaptivity) but also "continuously maintaining the present awareness with undistracted mindfulness" (Karmapa Wangchug Dorje, 2009, p. 165). This refers to a sustainment of awareness. Accordingly, it is an equivalent to the second requirement that has been pointed out in Meling (2021): non-dual reflexive knowing or non-propositional meta-awareness (phase 2 enaction).

In enaction speak, the transition process toward knowing groundlessness requires an experience of the current sense-making act. One needs to experience the current sense-making itself *as* an act *without* adding sense-making or adaptivity. This allows sense-making to cease.

The necessity for this non-dual reflexive knowing (phase 2 enaction) is reflected in another crucial tool of Mahāmudrā practice, the "self-liberation of thought": "[i]n Mahāmudrā terminology, this is known as the 'self-liberation' (*rang grol*) that occurs when one 'looks intently' (*cer gyis lta*) at a thought" (Dunne, 2015, p. 264). In this practice, phenomenal contents are experienced "just as a facet of mind," rather than as somehow representing an actual object "out there" (Dunne, 2015, p. 264). This is a very important point. Not only are the current contents of thought (sense-making) experienced but they are experienced *as actions of the mind*. They are seen not separately but, most importantly, in their context of being *in* experience. Thereby, the practitioner enhances a kind of background awareness which enables her to recognize this non-dual reflexive awareness itself.

Two aspects are to be emphasized at this point. First, the Mahāmudrā practice of "self-liberation of thought" (*rang grol*) aims at allowing thoughts to vanish: "[s]imply by looking at itself, thought is pacified" (Khenchen Thrangu Rinpoche, 2014, p. 157). This corresponds to the outset aim of the first stage in transitioning from adaptive sense-making to knowing groundlessness: *decreasing sense-making*. Second, in order to allow those thoughts to vanish (i.e., to decrease sense-making), the Mahāmudrā instructions emphasize on two mental gestures that are directly equivalent to those two from the enactive synthesis: non-adaptivity (inhibiting an approach/avoidance stance of being an agent in the world) and non-dual reflexive knowing ("looking intently," *cer gyis lta*). Those are important hints toward the coherence between the theoretical insights from the enactive model described by Meling (2021) and actual Mahāmudrā practice instructions aiming at such a shift toward a non-dual recognition directly in lived experience.

With these conclusions on stage 1, we can now turn to stage 2 of the first level of analysis: how is the Mahāmudrā practice of "looking intently" performed? Does it involve a form of intentional sense-making or another mode knowing which is rather non-intentional or non-propositional? In the next according step, I am going to evaluate the plausibility of the enactive hypothesis that the performance of such a non-adaptive reflexive knowing ("looking intently") requires another mode of knowing that is non-intentional and non-propositional in contrast to common intentional propositional sense-making. This leads us to the analysis in stage 2.

Stage 2: Know Thyself

As we have seen, Mahāmudrā practice instructions reflect the conclusions from the enactive model of the requirements for an experience of groundlessness, that is, of a direct non-dual experience (*cf.* Meling, 2021): for transitioning from an adaptive sense-making to a non-dual experience, one needs both, non-adaptivity and reflexive knowing. The current sense-making and adaptivity are to be recognized without adding adaptivity or sense-making.

The key question here concerns the kind of knowing involved in this required act of reflexive knowing: is the current sense-making activity recognized through propositional intentional sense-making or somehow differently? By means of the inherent logic of the idea of sense-making from the enactive approach, Meling (2021) concluded the following: the form of knowing that is required for a transition toward knowing groundlessness does *not* involve adaptive sense-making but another mode of knowing: sustained non-propositional meta-awareness, that is, non-dual reflexive experiencing. The reason for this is simple: sense-making in this context would lead to an infinite regress resulting in constant additions of sense-making acts. Sense-making would be increased, not reduced. Therefore, another mode of knowing needs to be introduced to the enactive approach: non-dual knowing which is recognized in knowing groundlessness (i.e., an experience of the non-dual). Does this correspond to or rather contradict Mahāmudrā instructions?

In the main Mahāmudrā practices, the key goal is to practice abiding in a form of mindful meta-awareness that lacks subject-object duality: The non-duality aspect here is much emphasized. Thereby, in Mahāmudrā meditation manuals on a so-called

gradual approach one begins by directing the mind to an object of attention (e.g., to breathing sensations) as an anchor (Dunne et al., 2019). However, this anchor is not a meditation object but merely a "'reminder' (*dran rtags*) that minimally captures attention so as to inhibit capture by distractors" (Dunne et al., 2019, p. 308). Eventually, one increasingly lets go of the "reminder." Accordingly, one remains in a purer form of mindful meta-awareness (i.e., non-dual reflexive knowing): "there is no object of meditation or act of meditating, no object of realization or act of realizing, no object of knowledge or act or knowing, and no object of mindfulness or act of being mindful. There are no such things on which to meditate" (Chagmé, 2000, p. 254–255).

How exactly is this performed? While the attentional resources are directed toward that anchor, the most resources are used for monitoring distractions and off-object features, for example, vividness of attention or proprioceptive states (Dunne et al., 2019). This important point reflects the aim of Mahāmudrā practice for recognizing *non-dual* awareness. It is emphasized in the following description of this practice by Dunne et al. (2019): "[a]s one gradually learns to drop attention to the anchor, one sustains meta-awareness, such that one is instructed to persist in the awareness of these off-object features of awareness without turning awareness itself into an explicit object of introspection" (Dunne et al., 2019, p. 309).

Most importantly, that sustained meta-awareness of off-object features is apparently non-dual. It is a form of awareness *of* awareness yet this awareness is not made an *object* of attention. Therefore, this exemplifies the form of reflexive awareness or mindful meta-awareness that is required for "looking intently." Thereby, those Mahāmudrā instructions on sustaining a form of non-dual meta-awareness directly corresponds to the second requirement in the first level of analysis in Meling (2021): non-dual reflexive knowing *without* adaptive sense-making. This mode of knowing must lack a subject–object duality, that is, the cognitive structuring into self/other and subject/object. Instead, it is mere experiencing.

What else can be said about that form of reflexive awareness from the point of view of Mahāmudrā practice? What was called in Meling's (2021) model "non-dual reflexive knowing" and "phase 2 enaction" can be directly translated into the Mahāmudrā concept of "reflexive awareness" or *svasaṃvitti*:

> *[k]nown by the technical term "reflexive awareness" (svasaṃvitti), this aspect of consciousness is non-dual in the sense that when information is obtained through reflexive awareness, it does not mean that a phenomenal sense of subjectivity is focusing on that information's source as an object (*Dunne, 2015, p. 261).

This non-dual aspect of reflexive awareness is of utmost importance. In this style of philosophy, it is argued that an attentional turn toward subjectivity is not necessary because some aspect of consciousness is already constantly aware of the subjective features of awareness. In other words, the subjective features of awareness cannot be brought into awareness through an act of distinction between the observing awareness and the observed awareness. This renders the reflexivity of this aspect of awareness non-dual. It does not turn one's own subjectivity to an object of observation. Yet it is aware of itself, reflexively:

> *[t]he claim here is that one has a capacity to make a reliable report without turning inward and observing the features of the experience that concerned oneself as a subject. One need not make this turn because, even without having introspected in a way that makes one's own subjectivity an object of observation, some aspect of consciousness was already aware of those subjective features (*Dunne, 2015, p. 261).

The capacity for reflexive awareness that does *not* require making subjectivity an *object* of awareness is exactly what is pointed out in the concept of "non-dual reflexive knowing" (phase 2 enaction) as the second requirement of shifting toward knowing groundlessness (*cf.* Meling, 2021). This correspondence is important as the Mahāmudrā practice here can back up a line of thought that is rather uncommon in Western philosophy including phenomenology (Krägeloh, 2019).

Those preceding descriptions of Mahāmudrā practice are summarized in the following quote. This quote pointedly demonstrates the correspondences between Mahāmudrā practice and the description of the transition from sense-making to a non-dual experience:

> *clearly, Mahāmudrā formal instructions require one to be "*non-judgmental*," in that one is not to engage with any conceptual evaluation during formal practice. Instead,* one releases all expectations or evaluative paradigms, *and when distracting thoughts occur, one does not judge them as virtuous or non-virtuous. Instead, one simply "*looks intently*" at the thought in the present moment and, having been* experienced as just a feature of mind itself, the thought "self liberates" or dissipates on its own *(*Dunne, 2015, p. 266, emphasis added).

This passage on Mahāmudrā formal instructions clearly reflects both two requirements from the first level of analysis in Meling (2021): (1) non-adaptivity, and (2) non-dual reflexive knowing (phase 2 enaction). Those two requirements are analogue to (1) being "non-judgmental" (releasing evaluative paradigms) and to (2) "looking intently" (*cer gyis lta*) by reflexive non-dual awareness (*svasaṃvitti*). Those lead to self-liberation of thought (*rang grol*). At this, (1) the first requirement "non-adaptivity" translates into being "non-judgmental"; (2) the second requirement "non-dual reflexive knowing" (phase 2 enaction) translates into "looking intently" by reflexive non-dual awareness (*svasaṃvitti*). These two elements together lead to a decrease of sense-making which translates into the self-liberation of thought (*rang grol*). Those matches between the enactive model of non-dual practice (*cf.* Meling, 2021) and Mahāmudrā practice instructions clearly show that the conclusions from the enactive theory make sense in the context of Mahāmudrā practices which aim at directly recognizing non-dual awareness.

Now that we have compared the two requirements of a transition from sense-making to a non-dual experience, we are ready for asking about the point of arrival: non-dual experience. Therefore, the question for the following section concerns the non-dual experience as knowing groundlessness in Mahāmudrā practice: what is a non-dual experience in the context of Mahāmudrā practice? Does the synthesized description from the first level of analysis make sense in the context of Mahāmudrā?

Point of Arrival: Knowing Groundlessness

Is reflexive awareness (Tibetan: *rang rig*, Sanskrit: *svasaṃvitti*) the same as "knowing groundlessness" or as a non-dual experience? From within the coherence of the enactive approach, the following distinction between non-dual reflexive knowing and knowing groundlessness has been derived: while non-dual reflexive knowing is already present *during* sense-making but is *obscured* by it, knowing groundlessness is the *recognition* of this non-dual reflexive knowing during an *absence of sense-making*.

Interestingly, the Mahāmudrā tradition makes a similar distinction:

> *first, reflexive awareness does not employ a subject–object structure, and second, it is present in every moment of ordinary, dualistic consciousness. On this view, it must be present because it is what accounts for the fact that dualistic experience always includes a sense of subjectivity. In the context of contemplative practice, this means that inducing a nondual state does not require developing some new capacity of awareness. Rather, it involves enhancing an innate feature of consciousness while also using techniques that make the dualistic structures subside (*Dunne, 2015, p. 261, emphasis added).

This passage shows that non-dual reflexive awareness in Mahāmudrā is not seen as a new capacity of awareness. Instead, it is already present in every moment of ordinary dualistic consciousness. However, knowing groundlessness involves in Mahāmudrā practice the enhancement of this non-dual awareness while enabling the subsidence of dualistic cognition (i.e., subsidence of adaptive sense-making). Also, this point of Mahāmudrā is in fascinating correspondence to the previously applied juxtaposition between non-dual reflexive knowing and knowing groundlessness: non-dual reflexive knowing is constantly present but is only recognized in a moment of knowing groundlessness when adaptive sense-making has ceased.

However, the Mahāmudrā tradition also provides insights which the enactive theory alone cannot give account of. Those insights concern *experience descriptions* of knowing groundlessness: what is it like to experience groundlessness? The traditional Mahāmudrā response to that question highlights two experiential aspects of groundlessness: *emptiness* and *luminosity*. In other words, realizing groundlessness is to see that the flow of experience itself is nothing other than the *empty luminous mind*. "Luminosity" in this regard denotes the "knowingness" aspect of consciousness whereas "emptiness" means that it is devoid of the structures that constitute subject and object, and even time and space: "[n]ot only is everything from the aggregate of forms to omniscient enlightenment unreal, empty and devoid of mental constructs; in addition, everything is luminosity" (Chökyi Nyima Rinpoche, 2002, p. 13).

In summary, the first level of analysis in Meling (2021) is well reflected by Mahāmudrā practice instructions. In the first level of analysis it has been derived from the enactive approach a theoretical description of what a practitioner would need to do in order to enable her a transition to knowing groundlessness. In Mahāmudrā, we find a tradition in which this exact transition to knowing groundlessness is actually practiced in a direct embodied way. Most interestingly, there is a surprisingly close correspondence between this article's theoretical derivation of what is needed for such a transition and what Mahāmudrā practitioners in fact *do* or *not do* in order to enter a non-dual state. This strong correspondence is taken as a clear hint that the conclusions from this article's first level of analysis are indeed plausible in the context of non-dual meditative practice.

Second Level of Analysis

The second level of analysis provided the insight that the first level description is invalid from *within* the perspective of knowing groundlessness. The description is revealed as enacted. First, the provided description is context-dependent and observer-relative. Second, it comes from *within* acts of adaptive sense-making (phase 1 enaction). Third, this description is inappropriate from *within* the "perspective" of knowing groundlessness. Fourth, none of the two perspectives is ultimately true. However, they make sense in different contexts.

In the context of the "perspective" from within knowing groundlessness, language is an inappropriate method. Any use of language reintroduces sense-making. This necessarily interrupts a moment of knowing groundlessness. Therefore, language and knowing groundlessness are mutually exclusive. At this point, we have reached an end of linguistic description. Here, philosophical analysis is not useful anymore. From *within* this "perspective" of knowing groundlessness this exact knowing groundlessness can only be explored further when conceptual thinking is left behind.

Is there a similarity of those conclusions to some forms of Buddhist philosophy? First, the most obvious correspondence is due to a direct use of a traditional Buddhist argument in the second level of analysis (*cf*. Meling, 2021). The neither-one-nor-many argument, which has been applied to reveal the incoherence of the idea of emergence (*cf*. Meling, 2021), has its roots in Buddhist philosophy, namely, in Dharmakīrti's *Saṃbandhaparikṣā* (Analysis of Relations; *cf*. Dunne, 2004, p. 43). Even more importantly, the core of the second level of analysis is very similar to the endpoint of Nāgārjuna's philosophy who influentially introduced the idea of groundlessness (*śūnyatā*) to Buddhist thought in the first place. Those similar conclusions are expressed in several passages of his *Mūlamadhyamakakārikā*. Let us have a look on some of those passages in detail.

First, Nāgārjuna offers a similar criticism concerning the idea of relationality or circular establishment. Thereby, it is

translatable to a criticism against the idea of co-emergence in the enactive approach. In chapter 10, verse 10, Nāgārjuna addresses this idea of co-dependence: "[i]f an entity x is established in dependence [on something else y], and in dependence on that very entity x there is established that y on which x's establishment depends, then what is dependent on what?" (Mūlamadhyamakakārikā, chapter 10, verse 10; *cf*. translation by Siderits and Katsura, 2013, p. 115). The translators Siderits and Katsura added an elaboration of this argument in the form of an example:

> *[i]f fire truly depends on fuel, then fuel must first exist before there can be fire. But if fuel in turn depends on fire, it cannot exist prior to fire. The mutual dependence that the opponent claims to hold between fire and fuel (or between person and skandhas) appears to be incoherent (*Siderits and Katsura, 2013, p. 115).

This is the striking point. The mutual dependence between fire and fuel (or of membrane and metabolism in the case of an autopoietic cell) turns out to be incoherent. From Nāgārjuna's point of view, this is not a circular establishment but a failure to establish. If this argument by Nāgārjuna is accepted, all the enactive accounts of circular emergence (e.g., co-emergence and autonomy) are failures of establishment. In order to establish them, those ideas prompt to talk about something else. It renders a form of avoidance to say that one simply does *not* know. Rather, it is required to understand those incoherent ideas of the circular causality as pointers to the need for recognizing those things and processes as being empty or *śūnya*. They need to be experienced as groundless.

Second, in the second level of analysis (see Meling, 2021) this analysis has arrived at the conclusion that descriptions of groundlessness are necessarily groundless themselves. Therefore, conceptuality needs to be overcome in order to enable an experience of groundlessness in a more direct manner. This claimed necessity for overcoming the theoretical description of groundlessness is also reflected in Nāgārjuna's endpoint of his philosophy: "[d]ependent origination we declare to be emptiness. It [emptiness] is a dependent concept; just that is the middle path" [Mūlamadhyamakakārikā, chapter 24, verse 18; *cf*. translation by Siderits and Katsura (2013, p. 277)]. This is one of the most famous verses from Nāgārjuna's *Mūlamadhyamakakārikā*. However, the translators call for caution concerning this verse as it can easily be misunderstood. They elaborate on this relation between interdependence and emptiness in the following way:

> *[t]o say of emptiness that it is a dependent concept is to say that it is like the chariot, a mere conceptual fiction. […] That is, emptiness is itself empty. Emptiness is not an ultimately real entity nor a property of ultimately real entities. Emptiness is no more than a useful way of conceptualizing experience (*Siderits and Katsura, 2013, p. 277).

Accordingly, emptiness is seen as empty itself. In our terminology, groundlessness is itself groundless. Therefore, to say that groundlessness (*śūnyatā*, emptiness) is a "dependent concept" does not mean that interdependence ultimately exists but rather that there is no possibility for an ultimate reality where things have an *independent* essence. Therefore, *śūnyatā* has no ultimate meaning, it is groundless itself: "[i]f something that is non-empty existed, then something that is empty might also exist. Nothing whatsoever exists that is non-empty; then how will the empty come to exist?" [Mūlamadhyamakakārikā, chapter 13, verse 7; *cf*. translation by Siderits and Katsura (2013, p. 143)]. This is a very important point. If nothing exists that is not groundless, then also the groundlessness itself cannot exist in and of itself. Therefore, it is a major mistake to make *śūnyatā* into *something* one can know or experience. It is a mistake to make it into an object. In Nāgārjuna's words, "[e]mptiness is taught by the conquerors as the expedient to get rid of all [metaphysical] views. But those for whom emptiness is a [metaphysical] view have been called incurable" [Mūlamadhyamakakārikā, chapter 13, verse 8; *cf*. translation by Siderits and Katsura (2013, p. 145)]. In this verse, Nāgārjuna importantly warns against turning emptiness into a metaphysical view. Those who do it are "incurable" because they turn groundlessness to their ground. Since groundlessness is the cure, they turn the cure into the illness. That is why this view in groundlessness is so dangerous if one overlooks that the view of groundlessness is itself groundless. Therefore, groundlessness is merely a metaphor that shall nudge one into a state *free* of views.

This is the reason why this philosophy is explicitly *not* nihilistic. A nihilist dedicates oneself in the *view* that nothing exists. By this, nihilism provides a place to hang one's hat: nothingness. It is a *belief* in the absence. The Madhyamika but recognize that this is a view. As *śūnyatā* is a place from which one abandons *all* views, one also abandons the view that *śūnyatā* exists. This is why the term *śūnyatā* (groundlessness) shall nudge us into a state free of views.

Third, in the second level of analysis, it has been proposed that any use of language reintroduces sense-making. This necessarily interrupts a moment of knowing groundlessness. Therefore, language and knowing groundlessness are mutually exclusive. Accordingly, language keeps a practitioner from *actually* experiencing what this article tries to investigate: groundlessness. Also, this point is clearly reflected in Nāgārjuna's endpoint of his philosophy (verse 9 of chapter 18): "not to be attained by means of another, free [from intrinsic nature], not populated by hypostatization, devoid of falsifying conceptualization, not having many separate meanings—this is the nature of reality" [Mūlamadhyamakakārikā, chapter 18, verse 9; *cf*. translation by Siderits and Katsura (2013, p. 202)]. This verse concerns the problem of language. As the translators explain, "[t]o say that the nature of reality is not to be attained by means of another is to say that one must apprehend it directly for oneself" (Siderits and Katsura, 2013, p. 202). Groundlessness cannot be conveyed to you. Language is at this point insufficient. Language cannot refer to knowing groundlessness or a non-dual state because one cannot refer to non-referring without immediately obscuring it. This is in close alignment to our conclusion from the second level of

analysis: an actual direct understanding of knowing groundlessness requires us to see that the description from the first level of analysis is itself groundless. It is merely context-dependent and observer-relative. Any further application of language as a method for investigation keeps us away from directly knowing groundlessness. Through language we arrived at the endpoint of the capabilities of language. Through rationality we arrived at the irrationality of rationality itself: rationality is always context-dependent and observer-relative. This is clearly reflected in Nāgārjuna's middle way.

In making this step we are enabled to see an interesting split in the levels of philosophy by Nāgārjuna. There are two levels. On the one hand, Nāgārjuna stated positively that groundlessness (*śūnyatā*) is a dependent concept. On the other hand, groundlessness does not have an ultimate meaning. To say that it is a dependent concept is therefore also wrong since it is a statement concerning its existence. What does that mean? At this point, it is important to have in mind Nāgārjuna's conception of truth. He and the Madhyamika philosophy distinguish two levels of truth, the *relative* and the *ultimate*. Those two truth levels are also mentioned by Varela et al. (1991):

> *[r]elative truth (samvrti, which literally means covered or concealed) is the phenomenal world just as it appears—with chairs, people, species, and the coherence of those through time. Ultimate truth (paramartha) is the emptiness of that very same phenomenal world. The Tibetan term for relative truth, kundzop, captures the relation between the two imagistically; kundzop means all dressed up, outfitted, or costumed—that is, relative truth is sunyata (absolute truth) costumed in the brilliant colors of the phenomenal world (*Varela et al., 1991, p. 226).

While the relative truth is the way things appear with clear properties, the ultimate truth goes *beyond* all descriptions and concepts. It consists in deconstructing every statement without becoming itself a positive statement on what exists.

On the relative truth level, one can say that everything is groundless. It lacks any own existence. Therefore, also groundlessness itself is groundless, it must be understood as a dependent concept that does not ultimately exist in itself [*cf*. Mūlamadhyamakakārikā, chapter 24, verse 18; *cf*. translation by Siderits and Katsura (2013, p. 277)]. This is a crucial statement. It already leads to the ultimate level: if it is true that everything is groundless, it is only coherent to apply it to itself by unfixing the fixation, even on groundlessness as an idea itself.

Therefore, according to one interpretation of Nāgārjuna, on the ultimate truth level, one simply cannot say that this is true either. To say that something is true is again to solidify the unsolid. Even this cannot be said. On the ultimate level, any form of linguistic reference simply fails, including this one. However, this article does not aim for accounting for an ultimate truth level which would be mere contradiction. Instead, we will continue to explore this on the relative truth level within language.

This contrast between the relative and the ultimate truth level is directly analogue to the distinction between the first level of analysis and the second level of analysis. On the first level of analysis, the transition from adaptive sense-making to knowing groundlessness is realized through non-adaptivity and the simultaneous sustainment of non-dual reflexive knowing. However, on the second level of analysis, this first level description is revealed as context-dependent and observer-relative. Moreover, it reflects the perspective from *within* sense-making. From *within* the "perspective" of knowing groundlessness, the first level description is invalid and not representing that which it tries to describe. From this point of view, language as a method is inappropriate. While the first level of analysis relates to Nāgārjuna's notion of relative truth, the second level of analysis refers to his notion of ultimate truth.

Thereby, the second level of analysis arrived at an end of capabilities of theory and analysis. This corresponds to Chökyi Nyima Rinpoche's statement that clearly reflects this view: "[t]he ultimate result of the scholarly approach is to go beyond analysis" (Chökyi Nyima Rinpoche, 2002, p. 183). It leaves me with the impression that the second level of analysis can be regarded as successful.

To summarize, it is interesting how corresponding those views arising from *within* the enactive approach are in relation to Mahāmudrā practice and to Nāgārjuna's philosophy of the middle way.

In this section, we have explored to which extent the enactive theoretical description of the transition from adaptive sense-making to knowing groundlessness (as found in the model by Meling, 2021) corresponds to Mahāmudrā practice. Thereby, we discovered striking correspondences between what the enactive theory predicted to be effective for shifting into an experiential mode free from subject–object duality and what practitioners in the Mahāmudrā tradition actually practice in order to shift into this exact experiential mode. Those correspondences between the conclusions from the first level of analysis and Mahāmudrā practice are summarized in **Table 1**.

At this point, I will highlight the correspondences between the enactive theory of what a shift to knowing groundlessness requires and what Mahāmudrā practitioners in fact practice for facilitating such a shift. Especially interesting is that those correspondences occurred on both of the two levels, on the first level of analysis and on the second level of analysis. On the first level of analysis two main ingredients have been derived as being necessary for sense-making to cease and to know groundlessness: (1) non-adaptivity and (2) non-dual reflexive knowing. Both two predicted requirements for a shift from sense-making to knowing groundlessness find their direct equivalent in the non-dual Mahāmudrā practice and in its underlying philosophy: (1) non-judgment and (2) reflexive awareness (*svasaṃvitti; rang rig*).

The second level of analysis has expounded that from within knowing groundlessness there is no object to describe and no subject that describes. Thereby, language and knowing groundlessness are mutually exclusive. From *within* this "perspective" of knowing groundlessness this exact knowing groundlessness can only be explored further when conceptual

TABLE 1 | Summary of correspondences between the enactive approach to the transition from sense-making to "knowing groundlessness" and Buddhist literature.

Stages of exploration	Enactive approach to knowing groundlessness	Corresponding ideas from Mahāmudrā instructions
(1) Point of departure	Adaptive sense-making	Samsara: confused and ignorant mind that is dualistic on the basis of its habitual approach/avoidance tendencies
(2) Stage 1	*Aim*: decrease sense-making	*Aim*: inhibit thought (as an aid to cultivating present-centered awareness): self-liberation of thought (*rang grol*)
	Method: decrease adaptivity	*Method*: inhibit a requirement of thought: inhibit the approach/avoidance stance of an agent acting in the world
	Gaps: (1) There is no decrease of adaptivity without *knowing* the current adaptivity and sense-making.	*Purpose*: supporting present-centered *awareness*
	(2) There is no transition from decreasing one adaptivity act to another one without *knowing* the respective adaptivity act.	
(3) Stage 2	*Aim*: reflexive non-propositional meta-awareness of current sense-making acts and adaptivity acts	*Aim*: reflexive awareness
	Method and problem: the "sense-making-of-sense-making" approach leads to an infinite regress. Sense-making is then *in*creased.	*Method and problem*: the so-called "spy of mindfulness" approach leads to an infinite regress (*anavasthā*)
	Alternative: non-dual reflexive knowing (phase 2 enaction)	*Alternative*: "looking intently" (*cer gyis lta*) *via* non-dual reflexive awareness (*rang rig*; svasaṃvitti)
(4) Point of Arrival	Knowing groundlessness is phase 2 enaction (non-propositional meta-awareness) knowing itself, unobscured by adaptive sense-making.	Reflexive awareness (*rang rig*; *svasaṃvitti*) is constantly present but is only recognized in a moment of knowing groundlessness when adaptive sense-making has ceased.
		Groundlessness is experienced as *empty luminosity*.

thinking is left behind. This is clearly reflected in Nāgārjuna's endpoint of his philosophy.

The correspondences on the first level of analysis I interpret as a sign of plausibility: the derived predictions of the enactive theory regarding the transition from sense-making to knowing groundlessness make sense in the context of Mahāmudrā practice. The correspondences on the second level of analysis I interpret as an additional sign of plausibility: the conclusion that those descriptions of the transition process are themselves context-dependent, observer-relative, and accordingly groundless make also sense in the context of a certain interpretation of Madhyamika philosophy. Again, this is pointedly stated in Chökyi Nyima Rinpoche's words "[t]he ultimate result of the scholarly approach is to go beyond analysis" (Chökyi Nyima Rinpoche, 2002, p. 183). However, as the groundlessness of this approach is attempted to be kept in mind, this whole approach remains open for context-dependent and observer-relative discussion.

DISCUSSION

This article started off from a recently developed extension of the enactive view toward what is required for a momentary shift into a non-dual mode of experiencing free from subject–object structure. This enactive analysis contributes principled hypotheses on precise elements of non-dual practices: what exactly leads to a momentary shift into a non-dual mode of experience? These more concrete hypotheses are central in enabling a theoretical and scientific discourse on the specifics of non-dual experiences and non-dual styles of meditation.

The central aim of this article was to evaluate the coherence of these concrete hypotheses through comparing it to actual non-dual-oriented practice instructions. Therefore, it provides an approximate quality assessment of a recent theoretical enactive approach to non-dual experiences. Moreover, it targets at supporting a coherent enactive view of a specific style of non-dual meditative practice (Mahāmudrā practice).

In order to approach this central aim of this article, an enactive approach has been presented which accounts for what might be required from a cognitive system to shift into an experiential mode of non-dual experience. This resulted in presenting two performative structural elements that are key for an experiential shift into a non-dual state: non-adaptivity and non-propositional meta-awareness (reflexive knowing; phase 2 enaction). This has paved the way for the main step of this article: evaluating this enactive framework by comparison with concrete practice instructions from a non-dual meditation tradition: Mahāmudrā. This provides the core of an enactive approach to non-dual practice: non-dual meditative *practice* (not just a *theoretical far-off analysis*) from an enactive perspective.

As a result, we have seen a close correspondence between an enactive prediction of what a shift to knowing groundlessness requires and what Mahāmudrā practitioners in fact practice for enabling such a shift: on the first level of analysis, we encountered that (1) non-adaptivity matches the emphasis in Mahāmudrā instructions on non-judgment. Also, (2) non-propositional meta-awareness (non-dual reflexive knowing) matches the emphasis in Mahāmudrā instructions on reflexive awareness (*svasaṃvitti; rang rig*). This is considered preliminary evidence that the provided description of the transition process makes sense in the context of a lived practice that aims at eliciting non-dual experiences. Interesting is also that the provided description from the second level of analysis is reflected in one way of reading Nāgārjuna's *Madhyamika philosophy*.

This enactive understanding of non-dual meditative practice paves the way for an in-depth academic discourse on those concrete structural components that might be crucial to a shift into a pure non-dual experience. The two concrete hypotheses on what a shift into non-dual mode of experience requires (*non-adaptivity* and *non-propositional meta-awareness*) (1) build

on a principled enactive meshwork of ideas and (2) match Mahāmudrā practice as one exemplary non-dual practice tradition. Therefore, principled hypotheses about what concrete experiential acts cause non-dual experiences are provided that may inform future scientific studies into the specifics of non-dual practices. This asks for operationalization of those two components: how to assess the extent to which a practitioner is non-judgmental (i.e., exhibits non-adaptivity) and to which extent the practitioner is reflexively aware and vigilant (i.e., exhibiting non-propositional meta-awareness)? This asks for a methodological evaluation of how psychometric assessments, phenomenological in-depth interviews (Petitmengin, 2006; Høffding and Martiny, 2016), and/or third-person measures like fMRI and EEG could be applied to a reliable mixed-method assessment (Berkovich-Ohana et al., 2020; Martiny et al., 2021) of the two central experiential gestures that are involved in the shift toward a pure non-dual experience: *non-adaptivity* and *non-propositional meta-awareness*.

Thereby, this article valuably contributes principled and theoretically grounded hypotheses as a necessary step toward the much-needed scientific inquiry into the variety of meditative practices:

> *"The framework presented here highlights the need to expand the scope of scientific research to include a range of meditation practices. In the same way that the study of mindfulness meditation has provided a unique window into the training of specific forms of attention, and the impact of attentional training on emotion regulation, learning and memory, and various forms of psychopathology, other forms of meditation may similarly yield important insights into the regulation of self-related processes and their import for well-being, health, and peripheral biology" (*Dahl et al., 2015, p. 521, emphasis added).

With its conceptual contribution, this article targets at inspiring future studies into the specifics of a central phenomenon in a variety of contemplative traditions: non-dual experience.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

The author confirms being the sole contributor of this work and has approved it for publication.

FUNDING

This work is supported by a Spark Grant from the Swiss National Science Foundation (CRSK-1_196833) and by the BIAL Foundation (No. 333/20).

ACKNOWLEDGMENTS

I wish to thank John Dunne and Milan Scheidegger for their inspiration and support and Markus Peschl for his helpful comments on an early draft of this article's ideas. Finally, I wish to thank the reviewers for their constructive feedback and valuable remarks.

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Conflict of Interest: The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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BRIEF RESEARCH REPORT
published: 04 May 2022
doi: 10.3389/fpsyg.2022.838381

The Examination of Conscience: A Preliminary Study on the Effects on Metamemory After a 2-Week Practice

Nicola De Pisapia and Martina Dall'Avanzi*

Department of Psychology and Cognitive Science, University of Trento, Rovereto, Italy

Examination of conscience (EC) is a contemplative practice that consists in examining daily the actions performed during the day (evening examination, immediately before going to bed) and the actions to be performed on the coming day (morning examination, immediately after sleep). While research on contemplative practices such as mindfulness has seen a large increase of studies in recent years, research into the psychological effects related to the practice of the EC has been largely ignored in the scientific literature. On the other hand, on a careful historical and philosophical analysis, it appears evident that references to it abound in many cultural contexts and in different eras. Here, we examined the effects of a 2-week program of this practice that participants performed using a digital application developed *ad hoc* for this experiment. A control group performed an activity of the same duration, also with the support of a digital application, but which consisted of listening to audio excerpts of an Italian literary novel. Measurements taken from both groups before and after the 2-week period consisted of self-assessments of metamemory capacity, that is, awareness and knowledge of their own memory processes. Results showed that participants reported a significant decrease in two properties of their metamemory after training, specifically vividness and coherence. No other significant changes were found between the two groups. Specifically, we found no differences in other metamemory characteristics, no differences in prospective or retrospective memory, and no differences in changes in stress levels. These results, although preliminary, suggest that a relatively short period of EC does indeed make people metacognitively more aware of the limitations and errors of their memory, in particular concerning vividness and coherence.

Keywords: contemplation, mental training, memory, metacognition, contemplative science

OPEN ACCESS

Edited by:
Luca Simione,
Institute of Cognitive Sciences and Technologies, National Research Council (ISTC-CNR), Italy

Reviewed by:
Anja Kühnel,
Medical School Berlin, Germany
Cloé Blanchette-Carrière,
Université de Montréal, Canada

****Correspondence:***
Nicola De Pisapia
nicola.depisapia@unitn.it

Specialty section:
This article was submitted to Consciousness Research, a section of the journal Frontiers in Psychology

Received: *17 December 2021*
Accepted: *08 April 2022*
Published: *04 May 2022*

Citation:
De Pisapia N and Dall'Avanzi M (2022) The Examination of Conscience: A Preliminary Study on the Effects on Metamemory After a 2-Week Practice. Front. Psychol. 13:838381. doi: 10.3389/fpsyg.2022.838381

INTRODUCTION

In this study, we have analyzed some of the effects produced by engaging in a contemplative practice that is largely unknown in scientific research, although the practice itself is widespread in various cultures. The name of this practice is examination of conscience (EC) and it is a contemplative practice consisting of a daily review of the actions performed during the day.

Usually, the practitioner performs this exercise in the evening before going to sleep (evening examination) and then immediately after waking up recapitulates the sequence of events of the past day (morning examination). During the morning examination, the practitioner additionally examines the actions he or she intends to perform the following day.

This practice has a long historical tradition worldwide, and particularly in Western and Eastern cultures. Variations of EC are described as practiced in the Pythagorean School in the 6th century BC (Huffman, 2014), in Stoicism of the Hellenistic and Ancient Roman period, for example, as described by Epictetus (Torode and Epictetus, 2017), or in the writings of the emperor Marcus Aurelius (Aurelius, 2011), in classic Tibetan Buddhist teachings (Dorje, 2004), as well as in the Christian spiritual exercises of St. Ignatius of Loyola (Loyola, 2007), just to mention a few references. For a complete historical excursus of this contemplative exercise—beyond the scope of this manuscript—see De Pisapia (2020).

As with other contemplative practices, different cultural backgrounds place emphasis on different aspects of the EC practice (in Pythagoreanism, for example, the emphasis is on memory training, while in Christianity, the purpose is to test conformity to religious law), but otherwise the procedural aspect of this exercise remains fairly constant. The essence of this exercise is still that the trainees make a daily examination in their own conscience of the actions they have performed during the day and those they will perform in the coming day. In this type of exercise, the constituent elements of the actions are as follows: (1) they should be practiced close to sleep; (2) there is a review (examination) of the salient episodes of the previous day and a contemplation of their value in terms of an ethical frame of reference (conscience) within which the individual wishes to grow and improve; and (3) there is a more conscious preparation for what the individual will do in the coming day, in accordance with the values he/she cultivates. Notice how the closeness to sleep might be a fundamental requirement, in fact in current scientific research, it is well know that sleep itself is a phase in which the experiences made during the day are consolidated, memory formation is promoted and the individual prepares for new activities (Diekelmann and Born, 2010).

This contemplative practice differs considerably from contemporary forms of mindfulness meditation (Kabat-Zinn, 2015), in which the main purpose is to direct attention to the present moment, and thus not to the past nor to the future. In particular, in one of its main exercises of mindfulness trainings, the meditation practice consists in focusing the attention on the bodily sensations linked to act of breathing. This is very different from the EC, where the focus is instead on practicing retrospective and prospective memory during the evening and morning examinations.

Given these premises, the recurrence of this practice for personal improvement in the history of Eastern and Western thought points to the centrality of this technique. It would seem, therefore, that this practice could be of enormous interest in the scholarly study of the diversity of contemplative experiences and practices. On the contrary, to our knowledge, there is currently no scientific research on the behavioral and psychological effects of this practice. Given that research on other contemplative practices is producing a large number of studies or giving possibilities of new clinical intervention for some psychopathologies, such as is happening in the field of mindfulness research (Baer, 2003), we believe that scientific investigation should also extend to other techniques belonging to contemplative traditions, but which are still ignored by current research. The purpose of the present study is therefore to conduct an initial exploratory investigation into the possible effects of the EC and to help lay the groundwork for future research on another culturally well-supported practice in the emerging field of contemplative studies. We believe that such exploration is important because it can provide preliminary methodological insights and initial results on this practice.

As a premise, we emphasize that the participants in this experiment were randomly selected. Therefore, we did not control for the particular value systems (religious, philosophical, ethical, etc.) that they might have associated with this particular practice. Rather, we simply developed a digital application consisting of audiofiles, which guided the participants to keep track of the procedural components of the exercise (evening and morning examination). Therefore, the focus of the present study was solely on the possible metacognitive effects of the exercise. Metacognition refers to the awareness and understanding of one's cognitive processes (Flavell, 1979). In recent years, one particular view that is emerging concerning contemplative practices is that they promote metacognitive self-regulatory and modulatory capacities, enabled by the repeated exercise of introspective awareness of one's own mental processes and behaviors (Dorjee, 2016). In the EC takes place a training of introspection in retrospective and prospective memory, therefore in this study, the specific metacognitive aspect that we scrutinized is metamemory. Such ability for metacognition of memory processes includes both the awareness and the knowledge of memory processes. The awareness component of metamemory concerns the monitoring and the regulation of memory, whereas the knowledge component corresponds to the general beliefs that a person has on his/her own memory processes (Perfect and Schwartz, 2002). Both components play a fundamental role in the recognition of our own limitations and competences in memory, for example, in the awareness and regulation of memory biases. These are particular types of cognitive biases that alter either the content or the recall of a memory, and they are very frequent both in healthy individuals, for example, concerning autobiographical memories (Romano et al., 2020), and in the development of mental disorders, such as anxiety (Coles and Heimberg, 2002) or psychosis (Eisenacher and Zink, 2017).

In this experiment, a group of participants performed the EC daily, both in the evening (retrospective) and in the morning (retrospective and prospective), using a digital application designed specifically for this study. As a control group, a homogeneous number of participants used another digital application with which they listened to an audiobook. This control group activity was performed before going to sleep

and then continued after waking for a total of 2 weeks, in parallel with the experimental group. The choice of a 2-week period was dictated by the fact that training in this contemplative practice is very intensive (twice a day), and in other effective similarly intensive memory training studies, there was a similar duration (e.g., Buschkuehl et al., 2012).

The digital application consisted of a simple list of audio files to listen to before falling asleep or in the morning upon awakening. For the experimental group, the pre-recorded voice indicated to carry out the EC, namely, in the evening reviewing the salient episodes of the past day, and in the morning again to repeat the salient episodes of the day before and the main actions to be carried out on the new day. For the control group, the pre-recorded voice read brain sequentially from a novel.

Both groups completed a series of questionnaires before and after the experimental and control activities. A reliable method for measuring the subjective aspects of metamemory is to ask participants to self-assess their memory performance using questionnaires (Mäntylä et al., 2010). This method is also valid more generally for measuring metacognitive aspects, where self-assessments are useful to distinguish between subjective components of *bias* (automatic subjective inclinations), of *sensitivity* (ability to judge one's mistakes), and *efficiency* (subjective sensitivity with respect to a certain level of task performance; Fleming and Lau, 2014). In this study, we used the Prospective and Retrospective Memory Questionnaire (Smith et al., 2000) and the Memory Experience Questionnaire (Luchetti and Sutin, 2016) that allowed us to investigate changes in metamemory after the 2-week training with the EC.

Additionally, we administered the Perceived Stress Scale (PSS; Cohen et al., 1994) to monitor possible stress-related mood changes throughout the period. Data collection took place during a lockdown in Italy to counteract the pandemic COVID-19, and all individuals who participated had already undergone at least 2 weeks of quarantine and were severely restricted in their movements. The possible conditioning effects of the lockdown on the cognitive system, induced by the stressful context, must therefore be taken into account in the overall evaluation of the results (Ingram et al., 2021). To control for cognitive effects linked to the special lockdown conditions, we had a control group that run in parallel to the experimental group.

Additionally, given our hypothesis that EC acts on metamemory (both retrospectively and prospectively), we asked our experimental and control participants after the 2-week period whether they had experienced a change in their ability to be lucid during dreaming. The parallel that we draw between EC and lucid dreaming is only theoretical and exploratory, and motivated as follows. A lucid dream is a dream in which the dreamer is aware that he/she is dreaming. It is an infrequent mental phenomenon, in which the experiences during a dream are correctly recognized by the dreamer as of a dream type thanks to an increased self-awareness. The lucid dreamer knows that he/she is within a dream context and in a virtual world made of corporeality, sensations, people, and stories that he/she experiences in full awareness of their hallucinatory character. This recognition is accompanied by an integral memory of one's waking life, and sometimes by an ability to guide one's actions with self-awareness (clarity) and proactivity (intentionality). Metacognitive (Filevich et al., 2015) and more specifically metamemory skills (Holzinger and Mayer, 2020) seem to be central in this mental phenomenon (Baird et al., 2019; De Pisapia, 2021). Furthermore, the EC is practiced close to sleep, and several techniques to increase the occurrence of lucid dreaming similarly involve retrospective and prospective metamemory training, for example, the so-called Mnemonic Induction of Lucid Dream, MILD (La Berge, 1980).

MATERIALS AND METHODS

Participants

A total of 44 participants took part in this research. We chose to determine the sample size based on comparatively similar experimental psychology studies on memory training, such as, for example, Richmond et al. (2011). They were recruited online (email and advertisement on social networks), and all contacts with them throughout the experiment took place remotely. The excluding criteria were the presence of neurological or psychological disorders (as self-reported by the participants, and not determined through an external assessment). Participants were randomly assigned to the two experimental groups, 22 in the control group and 22 in the experimental group. Three individuals from the experimental group did not complete the questionnaires, and consequently, they were excluded from the study. The average age was 35.75 years, with a SD of 7.2. The control group consisted of 7 males and 15 females (age $M = 31.8$, $SD = 7.0$), while the experimental group consisted of five males and 14 females (age $M = 40{,}3$, $SD = 6.7$).

Over a 2-week period, participants in both groups were required to use a digital application and listen to a few short audio files at two moments during the day, namely, in the evening before going to bed and in the morning after waking up. Before listening to the audio guide, participants were asked to find a quiet place where they could not be disturbed. They were then asked about the location of the exercise and when they expected to go to bed (for the evening practice) or how long it had been since they had woken up (for the morning practice). These questions allowed us to verify that participants actually performed the exercises when they were instructed to do so, i.e., just before going to bed and after waking up. After this brief questionnaire, participants began listening to the audio files included in the application.

Participants in the experimental group then listened to the instructions for the EC exercise, which were of course different in the morning and in the evening. These instructions followed the simple indications on the practice that can be found in the contemplative texts mentioned in the Introduction. They simply consisted of asking the participants to recall the main sequence of episodes from the day (evening exercise) and to both recapitulate the main sequence of events from the previous day and mentally repeat the main sequence of actions they planned to take during the day (morning exercise; see

Supplementary Material for the full transcript of the instructions).

Participants in the control group instead listened to audio excerpts from a book of Italian literature in the evening and in the morning sessions (Zeno's Conscience by Italo Svevo). This is a classic novel of Italian literature written in the first person as a kind of therapeutic diary of the protagonist describing some of the most important episodes of his life. We chose the reading of the literary novel because (1) it was an actual activity (thus, the control group was not passive or in a waiting list); (2) it engaged the control group for a time comparable to the EC practice (both in the evening and in the morning); (3) it was not a contemplative practice in itself; and (4) it did not affect metamemory directly.

A series of self-assessment tests were administered online to participants in both groups before (pre) and after (post) the entire 2-week program. The effects measured were related to the experience of memory, their perception of prospective and retrospective memory, stress, and the tendency to develop lucidity in dreams. Below is a description of the self-assessment measures.

Measures

Memory Experiences Questionnaire

The memory experiences questionnaire (MEQ) in the short version (Luchetti and Sutin, 2016) is a memory self-assessment test consisting of 34 questions, with answers given on a five-point Likert scale ranging from totally disagree to totally agree. There are 10 subscales that measure the phenomenological qualities of autobiographical memories: Vividness, Coherence, Accessibility, Sensory details, Emotional intensity, Visual perspective, Time perspective, Sharing, Distancing, and Valence. Each scale of the abbreviated form has a good internal consistency, a high correlation with the extended version (Sutin and Robins, 2007).

Prospective Memory and Retrospective Memory

The Prospective and Retrospective Memory Questionnaire (PMRQ; Smith et al., 2000) is a self-assessment questionnaire of memory failures in the form of 16 questions (e.g., "Do you fail to recall things that have happened to you in the last few days?"). Answers are given on a five-point Likert scale from 1 corresponding to "never" to 5 corresponding to "very often," where an increase in the scoring corresponds to a perception of a worsening of memory. There is a global scoring, but results are also divided into the prospective and retrospective memory subscales, which investigate the two memories separately. Notice how a scoring increase in this questionnaire corresponds to an increase in the perceptions of memory failures.

Perceived Stress Scale

The Perceived Stress Scale (PSS) (Cohen et al., 1994) is a test for assessing the perception of stress. The questionnaire consists of 10 sentences, and for each of them, the participant must evaluate how stressful the situations described are by giving a score on a five-point Likert scale ranging from 0 = never to 4 = very often.

Lucid Dreaming

At the end of the 2-week period using the digital application, we asked every participant of both groups to answer this simple question: "In the last 2 weeks have you noticed an increase in the awareness of dreaming while dreaming?." The answers could vary on a scale from 1 to 5 (1-Totally disagree; 2-Partially disagree; 3-Neither agree nor disagree; 4-Partially agree; and 5-Totally agree).

Data Analysis

The responses on each questionnaire were scored according to their protocols, which resulted in one score per participant and time point for each of the scale or subscale. The distribution of scores on all the dependent variables was evaluated prior to conducting primary analyses; because the data were not normally distributed, we used permutation tests, which are non-parametric tests as they do not rely on assumptions about the distribution of the data and can be used with different types of scales and with a small sample size.

For each experimental and control participant, we computed gain scores for each measure by subtracting the pretest scores from the posttest scores and then running independent sample *t*-test on gain score differences between the groups. We used permutational *t*-tests with the "pairwise.perm.t.test" function from the "RVAideMemoire" package in R (by Hervé and Hervé, 2020). The difference between the traditional and the permutational *t*-tests is that while the traditional *t*-test determines the equality of the group mean, whereas the permutation version tests the exchangeability of the group observations. The number of permutation was set to 10,000. We applied the false discovery rate (FDR) correction method (Benjamini and Hochberg, 1995) to account for Type I errors introduced by multiple pairwise tests and Type II errors introduced by small sample size, setting statistical significance at $p = 0.05$.

RESULTS

Full results are summarized in **Table 1**. In particular, results from the *t*-tests of the gain scores in the MEQ showed differences in two subscales between the two groups, showing how the experimental group decreased the values in the self-assessment of two of the subscales. In particular, the subscale of Vividness of the memory decreased significantly in the experimental group (gain score $M = -0.611$, $SD = 2.593$) compared to the increase of controls (gain score $M = 1.476$, $SD = 3.586$) with a mean difference between the two groups of $M = -2.087$ (value of $p = 0.047$, FDR corrected). Furthermore, the subscale Coherence between the remembered events decreased significantly in the experimental group (gain score $M = -2.111$, $SD = 2.988$) compared to a slight decrease of controls (gain score $M = -0.238$, $SD = 1.998$) with a mean difference between the two groups of $M = -1.873$ (value of $p = 0.027$, FDR corrected).

Results of the PMRQ showed instead no significant differences between the two groups (experimental vs. control group, gain score $M = 1.991$, $SD = -2.331$, value of $p = 0.16$). The perception of prospective memory remained fundamentally unchanged in

TABLE 1 | Gain scores (means M and SD) of metamemory measures, stress, and lucid dreaming self-assessments in the experimental group and the control group, and then, their differences tested with *t*-test permutation (false discovery rate, FDR corrected).

Variable	Experimental group		Control group		Experimental vs. control		
	Gain scores		Gain scores		Gain differences		
	M	*SD*	*M*	*SD*	Mean diff	*t*-value	*p*-value
MEQ	3.833	10.596	0.524	7.507	3.309	0.404	0.280
Vividness	**-0.611**	**2.593**	**1.476**	**3.586**	**-2.087**	**−1.775**	**0.047**
Coherence	**−2.111**	**2.988**	**−0.238**	**1.998**	**−1.873**	**−5.949**	**0.027**
Accessibility	0.333	4.339	0.190	3.140	0.143	−2.021	0.930
Sensorial details	1.111	4.739	1.381	4.914	−0.270	−0.267	0.890
Emotional intensity	−0.278	4.638	−0.381	3.956	0.103	−2.634	0.970
Visual perspective	0.611	2.789	−0.238	3.659	0.849	−2.466	0.440
Temporal perspective	0.000	3.308	0.333	2.331	−0.333	−2.824	0.760
Sharing	−0.944	4.151	0.000	4.572	−0.944	−2.705	0.550
Distancing	0.889	2.988	0.429	2.271	0.460	−1.934	0.640
Valence	2.056	8.680	−2.048	6.771	4.104	−1.277	0.110
PMRQ	0.941	4.723	−1.050	3.410	1.991	−2.331	0.160
Prospective memory	−0.059	2.727	−0.650	2.739	0.591	−4.053	0.550
Retrospective memory	1.000	3.518	−0.400	1.847	1.400	−2.607	0.150
PSS	−2.000	6.872	−1.000	6.221	−1.000	−2.874	0.650
Lucid dreaming	**3.200**	**1.146**	**2.333**	**1.175**	**0.867**	**5.238**	**0.047**

Statistically significant gain score differences are in bold.

both groups (gain scores $M = -0.059$ and $SD = 2.727$ in the experimental group, gain scores $M = -0.65$ and $SD = 2.739$ in controls). Notably, the retrospective memory was generally perceived in the experimental group as worsened from pre to post (gain scores $M = 1.000$ and $SD = 3.518$ in the experimental group, $M = -0.400$ and $SD = 1.847$ in controls) with a total perception of retrospective memory change of $M = 1.4$, even though this difference was not significant ($p = 0.150$, FDR corrected).

As for the stress, in the PSS, we found no significant differences between the two groups in the pre vs. post-comparison (experimental vs. control group, gain score $M = -1.0$, $SD = -2.874$, value of $p = 0.65$).

Finally, concerning the self-reported occurrence of lucid dreams, the experimental group reported a significant increase in the occurrence of lucidity and awareness in dreams (gain score $M = 0.867$, value of $p = 0.047$, FDR corrected) with scores of $M = 3.200$ and $SD = 1.146$ for the experimental group and $M = 2.333$ and $SD = 1.175$ for the control group.

DISCUSSION

In this study, we examined the effects of a 2-week program consisting of evening and morning exercises of EC supported by a digital application. A control group performed an activity of the same duration, also with the support of a digital application, but consisting of listening to audio excerpts of an Italian literary novel. Measurements conducted on both groups before and after the 2-week period showed that the experimental group participants' self-assessment of some properties of their metamemory decreased. Specifically, we noted a significant decrease in Vividness, which refers to the visual clarity and visual intensity of the recalled memories, and Coherence, which refers to the extent to which the memory involves a logical story in a particular time and place rather than just fragments of the original experience. Another change we noted was a significant increase in participants' self-assessed capacity to develop lucidity in their dreams. No other significant changes were found between the two groups. In particular, we found no differences in other properties of metamemory in general, no differences in prospective or retrospective memory, and no differences in changes in stress levels.

While it may seem counterintuitive that people who undergo metamemory training become worse at metamemory, one possible explanation is that this exercise makes people more aware of the limitations and fallacies of their memory. Metamemory consists of awareness and knowledge of our own memory processes (Perfect and Schwartz, 2002), and the actual familiarity and exploration of our beliefs about our own memory processes triggered by the EC exercise had the effect in our 2-week protocol of making participants more aware of their limitations and memory errors. The metamemory properties that decrease are specifically Vividness and Coherence of memories. For these measures, participants made a self-assessment of the ability to see their memory clearly and to reconstruct the sequence of remembered events, and to check whether they appeared in memory vividly and in the form of a logical and coherent story. Vividness refers to the visual clarity and visual intensity of retrieved memories, and it has been described as the most important aspect of autobiographical memory (Greenberg and Rubin, 2003). Coherence refers instead to the extent to which a retrieved memory involves a logical story in a specific place and time rather than experiential

fragments (Sutin and Robins, 2007). These subscales are therefore of central importance and very instructive for the practice of EC, where the exercise consists mainly in carrying out a daily screening of actions performed and yet to be performed, with the result that participants became much more aware of what their mind was actually capable of performing when they tried to vividly and logically reconstruct their memory or intentions.

As for the significant improvement in lucid dreaming, the extreme limitation of the method used (a simple self-assessment question) certainly does not allow a definite conclusion. However, this datum points to the need to further explore the possibility that metamemory trainings such as EC may indeed elicit greater metacognitive capacity during dreaming, even in the context of a more severe assessment of one's memory abilities.

This experiment represents only a preliminary attempt to investigate EC, a contemplative practice that belongs to a wide variety of traditions. Apart from the interest of these preliminary results and the method used (the use of a digital application and the comparison with an active control group), the study has a number of limitations. One of these relates to the fact that the experiment was conducted during the COVID-19 lockdown period, which severely restricted the movements and diversity of experiences of participants who were forced to work or study from home. This may have influenced the outcome in ways that are difficult to assess. Another limitation is that we did not measure the level of religiosity or spiritual orientation of the participants, in order to ensure that experimental and control groups were comparable on these measures. Another limitation is the duration of the protocol of only 2 weeks, which leaves open the question of what would happen if this practice was longer and more stable. Another limitation is that the participants were not assessed or excluded based on conditions that might potentially impact the results, such as, for example, sleep disorders or substance use/medication. Finally, the questionnaires used were exclusively self-assessments, so that only subjective aspect of both metamemory and lucidity in dreaming was measured and no conclusions could be drawn about objective memory performance or verified frequency change in lucid dream occurrence.

In conclusion, despite these significant limitations, all of which can be addressed in future studies, we believe this study is important because it provides some methodological insights and initial interesting results on this contemplative practice, which has otherwise been ignored in the scientific literature despite being widely used throughout human history and in various cultures around the world.

DATA AVAILABILITY STATEMENT

The datasets presented in this article are not readily available because the participants in the study only gave permission to the researchers to use their data. Requests to access the datasets should be directed to nicola.depisapia@unitn.it.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Research Ethics Committee University of Trento. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

NP and MA designed the study. MA programmed the digital application, collected the data, and performed the analysis. NP lead in writing the manuscript and supervised the project. All authors contributed to the article and approved the submitted version.

ACKNOWLEDGMENTS

The authors would like to thank Clara Rastelli for providing one of the scripts for the analysis and all participants for their patience and care in following our instructions.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.838381/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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ORIGINAL RESEARCH
published: 30 June 2022
doi: 10.3389/fpsyg.2022.863091

Characteristics of Kundalini-Related Sensory, Motor, and Affective Experiences During Tantric Yoga Meditation

Richard W. Maxwell[1] and Sucharit Katyal[2]*

[1]*Private Practitioner, Ithaca, NY, United States,* [2]*Independent Researcher, Copenhagen, Denmark*

Traditional spiritual literature contains rich anecdotal reports of spontaneously arising experiences occurring during meditation practice, but formal investigation of such experiences is limited. Previous work has sometimes related spontaneous experiences to the Indian traditional contemplative concept of kundalini. Historically, descriptions of kundalini come out of Tantric schools of Yoga, where it has been described as a "rising energy" moving within the spinal column up to the brain. Spontaneous meditation experiences have previously been studied within Buddhist and Christian practices and within eclectic groups of contemplative practitioners. Prior explorations of kundalini have emphasized extreme experiences, sometimes having clinical consequences. We conducted a first such investigation of kundalini-related experiences within a sample of meditators from a single Tantric Yoga tradition (known as Ananda Marga) that emphasizes the role of kundalini. We developed a semi-structured questionnaire to conduct an exploratory pilot investigation of spontaneous sensory, motor and affective experiences during meditation practice. In addition to identifying the characteristics of subjective experiences, we measured quantity of meditation, supplemental practices, trait affect and trait mindfulness. We administered it to 80 volunteers at two Ananda Marga retreats. Among reported experiences, we found the highest prevalence for positive mood shifts, followed by motor and then sensory experiences. The frequency of spontaneous experiences was not related to the quantity of practiced meditation or trait measures of mindfulness and affect. Self-reports included multiple descriptions of rising sensations, sometimes being directly called kundalini. Experiences with rising sensations were complex and many included references to positive affect, including ecstatic qualities. There were also reports of spontaneous anomalous experiences. These experiences of rising sensations resemble prior clinical descriptions that were considered kundalini-related. The individuals who reported rising sensations could not be distinguished from other participants based on the incidence of experiences, quantity of meditation practice, or trait measures of mindfulness and affect. In contrast, greater amount of Tantric Yoga meditation practice was associated with greater positive affect, less negative affect and greater mindfulness. Further study of these exploratory findings and how they may be related to spiritual

OPEN ACCESS

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***Correspondence:**
Richard W. Maxwell
rwmaxw@gmail.com

Specialty section:
This article was submitted to Consciousness Research, a section of the journal Frontiers in Psychology

Received: *26 January 2022*
Accepted: *27 April 2022*
Published: *30 June 2022*

Citation:
Maxwell RW and Katyal S (2022) Characteristics of Kundalini-Related Sensory, Motor, and Affective Experiences During Tantric Yoga Meditation. Front. Psychol. 13:863091. doi: 10.3389/fpsyg.2022.863091

and well-being goals of meditation is warranted along with scientific investigation of purported kundalini phenomena.

Keywords: meditation, tantric yoga, kundalini, subjective experiences, anomalous experiences, Ananda Marga, contemplative practices

INTRODUCTION

In recent years, there has been growing interest in the lived experience of meditation (Lutz et al., 2015; Shaner et al., 2017; Kordeš et al., 2019; Petitmengin et al., 2019; Agarwal et al., 2020). Subjective experiences during meditation have been examined along several dimensions including, the quality or depth of meditation (Piron, 2001; van Lutterveld et al., 2017; Katyal and Goldin, 2021), and changes in experiential boundaries of self (Lindahl and Britton, 2019; Berkovich-Ohana et al., 2020; Nave et al., 2021). Recent work has also revealed that meditation practice may engender experiences that have strong personal significance and change personal outlooks, often referred to as "kundalini awakening" (Lockley, 2019; Corneille and Luke, 2021; Woollacott et al., 2021). Tantric Yoga practices, within which the concept of kundalini originated (Hatley, 2022), have long been known to generate such experiences in the process of deepening meditation (Silburn, 1988; White, 2012).

Kundalini is a complex concept, first appearing in *Tantric Śaivism* scriptures *circa* 6–8th century C.E. It refers to a dormant "vital power" that rises up the spinal column when "aroused," sometimes yielding strong transformative personal experiences (Hatley, 2022). Despite some variations in conceptualizations of kundalini across traditional scriptures, a shared feature is the idea that it ascends through a central energy channel, traditionally referred to as the *sushumna nadi*, situated within the spine (Mallinson and Singleton, 2017). Along this channel, Tantric Yoga literature has described subtle energy centers (referred to as "chakras"), which are bodily experienced locations through which the kundalini is proposed to ascend (Anandamurti, 1993b). The most commonly-known chakra system includes seven chakras (Feuerstein, 1997), though there are slight differences of opinion concerning the precise bodily locations where these chakras are supposed to lie (e.g., Motoyama, 1981; Vishnu Tirtha, 2000; Saraswati, 2006; Anandamurti, 2010b). Our participants primarily utilize the classic seven chakra system described by Anandamurti (2010b), which is supplemented by two additional chakras (details in section "Materials and Methods").

The ascent of the kundalini has been associated with experiential phenomena in sensory modalities, including light, heat, somatosensory and different kinds of inner sounds (Feuerstein, 1997; Anandamurti, 2020a,c), motor activity (Vishnu Tirtha, 2000), and affect (Anandamurti, 1968). While kundalini has traditionally been considered a non-physical "force" capable of being aroused (Anandamurti, 1993a), kundalini has never been directly measured. As a result, kundalini's association with experiential phenomena is presumed to be indirect. Therefore, we use the term "kundalini-related" phenomena for experiences that may be measurable or reportable and which have shown some relationship with identified patterns of experiences associated with kundalini.

A framework for formal investigation of kundalini-related phenomena was developed in a psychiatric context (Sannella, 1992). Sannella organized the "signs" (objective indications) and "symptoms" (subjective descriptions) of what he called "physio-kundalini" experiences into four basic categories: motor, sensory, interpretive (i.e., affective and cognitive), and non-physiological (parapsychological or anomalous) phenomena, while recognizing that these phenomena might be "different aspects of a single integrated experience" (1992, p. 93). Motor phenomena included a range of spontaneous movements from simple twitching, to prolonged trembling and automatic assumption of complex yogic postures; audible vocal outbursts; unusual breathing patterns, including rapid breathing, shallow breathing, deep breathing, and extended breath retention; and frozen postures resembling paralysis. Sensory phenomena included somatosensory (tingling, tickling, itching, and vibrating sensations); temperature (heat and cold sensations); inner lights and visions; and inner sounds of many varieties. Interpretive phenomena represented unusual or extreme emotion; distortions of thought process; detachment from typical thoughts, feelings and sensations; dissociation from one's own mental processes, potentially leading to delusions; what was called "single seeing" (a subjective state with a unitary perceptive origin); and a "great body" experience in which the kinesthetic sense seems to extend beyond the normal boundaries. Non-physiological phenomena included out of body experiences and paranormal "psychic" perceptions.

More recently, to measure kundalini-related phenomena, researchers have developed a Kundalini Awakening Scale (KAS; Sanches and Daniels, 2008). The KAS consists of 76 items organized into five subscales (Changes, Negative experiences, Positive experiences, Involuntary positionings, and Physical symptoms) and a Total score. The KAS items were generated from four primary sources: an extensive personal description of presumed kundalini effects (Krishna, 1993), clinical data (Sannella, 1992), a theoretical conception (Bentov, 1988), and spiritual emergency work (Grof and Grof, 1992), along with some additional unspecified reports of kundalini awakening.

A few studies have examined the effects of meditation on KAS. Individuals engaging in a relatively unstructured set of meditation practices were found to have a positive association between negative experiences and the overall KAS scores (Sanches and Daniels, 2008). In a primarily student population, greater weekly time spent practicing meditation was associated with higher KAS Total scores (de Castro, 2015). The presence of greater KAS Physical symptoms scores (such as, unusual or unexpected tactile and temperature sensations, or unusual breathing and muscle activity) was considered a possible

distinguishing feature of kundalini-related involvement in spiritually transformative experiences (Corneille and Luke, 2021). Additional scales associated with kundalini experiences have been developed in the context of clinical conditions (Greyson, 1993a; Thalbourne and Fox, 1999).

Besides the positive effects classically associated with meditation, recent studies have also investigated adverse meditation experiences (Cebolla et al., 2017; Anderson et al., 2019; Schlosser et al., 2019; Farias et al., 2020; Goldberg et al., 2021; Lambert et al., 2021). According to traditional Tantric Yoga accounts, adverse experiences during meditation are considered to arise primarily due to the premature or improper arousal of kundalini, i.e., in meditators lacking adequate preparation (Krishna, 1993; Feuerstein, 1998). In contrast, we were interested in examining kundalini-related experiences in a sample that would have had adequate preparation for kundalini experiences. Because the concept of kundalini has traditionally been closely related to Tantric schools of meditation, we focused on recruiting a sample that was adept in such a system of meditation practice (Anandamurti, 1968). The primary difference between the experience of an improper arousal and a balanced arousal of kundalini may be the presence of a pre-existing psychiatric vulnerability that is more readily expressed when the proper training and support are not present (Suchandra et al., 2021). Qualities of experiences may have similarities for both improper and balanced arousal conditions, but in a kundalini syndrome (Valanciute and Thampy, 2011; Benning et al., 2018), they will have more prominent disruptive and unpleasant features. We focused specifically on meditators from Ananda Marga, a school of Tantric Yoga (Corby et al., 1978), because meditators of this school receive precise meditation instructions that are largely similar across individuals. We expected that this would provide a clearer impression of kundalini-related expression over prior studies which have examined experiences arising from eclectic sources with no common practices or philosophy (Taylor and Egete-Szabo, 2017; Lockley, 2019; Corneille and Luke, 2021; Woollacott et al., 2021). We predicted our sample would have a comparatively low incidence of adverse experiences resulting from the comprehensive practices and systematic training.

Because previous measures of kundalini-related experiences have been largely based on clinical reports involving people in distress (Greyson, 1993a; Thalbourne and Fox, 1999; Sanches and Daniels, 2008), they appeared somewhat inadequate for measuring such experiences in a healthy meditating sample of Tantric Yoga meditators. Therefore, rather than using pre-existing scales, we adopted the general experiential framework identified by Sannella (1992), and adapted it so that it could be used in a healthy sample versed with the idea of kundalini and engaging practices to awaken it. The majority of our questionnaire utilized a semi-structured format that allowed open-ended descriptions of participants' meditation experiences in different sensory, motor and affective modalities. Additionally, we used standard questionnaires to measure traits of positive and negative affect, and trait mindfulness. We utilized reports of rising sensations involving the back as a primary marker for the presence of kundalini-related activity.

Furthermore, based on prior research (de Castro, 2015), we expected that participants with longer daily meditation practice would report greater kundalini-related experiences and greater mindfulness. We also predicted that greater reported years of meditation practice would correlate positively with trait positive affect and trait mindfulness scores, consistent with prior findings (Easterlin and Cardeña, 1998).

MATERIALS AND METHODS

Participants

A total of 84 individuals were recruited and returned surveys. Recruitment occurred at two Ananda Marga meditation retreats. Two individuals were excluded due to incomplete surveys. Another survey lacked specification of the amount of daily meditation performed and was excluded. One additional individual was excluded because they were below 18 years of age. As a result, 80 participants ($n = 33$ females, 47 males) were included in this study. The mean age of the participants was 41.9 years (SD 13.9, range 20–77). Concerning education, 20 (25%) participants had a high school education, 6 (8%) had Associate's degrees, 28 (35%) had Bachelor's degrees, 16 (20%) had Master's degrees, 7 (9%) had doctoral or law degrees, and 3 (4%) did not report their education.

All participants provided consent according to guidelines recommended by the American Psychological Association Ethics Code, section 8.02 (American Psychological Association, 2002). All participants volunteered and completed the surveys at their own pace during their personal time. Participants were allowed to skip items in the survey or opt-out of the study at any point, if they desired.

Questionnaire Contents

After the consent form, the hand-written questionnaire began with demographic questions, followed by questions concerning the quantity of meditation performed and the degree of observance of various supplementary practices (see below). A series of questions examining experiences during meditation in any of six modalities was presented next. The six modality categories included four sensory realms (Somatosensory, Temperature, Light, and Sound), Motor activity and Mood. However, within the questionnaire, the term "Touch" was used instead of "Somatosensory" because we expected all individuals might not understand the meaning of "somatosensory." With each sensory modality, participants were asked not to report any experiences that could be explained by an external sensory input. For the Motor modality, all reported experiences were asked to be movements that were spontaneous and unintentional. For Mood, participants were asked to describe any "unusual shift in mood" that was associated with meditation. At the end, two published scales were included to measure trait mindfulness and trait affect. Some additional items were present in the questionnaire that were not included in this analysis.

While kundalini was the central focus of this research, there was no use of the terms "kundalini" or "awakening" or "energy" in any information provided to the participants in order to

avoid creating a bias or expectation. Information about self-transformations, parapsychological and anomalous experiences was not specifically sought, but we did analyze them when they were provided. We emphasized open-ended subjective responses so that descriptions could be as elaborate and varied as participants desired. Evaluating the content of subjective experience has been shown to provide more extensive information than just noting the presence of the category of the experience (Benning et al., 2018).

The questionnaire section called "Sensory and Muscular Experiences During Meditation," contained the questions for reports of experiences in all of these six modalities. If any experience was present for a particular modality, participants were directed to additional questions which sought to clarify relevant characteristics. For example, for light, participants were initially asked, "Have you had any experiences with light, unrelated to external light sources, that you attribute to being a meditator?" If an answer of "yes" was provided, then they were asked, "Have you experienced light inside your head or body during meditation?" In addition to the "yes/no" components, participants were asked to describe what they experienced. Additional questions associated with frequency, strength, duration, location, color and form followed. Responses were grouped for some sets of descriptive responses based on inherent relationships, such as degrees of brightness, or quantity of time. The additional questions for each modality were different, designed to identify details that were unique to that modality.

For somatosensory responses, it was initially asked, "Have you had sensations such as pressure, tension, tickling, tingling, vibrating, quivering, itching, or crawling—pleasant or unpleasant—within the body or skin (independent of any normal cause)?" The designation of physical location was important for Somatosensory responses and part of the additional questions. Participants used a variety of different terminologies, particularly when using chakras to designate a location. Questions concerning chakras did not distinguish between the location of the controlling points and the concentration points. Sanskrit and English names for the same chakra were tallied together (e.g., root chakra and *muladhara* chakra were considered the same for analysis). Body regions not directly referring to a chakra were tallied separately. There were three related questions about somatosensory experiences. We combined these into a composite score, eliminating redundancies (if the same sensation was reported for more than one of the questions for a participant, it was only counted as one occurrence for that participant). It was also asked if the "physical sensations ever move through a sequence of locations (independent of you intention)." If so, they were asked to explain the progression.

For temperature, it was initially asked, "Independent of any defined medical condition or external source, have you ever seen a reddening of your skin, or sensed unusual heat or cold in your body, or on your skin?" For muscle activity, it was asked, "Have you ever experienced spontaneous involuntary movements, vocalizations, or breathing patterns independent of any obvious physical or psychological cause?" All modalities, except mood and sound, followed a questionnaire structure similar to the one explained for light. For mood, it was simply asked, "Have you ever experienced an unusual shift in mood that you associate with meditation, or other spiritual practices?" A request followed to explain whatever was experienced. For sound, it was asked, "Have you ever heard any sounds that appeared unrelated to any external source and that you attribute to being a meditator?" This was followed by asking if it occurred during meditation and then a designation the frequency of occurrence of specific types of sounds was requested. For those sounds, we utilized sound categories based on a sequence described in spiritual literature (Anandamurti, 1999). This literature suggests that, for some individuals, each cakra can be associated with a different sound as the kundalini rises from lower to higher chakras (from the *muladhara* to the *ajina* chakra; the sounds of crickets, ankle bells, sweet flute, gong or ocean, and om/aum, respectively). Sound options included items of that sequence, plus additional options (tones, music, hissing, roaring, and thunder) in order to introduce alternatives. Participants could also independently name two additional sounds.

To measure trait mindfulness, we used the total score of the CAMS-R: Cognitive and Affective Mindfulness Scale-Revised (Feldman et al., 2007). There was a significant correlation of gender with CAMS-R Total Score ($r = 0.19$, $p = 0.007$), but not age. Despite that, the CAMS-R had "good" internal consistency (alpha = 0.76) using definitions based on alpha levels adjusted for sample size and number of items (Pontekotto and Ruckdeschel, 2007). Multiple components of the CAMS-R had significant relationships with other measures of mindfulness, distress, well-being, emotional regulation, approaches to problems and other mindfulness measures, demonstrating convergent and discriminant validity. The CAMS-R is divided into four subscales (attention, present focus, awareness, and acceptance), which produce the total score when summed. The items were rated on a 4-point Likert scale from 1 (Rarely/Not at all) to 4 (Almost Always). Examples of CAMS-R questions include: "I am easily distracted." "I am preoccupied by the past." "I try to notice my thoughts without judging them." "I can tolerate emotional pain."

For a measure of trait affect, we used the Positive and Negative Affect Schedule, or PANAS (Watson et al., 1988). The PANAS consists of two scales, one for positive affect (PA) and the other for negative affect (NA). Internal consistency for the time scale that we used was "excellent" (PA alpha = 0.88; NA alpha = 0.87). The two PANAS scales demonstrated the strongest convergent/discriminant validity when the relationship between PA and NA was compared to multiple other similar measures. Correlations between PA and NA and measures of distress and psychopathology were strong for NA and comparatively weak (and inverse) for PA, demonstrating good external validity with the more concise PANAS scales. Each scale has 10 adjectives that are ranked on a 5-point Likert scale from 1 (Very Slightly) to 5 (Extremely). Examples of PA include "alert" and "inspired." NA includes "upset" and "afraid." There are a number of time frame options that may be used when providing answers. In order to identify trait affect, we used, "Indicate to what extent you generally feel this way, that is, how you feel on average."

In some instances, participants provided two options on a single Likert scale item, i.e., two neighboring levels were

indicated when only one was requested. Presumably, they could not decide between the two, or both in some way applied for them. In such instances, we resolved that ambiguity by using the score closest to the mean of the levels for that item.

A full copy of the questionnaire (Meditation Survey Questions.docx), a copy of the questionnaire data that was used for this paper (Survey vs. and Descriptive.xlsx), the selection of variables used for statistical analysis in R (Survey 1 data for R.csv), and the data file used for the imputation (Survey 1 for Impute.csv) may be found at https://osf.io/cnghp/.

Meditation Practices

We use the word meditation according to a "method" definition (i.e., as a mental training technique and not a state; Nash and Newberg, 2013). Participants used multiple methods of meditation. In Ananda Marga, these methods are organized into "lessons," and used to varying degrees depending on the individual. These lessons are largely consistent with yoga practice methods outlined by Patanjali. Patanjali, believed to have lived in India in the early centuries of the Common Era, organized yoga practices into "eight limbs," often called "ashtanga yoga" (Larson, 2012). The first three (Yama and Niyama: moral codes; and asanas: physical postures/stretching exercises) were not part of the lessons (Anandamurti, 2010c), but were considered to be partly included in additional "Supplementary Practices" (see below) and not part of "meditation" in this study. The remaining five limbs were considered to be components of the meditative process (Pranayama: breath control; Pratyahara: sense withdrawal; Dharana: concentration upon physical ideation points; Dhyana: meditation/abstract contemplation; and Samadhi: absorption/one-pointed concentration) and were present to varying degrees in the different lessons of Ananda Marga (Anandamurti, 2010d). In Ananda Marga, the primary meditation practice (known as, "first lesson") included concentrating on the "sound" and "meaning" of an internally repeated mantra, while focusing on a specific point of concentration. The mantras and points of concentration varied across individuals, although the general procedure using those components was the same. No attempt was made to distinguish time spent on different meditative practices.

To quantify the amount of meditation practiced by participants we asked participants to report: (1) "Current daily time (in minutes) typically spent meditating" (MDM), (2) "Number of years of Ananda Marga meditation" and "Number of years of other types of meditation" (both summed together to produce: YR), and (3) an estimate of lifetime hours (LTH) of meditation. For LTH, participants were asked to specify the number of years the MDM had been maintained. Following that, they were asked to divide their remaining prior lifetime meditation practice into as many as three different sets of years. For each set, they were asked to estimate the typical amount of daily meditation practice. LTH was calculated by multiplying the daily meditation practice (in minutes) for each set by 365 and then by the number of years in that set. All sets were summed together and the total was divided by 60, generating the resultant estimated LTH.

Chakras

Within Ananda Marga, a nine-chakra system is used, adding two chakras to the basic seven chakra system (Anandamurti, 1994). The basic seven chakra system (Avalon, 1974) is represented in **Figure 1**. The controlling points (*piitha* in Sanskrit) of the chakras are considered to be within the *sushumna nadi* which "passes through the length of the spinal column and extends up to the crown of the head" (Anandamurti, 2010b, p. 284). The concept of chakras is complex and, in addition to controlling points, includes concentration points and influence over glands within the region of each chakra. Chakra descriptions often include mixed portions of these three different aspects, but all are important and their physiological expression may originate

FIGURE 1 | An artistic representation of the basic seven chakras used in Ananda Marga. Locations for the chakras are, respectively, in ascending order: the base of the spine above the perineum (*muladhara*, first chakra), at the genital organ (*svadisthana*, second chakra), at the navel (*manipura*, third chakra), at the midpoint of the chest (*anahata*, fourth chakra), at the throat (*vishuddha*, fifth chakra), between the eyebrows (*ajina*, sixth chakra), and at the crown of the head (*sahasrara*, seventh chakra). The locations of each chakra symbol represent concentration points on the ventral surface of the body, and are believed to reflect controlling points in the spine from where one can control certain mental dispositions (or *vrttis*) by influencing the secretion of glands in the vicinity of that point. The line connecting the chakras represents the *sushumna nadi*. Additional symbolic details are not presented here and are beyond the scope of the present discussion, including additional symbolic features related to the internal geometric shapes of each chakra, colors (presented in just neutral gray and white) and associated sounds. This digital artwork was created by Aaron Staengl and reprinted here with his permission.

from a common developmental process (Maxwell, 2009). The concentration points for each chakra are used for meditation practices and are located more ventrally than the controlling points. The concentration points of the chakras are at roughly the same vertical level as the controlling points. The locations for the concentration points include the base of the spine above the perineum (*muladhara*, first chakra), at the genital organ (*svadisthana*, second chakra), at the navel (*manipura*, third chakra), at the midpoint of the chest (*anahata*, fourth chakra), at the throat (*vishuddha*, fifth chakra), between the eyebrows (*ajina*, sixth chakra), and at the crown of the head (*sahasrara*, seventh chakra; Anandamurti, 2010b). For the additional two chakras, one is between the *vishuddha* and *ajina* chakras (*lalana* chakra), and the other is just beneath the crown of the head (*guru* chakra; Anandamurti, 2010a).

Supplementary Practices

We calculated an additional composite variable that we called "Supplementary Practices" to identify the possible influence of supplemental practices on the quantity of meditation, and level of affect and mindfulness. Supplementary Practices included yoga asanas (yoga postures), diet, fasting, amount of sexual activity, and recreational drug use. Each of these was a dichotomous variable, or transformed into a dichotomous variable. Positive observance was given the value of "1." The sum of these five scores produced the value of the Supplementary Practices variable. Additional explanation of each of the five practices may be found in the **Supplementary Materials**.

Kundalini-Related Somatomotor Activity

We wanted to have a more specific measure of kundalini than the broad collection of signs and symptoms offered by Sannella (1992) and also described traditionally (Silburn, 1988; Feuerstein, 1997; Eliade, 2009; Anandamurti, 2020a,c). To do this, we calculated KRSM, an exploratory intra-subject dichotomous variable, based on the traditional description of kundalini as a rising power (Hatley, 2022) or force (Anandamurti, 1993a). All subjects who reported somatosensory or temperature sensations rising in the spine or back were included in KRSM (the back was included to cover less precise descriptions than the spine).

Data Analysis

We used Cronbach alpha as a measure of reliability (Cronbach, 1951). As alpha is only valid for unidimensional data, we also tested the dimensionality of the data using DIMTEST in the EFA.dimensionality package in R. DIMTEST contains multiple indicators of dimensionality (including the Kaiser criterion, the empirical Kaiser test, traditional parallel analysis, comparison data test, the Hull method, sequential chi-square model test).

Additional explanation of the processes used for data analysis may be found in the **Supplementary Materials**.

RESULTS

Incidence of Each Modality

We first examined general relationships among the six modalities (Somatosensory, Motor, Temperature, Light, Sound, and Mood), beginning with how commonly each occurred during meditation practice for our participants. **Figure 2** shows the percent of participants that reported a spontaneous experience in each sensory and motor modality or a shift in mood associated with meditation practice. The greatest number of participants reported experiencing a mood shift ($n = 58$, 73%). The next most common modality was motor experiences that involved some type of spontaneous physical activity ($n = 49$, 61%). This was followed by sensory experiences associated with light ($n = 45$, 56%), somatosensory ($n = 42$, 53%) and sound ($n = 37$, 46%). Experiences associated with a sense of change in temperature in some portion of or throughout the body occurred in the fewest number of participants ($n = 22$, 28%). Using logistic regressions for gender with each variable and linear regressions for age, no significant relationships were observed after correcting for multiple measurements with the false discovery rate procedure, "FDR," (Benjamini and Hochberg, 1995).

Four participants (5%) reported having no experiences in any of the modalities. These four were not beginners but had diverse quantities of meditation ranging from approximately 5,200 to 33,000 LTH. Three participants (4%) reported experiences in all six modalities, ranging from about 3,300 to 16,400 LTH. No somatomotor (somatosensory, temperature and motor) experiences were reported by 20 participants (25%); no audiovisual (sound and light) experiences were reported by 24 participants (30%); and four participants (5%) reported only affective (mood shift) experiences. The remainder of the participants reported experiences in varying combinations of the modalities.

Relationships Among Modalities

We next examined the relationships among the six modalities using a separate logistic regression for each modality in relation to the other modalities (**Table 1**). Somatosensory was significantly

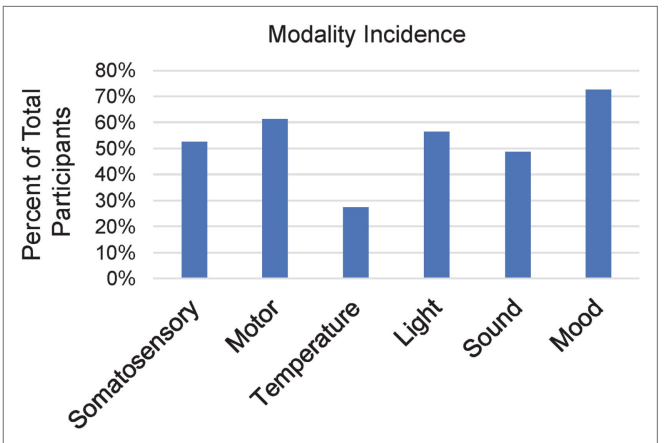

FIGURE 2 | Bar chart for the percent of all participants ($n = 80$) who reported having experiences within any particular modality.

TABLE 1 | Modality logistic regressions.

	Somato-sensory	Motor	Temperature	Light	Sound	Mood
Somatosensory		3.160**	2.194.	1.066	0.799	0.957
Motor	3.194**		0.304	0.587	−0.126	1.521
Temperature	2.266	0.317		0.222	−0.017	−0.602
Light	1.113	0.625	0.214		2.513.	−0.419
Sound	0.933	−0.113	−0.119	2.510.		0.368
Mood	1.045	1.524	−0.598	−0.376	0.415	

*Each row presents the z-scores from a logistic regression with one dependent variable (one modality) and five independent variables (the remaining modalities). The dependent variable is located in the first column. The remaining columns represent the independent variables. N = 80. All probabilities were corrected for multiple comparisons using the "FDR" approach. Significance codes: ' 'p < 1; '.'p < 0.1; '**'p < 0.01.*

related to Motor ($z = 3.160$, $p = 0.008$; FDR-corrected) and there was a tendency toward significance with Temperature ($z = 2.194$; $p = 0.071$; FDR-corrected). However, when Temperature was the dependent variable, there were no significant relationships. Motor was significantly related only to Somatosensory ($z = 3.194$, $p = 0.007$; FDR-corrected). Sound and Light both had a tendency toward significance with each other ($z = 2.51$, $p = 0.06$; FDR-corrected). Mood had no significant relationship with any of the other modalities. For subsequent analyses, we organized the analysis of modality experiences according to these groupings: somatomotor (Somatosensory together with Motor and Temperature); audiovisual (Light with Sound); and affect (Mood).

Internal Reliability for Modalities

We assessed the dimensionality of the modalities using the DIMTEST procedure. We used six dimensionality indicators. All but one converged on a single factor, indicating that our modality data was unidimensional. Accordingly, we used Cronbach's alpha to measure reliability (Cronbach, 1951). The alpha level we calculated for the six modalities was 0.572.

Quantity of Meditation Practice

Participants' mean minutes of daily meditation (MDM) was 86.2 (SD 46.3, range 10–225) and they had been meditating for a mean of 17.5 years (YR; SD 12.6, range 2–39). The mean for their lifetime hours of meditation (LTH) was 8,431 (SD 8,282, range 61–32,850). Within this sample, 32 participants (40%) had greater than 10,000 LTH. The logistic regressions for gender demonstrated no significant relationships with any of the meditation variables, or the Supplementary Practices variable. However, linear regressions demonstrated highly significant relationships of age with YR ($t = 14.1$, $p < 0.001$) and with LTH ($t = 9.4$, $p < 0.001$), an anticipated unavoidable severe bias for which we have used statistical correction.

Individual Modalities

Somatosensory (Somatomotor)

Since kundalini has been described as rising upward through the spine while piercing the various chakras (Anandamurti, 1993b), we were interested in how reports of spontaneous somatosensory experiences were localized at specific points on the body. Each participant could report as many locations for somatosensory experiences as desired. Within the 28 participants (67% of Somatosensory responders) who reported locations (**Figure 3A**), the spine had the greatest number of endorsements ($n = 13$, 31% of Somatosensory responders), followed by *ajina* chakra, and *anahata* chakra ($n = 9$, 21%-for each). Less common responses included body parts such as head, back or body, other chakras, or "all chakras."

In addition to somatosensory experiences occurring at different points on the body, we were also interested in how participants qualitatively described somatosensory experiences which arose during meditation (**Figure 3B**). Participants were allowed to report as many different somatosensory experiences as they wanted. The most common ways participants qualified somatosensory experiences were by using the words, "vibrating" ($n = 14$, 33%), "energy" ($n = 12$, 29%), "tingling" ($n = 10$, 24%), "pressure" ($n = 9$, 21%), and "pleasant" ($n = 9$, 21%). There were also a large number of unique responses ($n = 26$; not shown in **Figure 3B**), demonstrating the diversity of how these experiences were described.

In addition to the descriptions of locations and qualities of somatosensory experiences, we also were interested to know if the sensations moved through different locations and how that was described. Sensations changed locations for 17 (40%) Somatosensory responders out of 27 who gave responses to that question. Of those who reported changing locations, 13 (31%) reported rising sensations in the spine or back (see Somatosensory responses in **Table 2** for examples). In two instances, sensations were reported to travel both upward and downward (e.g., P-64 in **Table 2**). Other responses included movement in relation to changes in concentration points (which occur in some practices), pulsations in relation to the breath, expanding outward from a particular chakra, and involvement of the extremities or the face in energy movements.

Nine participants (21%) described positive feelings associated with their somatosensory experiences (see P-64 in **Table 2**), while two (5%) referred to negative feelings (see P-33 in **Table 2**).

Motor (Somatomotor)

We suspected that spontaneous muscle activity may potentially provide clues to kundalini-related energy states within the body (Vishnu Tirtha, 2000). We were interested to identify muscle activity that was spontaneous and involuntary and experienced in relation to meditation. Participants were allowed to report as many motor experiences as they wanted. **Table 2** provides a variety of examples.

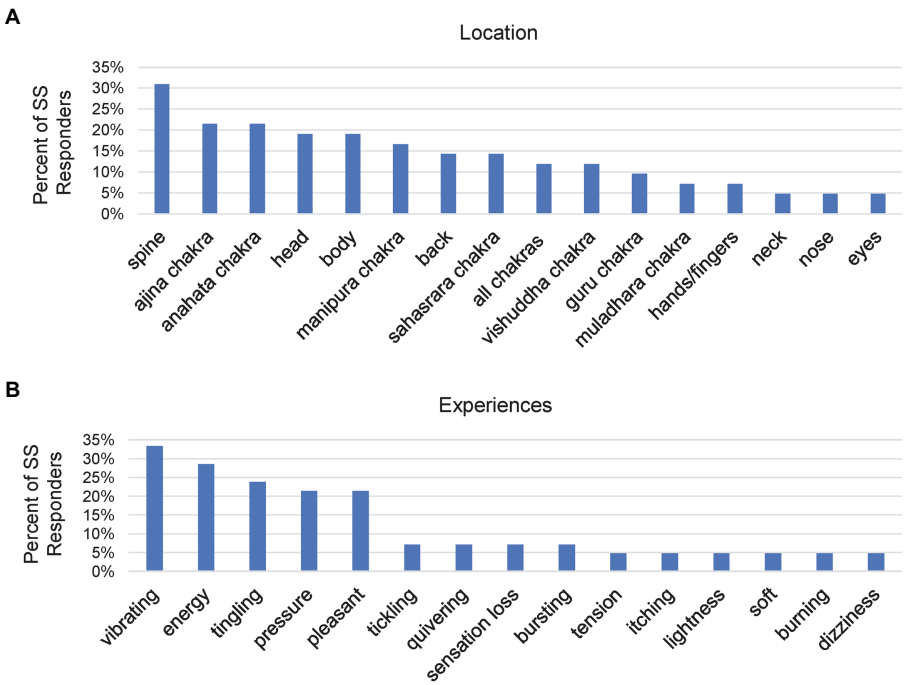

FIGURE 3 | Bar chart for the percentage of Somatosensory (SS) responders who reported various somatosensory characteristics, including **(A)** various locations of somatosensory experiences, and **(B)** specific types of somatosensory experiences. Participants were allowed to report as many different locations and experiences as desired.

Motor experiences were divided into abrupt movements, positioning movements, breathing changes and vocalizations. Abrupt movements were the most frequent type of motor event, occurring for 33 participants (67% of the Motor responders; **Figure 4A**). Participants qualified abrupt movements most commonly by using words like "jerking" ($n = 14$, 29%) and "rhythmic" ($n = 9$, 18%). Many response descriptions were unique, generated by only a single responder ($n = 8$; not included in **Figure 4A**), often implicating an energy release such as "violent," "jolt" and "bouncing."

The positioning category had responses from 26 participants (55% of motor responders). Positioning and the abrupt movement categories had 20 overlapping participants. The most mentioned positioning movements (**Figure 4B**) were back straightening and head alignment ($n = 4$, 8% for each), and body stiffening ($n = 3$, 6%). There was a higher occurrence of "unique" responses ($n = 9$) that were not included in **Figure 4B**. Examples were "back twist" and "hand configuration."

The presence of "odd breathing patterns" (**Figure 4C**) was reported by 25 participants (51% of motor responders). "Rapid" or "fast" breathing occurred the most ($n = 6$, 13%), followed by "deep" breathing ($n = 5$, 10%) Also reported was "very slow" breathing ($n = 2$, 4%), "quick inhalation" ($n = 3$, 6%), and having breathing "stop" unintentionally ($n = 2$, 4%). The unique responses ($n = 8$) included energetic changes like "more intense," "extreme energy" and "losing control" and were not included in **Figure 4C**.

Vocalizations involving an involuntary vocal expression of any form (**Figure 4D**) were reported by 23 participants (47% of motor responders). The most common were described as releasing a "grunt" ($n = 6$, 13%), "crying out" ($n = 5$, 10%), and calling out the word "Baba" (an affectionate name referring to the Guru; $n = 5$, 10%). One participant stated that "grunts" may be the same as the sound "hum," (see P-48 in **Table 2**). Clarifying such relationships will require further research.

Some participants spontaneously reported associations between motor experiences and other modalities. P-32 described a rising vibration along with quivering, plus body jerking and consistent very bright light (**Table 2**). P-1 and P-69 in **Table 3** provide additional examples of multi-modal complexity. Ten of the 13 participants who reported rising somatosensory experiences (not mentioning motor activity), also reported spontaneous physical motor movements; nine reported spontaneous vocalizations; and five reported breathing changes, all during meditation.

Temperature (Somatomotor)

We considered temperature experiences important to examine because of traditional literature associating heat with kundalini activity (Eliade, 2009). Participants were asked to specify temperature changes that were "independent of any medical condition or external source."

Participants could report as many locations of the temperature experiences as they desired. The most common reports were that temperature changes occurred over the whole body ($n = 11$, 50%). Most of the remaining responses had unique locations ($n = 10$).

TABLE 2 | A sample of modality responses demonstrating potential signs of kundalini-related activity, with participant number (P-#), estimated number of lifetime hours of meditation (LTH), modality of experience being reported, and quotes of experience reports. In addition to putative kundalini-related somatosensory experiences, experiences from other modalities reported by the same participant are provided.

P-#	LTH	Modality	Sample kundalini-related experiences
P-19	17,885	Mood	Not sure if it is unusual-often experience a feeling of relaxation, letting go, surrender or peace. Sometimes spikes of devotional longing, deep absorption, love, or sense of grace
P-31	13,475	Somato sensory	Falling over, shaking; vibrating; along spine, hands; up kundalini to head
		Motor	Arms shake, breathe in quickly, grunt or say "Baba"
		Light	Moderately bright, white, circular, occasionally
		Mood	Samadhi, bliss
P-32	26,919	Somato sensory	Whole body becomes tense, vibration from the base of the spine up through the neck, quivering throughout the trunk, head and limbs; becomes quiet with intense meditation
		Motor	Jerking, rhythmic, spasmodic; often spontaneous vocalization "humm," less if I am able to channel the energy; slow and deep [breathing]
		Light	Very bright, consistently, [duration] with focus, [color] depends
		Sound	Crickets consistently, hissing, roaring and ocean infrequently
		Mood	When I am tired, meditation re-energizes my mind. I always feel calm and more centered after meditation. I become less attached and am able to think more clearly
P-33	2,981	Somato sensory	Vibrating became very strong-like a strong pulsating wave traveling up my spine-I thought I might vomit
		Mood	Sometimes after deep meditation, I feel a deep peace. Mind is silent and still, with a soft loving feeling. But I have also felt negative emotions and images come up, as if a pot lid was being opened
P-48	1,460	Somato sensory	Waves of pleasure all over, along the spine
		Motor	Occasionally a sudden straightening of spine when meditating, small grunt, more like a humm, occasionally a slowing of the breath
		Mood	A feeling of aloofness
P-64	16,425	Somato sensory	Tinglings up and down the sushumna nadi [central spinal channel], very pleasant; in all chakras much energy and very nice feeling
		Temp.	Heat inside, infrequently, sometimes longer than 30 min
		Motor	Sometimes it shakes me lightly, jerky and also smooth, often I come automatically into ujjai [or ujjayi] breathing [nasal diaphragmatic breathing with a throat constriction that causes a sound like snoring or "heavy" breathing]
		Light	Very bright light, in the head, consistently during meditation; lasts secs to mins; I understood the whole universe and saw Akasha Chronicle
		Sound	Roaring and bells occasionally, Om infrequently, all only in meditation
		Mood	I'm much more calm

The duration of temperature changes was organized into four groups (**Figure 5A**). It was somewhat more common for the temperature change to last throughout meditation ($n = 7$, 32%). When "throughout meditation" (or a similar conditional phrase) was stated, the specific amount of time was unspecified. The remaining groups had similar incidence rates, short, 1–3 min durations ($n = 5$, 23%); intermediate, 5–15 min durations ($n = 5$, 23%); and longer, 20 min or more ($n = 4$, 18%).

The frequency at which temperature changes occurred for participants was also organized into four groups (**Figure 5B**). Occasional occurrence was the dominant frequency ($n = 14$, 64%). Consistent temperature change was rare ($n = 1$, 4.5%). Four subjects reported temperature experiences occurring infrequently (18%) and two had experienced them, but not currently (9%).

We also asked if participants experienced their temperature sensations moving across locations. Five of 20 participants indicated that the temperature sensations moved and two reported a clear upward movement including the back.

Light (Audiovisual)

While somatomotor experiences have been thought to distinguish the presence of kundalini-related activity (Corneille and Luke, 2021), light (effulgence or radiance), has also been considered a major kundalini-related expression of phenomenological significance in Tantric Yoga (Anandamurti, 2020a), as well as many other religious and spiritual traditions (Kapstein, 2004; Fox, 2008). We therefore looked at many aspects of light. Light was the sensory modality reported by the greatest number of participants.

In addition to the 45 participants who reported light experiences during meditation, three who reported no light experiences during meditation did have visual experiences that they associated with their meditation. One (P-43) saw "white light around things and people." A second (P-47) saw light in "waves around me" and reported a complex experience in which she described a "healing" light moving through her and affecting a person with her who needed help (see **Table 3** and the description in the "Anomalous Experiences" section). A third reported seeing an image of the Guru in a hallucination.

Most of those reporting light experiences during meditation (43 of 45) provided a frequency from among four possible choices (**Figure 6A**). "Occasionally" ($n = 16$, 36%) was the most common and "consistently" was the least common, reported by 6 (13%). Of the six reporting "consistently," only the two participants with the highest LTHs (both greater than 10,000 LTH) were in the KRSM (kundalini-related somatomotor) group.

In addition to the frequency of light experiences, intensity and duration are important characteristics. Intensity was defined by brightness, with 38 of the 45 light responders giving responses

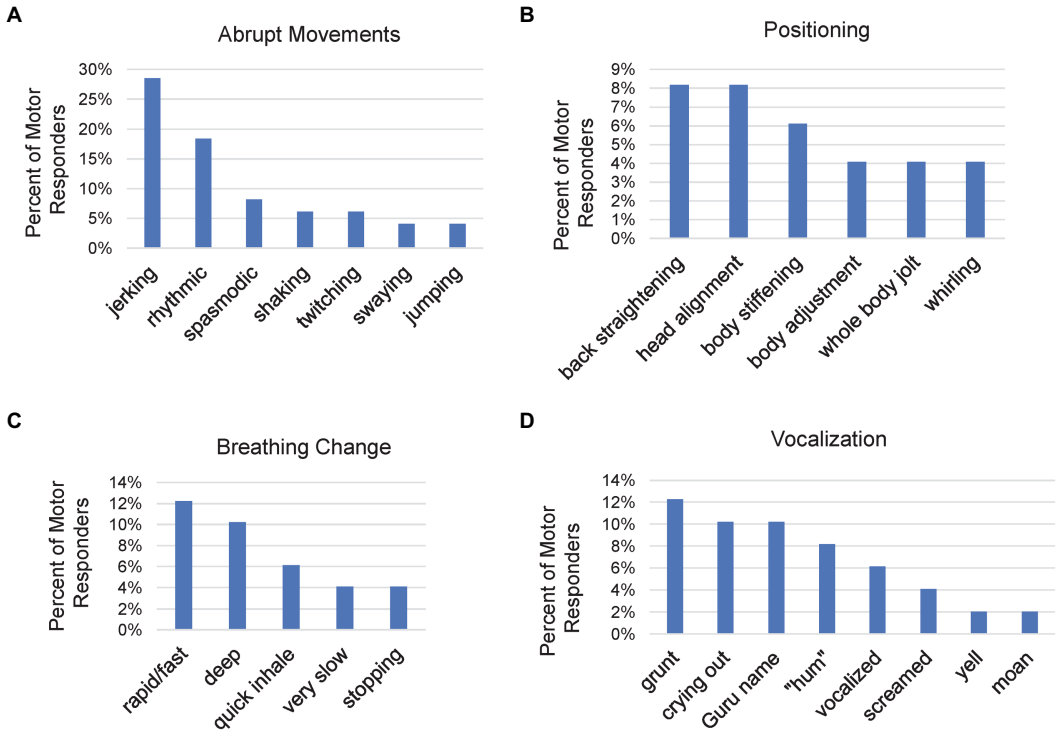

FIGURE 4 | Bar charts of characteristics for different types of motor responses including, abrupt movements **(A)**, positioning movements **(B)**, breathing changes **(C)**, and vocalizations **(D)**. Each graph shows the percent of Motor responders which provided the various responses. Participants were allowed to report as many different experiences as desired for each bar chart.

(**Figure 6B**). The highest level ("brilliant," also including "very," "extreme," "max," and "intense") had the strongest endorsement ($n = 14$, 31%). "Moderate" and "bright" experiences occurred a similar amount ($n = 10$, 22% for each). Relatively few participants reported "faint" experiences of light ($n = 3$, 7%). The experience of brilliant light did not reliably predict KRSM membership. Half of those experiencing brilliant light were in the KRSM group, of which only three had an LTH over 10,000.

For duration, 27 gave responses (**Figure 6C**). The shortest time period ("seconds") was the most common ($n = 12$, 27%), and only one indicated the longest time period, ">30 min" (2%). It was, however, unclear from the data whether participants who reported longer duration had such prolonged experiences during just one specific meditation practice or whether such experiences persisted beyond that particular practice.

We also examined other attributes of light like color, shape and location. By far, the most common color of light that participants experienced during their meditation was white ($n = 30$, 67%; **Figure 6D**). Five (11%) color reporters failed to name a specific color. Since 38 responses stated one or more specific colors, 79% of those naming a color, had a "white" response. "Yellow," including "golden," was the next most common ($n = 9$, 20%). Each participant could name as many colors as they desired. Six participants with yellow responses also gave a white response. The remaining responses were relatively uncommon, reported by only as many as three participants, for five additional colors. Some were also vague, simply stating "varied" or "many."

Comparatively few responses ($n = 15$, 33%) were given for the shape of the light (**Figure 6E**). "Circular" (also including "sun," "rings," and "globe") was the most common response ($n = 6$, 13%). Most of the remaining were unique responses. In contrast, 33 participants (69%) gave a response for the location or locations of their light experiences (**Figure 6F**). In the Somatosensory section, we tallied reports of physical locations and chakra locations separately because there was a greater diversity of responses which made relationships less clear. For Light, we have combined corresponding physical and chakra locations because without other competing options, the correspondence appeared logical. "Head" was reported most often ($n = 9$, 20%), followed by "top of head," including *sahasrara* chakra ($n = 7$, 16%), and then "forehead," including *ajina* chakra ($n = 6$, 13%). If all participants that referenced the head in some manner were combined, the head would be the primary location for light experiences ($n = 21$, 47%). Eliminating six vague or non-specific responses would give 21 of 27 participants (78%) reporting an area of the head as the location of their visual experiences.

Sound (Audiovisual)

Sound is another sensory modality that lacks an easily recognized relationship to kundalini-related energetic changes, although traditional literature has linked various sound experiences with the rising kundalini (Anandamurti, 1999; Mallinson and Singleton, 2017). Sound experiences during meditation were reported by 39 participants.

TABLE 3 | Participants with unusually strong or unusual experiences (*) are presented with participant number (P-#), estimated number of lifetime hours of meditation (LTH), modalities of experiences being reported, together with quotes of experience reports. In addition to notable experiences, experiences in other modalities for the same participant are provided in order to have a broader context.

P-#	LTH	Modality	Anomalous experiences
P-1	1,399	Somato sensory*	If my meditation is intense, I will usually feel a lot of vibrating and energy-this usually occurs once a day, or every other day; rising up the spine, through the chakras
		Motor*	Jerky and spasmodic, but very rarely; the meditation can become too intense and noise comes out, very rare
		Light*	Extremely bright, all around me, as long as the intensity of the meditation; saw shining light around people several times. Twice I've seen visual spiritual messages appear in front of me
		Mood*	Meditation brings extreme bliss
P-14	23,634	Motor	Vibratory, mild shaking, subtle
		Light	Occasionally, bright, white, between my eyes (inside), briefly
		Mood*	Tremendous feelings of happiness-tears of joy-bliss
P-47	30,194	Motor*	When very concentrated, I sit straight without pain or effort for long periods-long deep breathing that is not 'willed' by me intentionally
		Light*	When visualizing light around someone expressing frustration/needing help, and taking the thought that help *could* come through me (from the spiritual world), I experienced waves of light going through me, forcing me to close my eyes and meditate, losing all awareness of the environment—The other person actually saw a vision of two saints appear where I was sitting, and stopped talking. He later said reading the works of those saints helped resolve his difficulty
		Mood*	Negative or reactionary mood becomes objective and joyful, forgiving, humble, honest, insightful. Lethargy or hopelessness, disinterest changes to enthusiasm, interest, wanting to help versus neediness
P-56	12,471	Somato sensory*	Monthly, upper body vibrates intensely, followed by a strong shaking experience
		Motor*	Doing pranayama, breath becomes extremely long and very deep and extremely intense
		Mood	In a good meditation, I sometimes feel very light, like I'm floating afterwards
P-69	4,015	Somato sensory*	Rising of kundalini beyond control-through all the chakras-to *sahasrara* -merging into white light
		Sound*	"wild wind"-I have to go through that to reach the light behind-2 to 3 times
		Light*	One time there was a point of white light first, then I merged; very bright, inexpressibly
		Mood	[nothing reported]
P-74	4,745	Light*	My whole body was made of light instead of flesh
		Mood	Relief, love

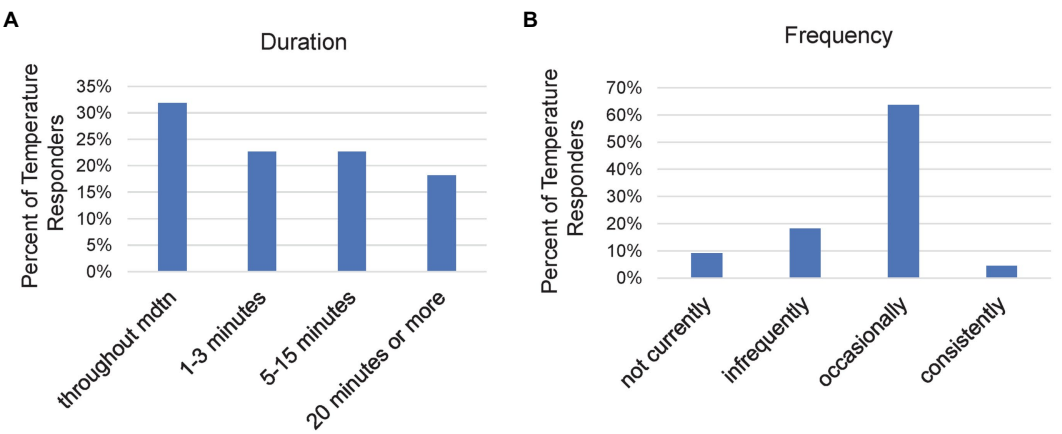

FIGURE 5 | Bar chart for the percentage of Temperature responders who reported different Temperature characteristics, including **(A)** duration of temperature experiences, and **(B)** frequency of temperature experiences.

Of the various options, the greatest number of participants reported hearing the sound of "crickets" ($n = 20$, 41% of Sound responders) during meditation (**Figure 7A**). "Tones" ($n = 13$, 27%) were the next most common response, followed by the sound of the "ocean" ($n = 11$, 22%) and "ankle bells" ($n = 10$, 20%). Nine participants (18%) provided 10 independently specified responses (not included in **Figure 7A**). Three (6%) stated some type of "voice" experience ("inner voice," "voices of spiritual guidance," and "a voice coming from beyond). Others were fully unique, ranging from "a certain kind of hum," "kirtan" (a kind of chanting), "indescribable," and "sound stopped" to "the confluence of two waters" and "fine golden rain."

Participants also specified the frequency of each of their sound responses. In order to have a general sense of how frequently participants had sound experiences, each participant's

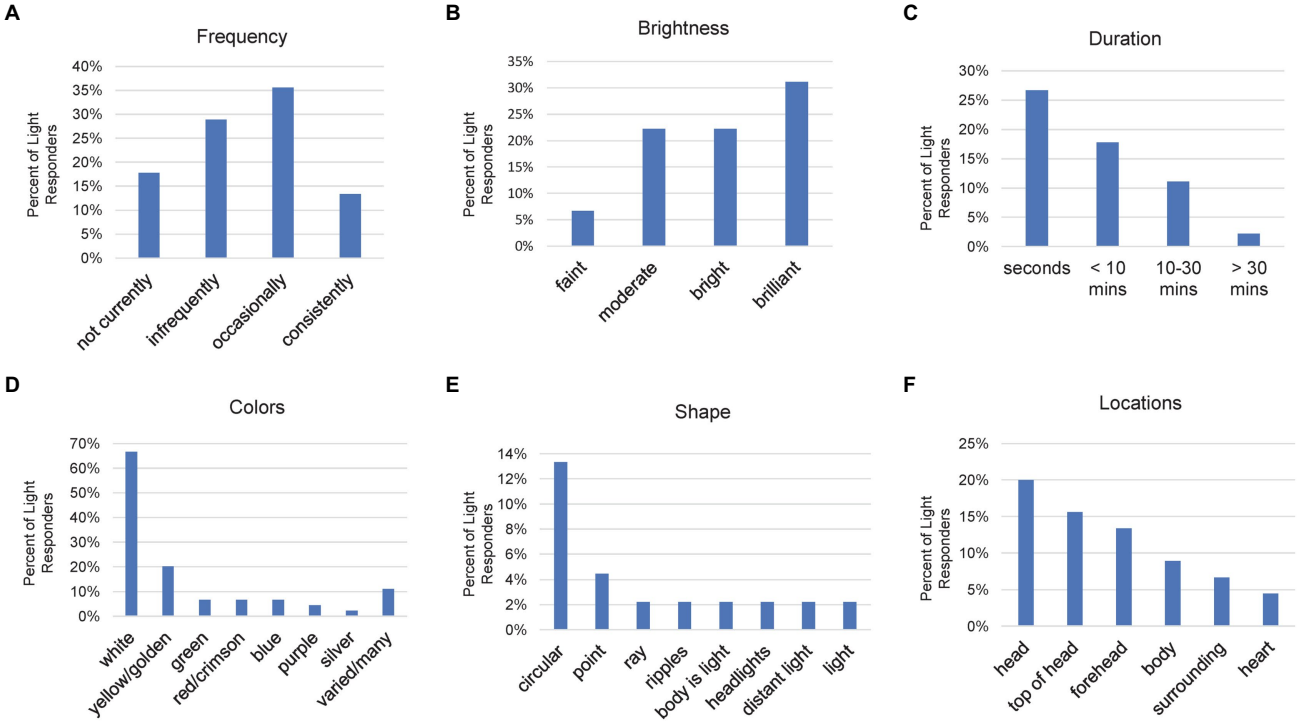

FIGURE 6 | Bar charts of the percent of Light responders indicating various light characteristics: **(A)** frequency, **(B)** brightness, **(C)** duration, **(D)** colors, **(E)** shape, and **(F)** locations. Participants reported as many different experiences as desired for colors and locations.

greatest reported sound frequency was graphed. "Occasionally" ($n = 17$, 44%) was the most common (**Figure 7B**). The remaining frequencies had similar rates of occurrence. "Crickets" had the greatest number of "consistently" responses during meditation ($n = 5$, 13%). Six participants (15%) reported hearing the om/aum sound during meditation. No one experienced the om/aum sound "consistently." P-43 was the only participant who reported experiencing om/aum "occasionally" when meditating. She had a relatively low LTH (365). One other om/aum reporter also had a low LTH (P-66; 183 LTH). However, other om/aum reporters had more meditation practice, ranging from 4,380 LTH to 16,547 LTH.

Mood (Affective)

We were interested to identify how affective feelings shifted with meditation. Of the 80 individuals in this study, 58 (73%) indicated that they had experienced an "unusual shift in mood" as a result of their meditation and other spiritual practices. Descriptions of this mood shift were quite varied. Of those who provided descriptions ($n = 56$), all but one response included positive elements (98%), or in relation to all 80 participants, 69%. Consistent with this, the vast majority of the words used had a positive connotation.

The most frequent words used in these descriptions are shown in **Figure 8**. "Happy," or grammatical variants, was the most common response, given by 11 participants (19% of those responding to the question of a mood shift). "Calm" was a close second ($n = 10$, 17%), followed by "bliss" ($n = 9$, 16%). "Relaxed," "love," "joy," "peace," and "detachment" were other comparatively frequent words. In addition to some less frequently used words, 20 words were used that were not used by anyone else. Not quite as many words, 13, were used by two participants (neither group was included in **Figure 8**). The instances of negative words were in these latter two groups.

Twice there was reference to "anger" arising, and a similar number for "sadness" and "tearing." For a different participant, "tears of joy" was mentioned once. One vague reference was made to "negative emotions" occurring in meditation. In four out of five references to some form of negative emotions, positive experiences were described first. For example, P-24 stated, "Often meditation has a powerful uplifting effect on my mood, this was to be expected. However, at least once I became irritated after doing meditation. More than once, I have felt very sad, even moved to tears."

Relationships Among Modalities, Meditation Quantity, and Psychological Variables

In addition to the qualitative information we gathered, we were interested to identify in what way modality activity was related to four other variables (MDM, YR, LTH, and Supplementary Practices) using logistic regressions. Each logistic regression had one modality as the dependent variable and the four independent variables. No significant effects were observed.

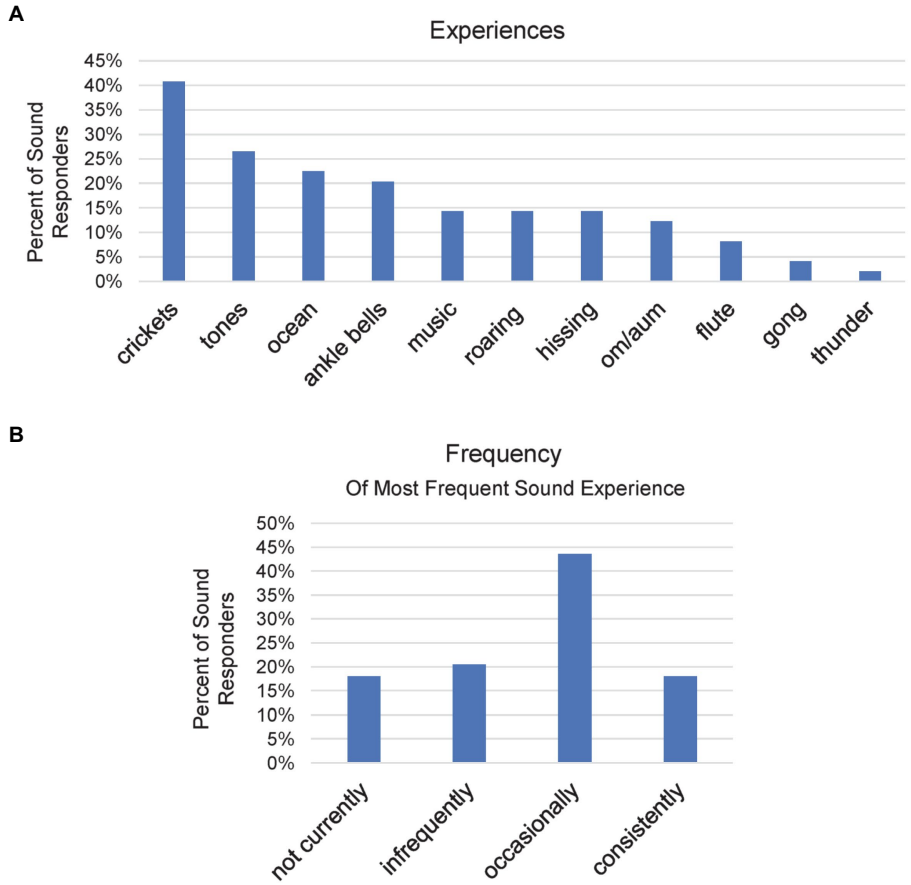

FIGURE 7 | (A) Bar chart demonstrating the incidence of each sound experience occurring during meditation as the percent of total Sound responders. **(B)** Bar showing how frequently participants who reported Sound experiences had such experiences. Each participant is represented only once.

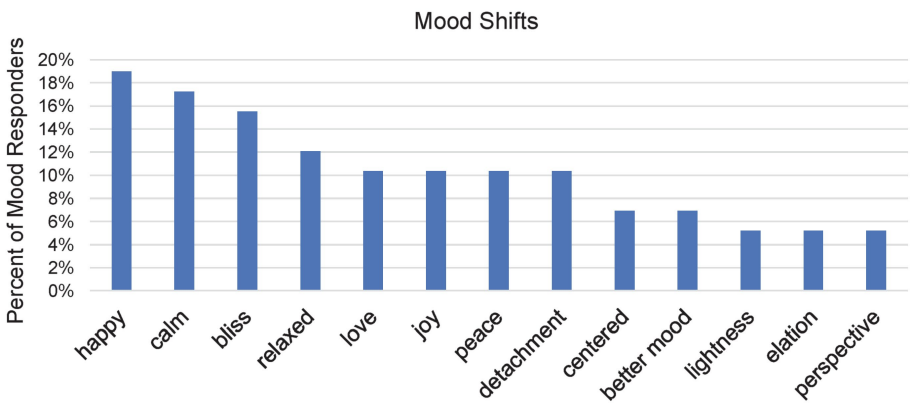

FIGURE 8 | Bar chart demonstrating the percent of Mood responders reporting various mood shifts. Participants were allowed to report as many different types of mood shifts as desired.

We next used logistic regressions similarly to individually compare each of the modalities (dependent variables), to three different independent variables (mindfulness, PA, and NA). There were no significant relationships for any of these logistic regressions.

A final set of logistic regressions was conducted with the dichotomous variable "KRSM" (representing all participants with kundalini-related somatomotor activity, defined as somatosensory or temperature experiences of rising sensations

in the spine and/or back). Fifteen participants (19% of all participants) met criteria for inclusion in KRSM. KRSM was used as the dependent variable with the six modalities as the independent variables. No significant relationships were found. Two additional logistic regressions were performed with KRSM as the dependent variable. When MDM, YR, LTH, and Supplementary Practices were the independent variables, no significant relationships were present. Similarly, when mindfulness, PA, and NA were the independent variables, there were also no significant relationships.

Partial Correlations Among Meditation Quantity and Psychological Variables

Since strong correlations were present, as expected, for age with YR ($r = 0.85$, $p < 0.0001$) and LTH ($r = 0.73$, $p < 0.0001$), we used partial correlations removing the contribution of age. This allowed us to examine relationships independent of age between other variables, particularly in relation to quantity of meditation. Each partial correlation had significance adjusted for multiple measurements using an "FDR" adjustment. Strong partial correlations (**Table 4**) were observed between MDM and mindfulness ($r = 0.448$, $p < 0.001$). YR had a significant partial correlation with PA ($r = 0.270$, $p < 0.05$). LTH had significant partial correlations with mindfulness ($r = 0.311$, $p < 0.05$) and NA ($r = -0.279$, $p < 0.05$). The partial correlation with NA was inverse, meaning that higher negativity occurred for lower LTH.

The partial correlations table for meditation and psychological variables (**Table 4**) also included an exploratory Supplementary Practices measure (composed of five supplemental yogic practices). Supplementary Practices had highly significant partial correlations with MDM ($r = 0.670$, $p < 0.001$) and LTH ($r = 0.505$, $p < 0.001$), in addition to significant partial correlations with mindfulness ($r = 0.297$, $p < 0.05$) and PA ($r = 0.247$, $p < 0.05$).

Finally, there were highly significant partial correlations between LTH and MDM ($r = 0.561$, $p < 0.001$), and between LTH and YR ($r = 0.674$, $p < 0.001$).

Among the psychological variables, there were highly significant partial correlations for mindfulness, PA, and NA with each other in every combination. The partial correlations for NA with the others were negative, or inverse. See **Table 4**.

Anomalous Experiences

Some experiences that were reported had more atypical characteristics, consistent with the interpretive and non-physiological (parapsychological or anomalous) categories of Sannella (1992). Some unusual light experiences occurred during meditation. When describing the form of light experienced during meditation, P-74 noted an experience in which her "whole body was made of light" (**Table 3**). Described under mood changes (not included in **Table 3**), P-84 reported that when he occasionally experienced very bright white light, "the breathing gets rapid and the heart beats fast," and he had "great joy." Elaborating further, he noted that, "After meditation, I feel tremendous love towards others." P-69 (**Table 3**) reported a complex experience also involving multiple modalities. This experience included somatosensory feelings of kundalini uncontrollably rising and reaching the chakra at the top of her head. Associated with this, she experienced "inexpressibly" bright white light, into which she "merged."

Additional unusual experiences with light not occurring during meditation (although considered related to the meditative practices) were described by a number of people. P-1 had "visual spiritual messages" appear before him and he also saw a "shining light" around people (**Table 3**). P-43 reported seeing "white light around things and people." P-41 reported walking down a path together with others, but being the only one to see the path as lit. A total of 12 (27%) participants reported experiencing "abnormal environmental illumination." Another 12 participants (out of which three overlapped with those experiencing abnormal environmental illumination) reported non-drug related visual hallucinations. Eight of those were spiritually-oriented hallucinations, seven associated with the Guru.

Many experiences were reported that included unusual somatosensory and motor intensity. P-56 described "intense" upper body vibrating and "extremely intense" deep breathing (**Table 3**). P-1 reported that with "intense meditation," in addition to vibrating, energy and jerkiness, he may experience a vocal release (**Table 3**). Similar intensity may have been present for five participants that reported "crying out" and two that reported they "screamed" (see **Figure 4D**). P-31 (**Table 2**) described "falling over, shaking" and under Mood stated "samadhi, bliss." P-33 had sufficiently strong vibrating moving up his spine that he thought he might vomit (**Table 2**).

TABLE 4 | Partial correlation table for meditation and psychological variables.

	PA	NA	Mfl	MDM	YR	LTH
NA	−0.368**					
Mfl	0.402***	−0.513***				
MDM	0.199.	−0.173	0.448***			
YR	0.270*	−0.180	0.204.	0.166		
LTH	0.222.	−0.279*	0.311*	0.561***	0.674***	
Prac	0.247*	−0.141	0.297*	0.670***	0.217.	0.505***

Partial correlations for psychological variables, meditation and practices are listed. The effect of age has been removed. All significance levels have been adjusted for multiple comparisons using the "FDR" procedure. PA, PANAS positive affect; NA, PANAS negative affect; Mfl, mindfulness (CAMS-R Total Score); MDM, minutes of daily meditation; YR, total years of meditation; LTH, estimated lifetime hours of meditation; Prac, the composite of Supplementary Practices. Significance codes: ' 'p < 1; '.'p < 0.1; ''p < 0.05; '**'p < 0.01; '***'p < 0.001.*

Participants described many powerful positive, potentially ecstatic, experiences. Two participants of the nine that used the term "bliss" were included in **Table 3**, because of the intensity of their descriptions. P-14 reported minimal other experiences, but in addition to reporting "bliss," he stated "tremendous feelings of happiness, tears of joy." P-1 reported "extreme bliss" from meditating. A sample of other reports not included in **Table 3** demonstrated other ways of expressing strong positive feelings: "waves of pleasure all over" (P-48); "Much calming. Deeply rooted joy." (P-17); "Bliss! Quiet-no thought state." (P-45); "feelings of elation" (P-21); and "intoxication" (P-16) which is a term often used to describe spiritual ecstasy (Anandamurti, 1982). While not as intensely positive, P-47 gave a rich description of positive changes under Mood in **Table 3**. The amount of meditation associated with these powerful positive experience descriptions covered virtually the whole range, from 593 to 22,634 LTH, not including P-47 who had more (30,194 LTH).

Additional reports included self-transformative experiences. In response to a question concerning having seen the environment illuminated by other than normal means, P-64 reported (**Table 2**) an experience in which she felt she understood the whole universe and saw the "Akasha Chronicle" [a concept within anthroposophy (Steiner, 1950) and also known as the Akashic Records in theosophy, representing a subtle compendium of all events in the universe]. Two others were not included in **Tables 2** or **3**. P-54 reported a "feeling of inner peace, messages flowing in mind, oneness with everything" in the context of the mood shift explanation. P-38 reported having out of body experiences in the context of breathing changes under Motor experiences ("sometimes I get out of the body experiences and my heart starts pounding and my breathing increases greatly in rate").

The most notable spontaneous experience was reported by P-47 (**Table 3**), briefly mentioned in the Light section. As she visualized light surrounding a person sitting with her who was "expressing frustration/needing help," she had the thought that help could come through her. She next experienced waves of light within herself and lost awareness of the environment, lapsing into meditation. She further reported that while she meditated, the person adjacent to her had a hallucinatory vision of two saints sitting in place of her. His later reading the works of those saints were claimed to have helped resolve the "difficulty" that he was experiencing. Given the highly unusual quality of this experience, it is unfortunate that greater details are not available. However, this was reported from a highly experienced participant who had the next to highest LTH. Nothing else in that participant's responses suggested exaggeration or over-dramatization.

DISCUSSION

The present study investigated spontaneous experiences arising from a single system of meditation practice which occurred in multiple modalities including sensory, motor and affective qualities. Our sample was comparatively small (80) making it an exploratory pilot study, and all conclusions should be tempered with this understanding. The alpha level for the internal reliability of our modality data (0.572) was below levels considered "acceptable." With our low sample size and few scales, a "fair" level of reliability should be 0.6 or higher (Pontekotto and Ruckdeschel, 2007). Our low alpha level may be due to variability in individual responses due to conditions such as environment/varying conditions in which the questionnaire was completed, fatigue/intolerance of the long questionnaire, and privacy issues/varying response to the personal nature of questions about their meditation. However, it has also been shown that low alpha levels can be due to too few items in a measure (Tavakol and Dennick, 2011). Given that our modality variables are each based on a single question, that limitation is probably present. Dimensionality and reliability matter when formal tests are being constructed, but that was not our intention. Therefore, the issue of reliability may not be relevant. Variability probably arose from the highly general nature of the initial questions that provided the data for the modality response frequencies. Our primary goal was to gather exploratory descriptive data concerning experiences arising during meditation. The value of what we have reported comes more from the descriptive details than from the dichotomous modality categories. On their own, the dichotomous modality data would be unlikely to generate a meaningful model of the richness of meditation experiences.

We first discuss the reported experiences within these modalities.

Somatosensory (Somatomotor)

Since kundalini-related experiences are most commonly associated with somatic experiences (Corneille and Luke, 2021), we begin by analyzing somatosensory experiences. Prior studies associated with kundalini have not included information about chakras and their somatic locations. While the most common response in our study for the location of a somatosensory experience was the "spine," two chakras were tied for second-most common location, namely *ajina* (between the eyebrows) and *anahata* (center of the chest). Many additional responses included references to other chakras. Bodily locations of chakras are used as concentration points in various ways in most Ananda Marga lessons. Overall, our results suggest that the spine and chakra points may be key somatic locations for spontaneous meditation experiences.

Research has shown that somatosensory experience can be influenced by attention to a particular body location, primarily promoting perceptions of "tingling," "warmth," and "numbness" (Tihanyi et al., 2018) which share some similarity to our most common Somatosensory reports of "vibrating," "energy," and "tingling." Within the Tantric Yoga practices of our participants, attention during various practices was directed to specific physical locations, suggesting that directed attention could be a cause of some of our Somatosensory reports. However, directed attention may not explain some of the more complex somatosensory meditation experiences which include spontaneous experiences in additional modalities (for example, P-69 feeling "kundalini" uncontrollably rising to the chakra at the top of

her head, and with this, experiencing inexpressibly bright white light, into which she "merged").

Somatosensory sensations moving upwards in the spine or back are traditionally associated with kundalini (Anandamurti, 1993b; Goswami, 1999). These are consistent with prior clinical descriptions involving "moving energy" and "spine" (Sannella, 1992; Benning et al., 2018) and similar reports related to awakening experiences (Lockley, 2019; Woollacott et al., 2021), but potentially different in quantity. For example, the latter authors specifically sought participants who believed they had a "spiritual awakening." They received reports of "tingling or creeping sensation" in relation to "energy rising up the spine" from 40% of all participants, and 65% reported "unusual flows of energy." In another study examining sudden profound spiritual experiences (Corneille and Luke, 2021), 40% self-identified as having a "spontaneous kundalini awakening" rather than a "spontaneous spiritual awakening." In contrast, only 19% of our participants ($n = 15$) reported either rising somatosensory or temperature experiences including the back and spine (representing the KRSM variable), but we did not require our participants to have had a "spiritual awakening" or "kundalini awakening" experience. At least one of "vibrating," "energy," and "tingling," the most reported somatosensory sensations, were reported by 45% of our participants (without reference to "unusual flows"), which included all of the participants with rising spinal sensations. In a phenomenological study of multiple Buddhist meditation practices (Lindahl et al., 2017), 63% reported somatic energy of varied strength, sometimes also described as "surges."

In addition to having different inclusion criteria, one possible explanation for our sample's comparatively low incidence of rising somatosensory energy experiences, may be that some participants in our study lacked sufficient meditation practice to have successfully activated their kundalini. However, Lindahl et al. (2017) had a similar variability in meditation experience. Another possibility is that participants followed a general guideline to disregard transient experiential phenomena (Anandamurti, 1992). A third possibility is that the meditative process included a sensory withdrawal step where participants were taught to withdraw their attention from both embedded and embodied factors that might distract them from the instructed meditation method (Anandamurti, 2010c; Hewitson, 2014). If sensory withdrawal was completed successfully, somatomotor experiences would not reach conscious awareness. P-14 and P-47 (**Table 3**) were possible examples of this. They both had high LTHs and did not report any somatosensory or temperature sensations, also having only subtle motor experiences, but having strong positive mood shifts. Therefore, it may not be possible to infer the lack of rising energy from the absence of the reported experience of energy phenomena. This demonstrates the potential importance of identifying a reliable objective measure in future research.

Many medical conditions can create moving somatic sensations called "formication," which is generally perceived as insects crawling either on or under the skin. These include psychiatric delusions, menopause, hepatitis, HIV, thyroid disease, anemia, neurologic dysfunction, drug side-effects, drug/alcohol withdrawal, and more (Koh et al., 2011; Cernovsky et al., 2021). Of the 15 participants included in KRSM, only 3 (20%) reported receiving a medical treatment. Two were women (49 and 77 years old), treated, respectively, for a skin condition and a thyroid disorder. The male (57 years old) was treated for a cardiovascular condition. Even if all three were considered to be formicating for a medical reason, it is unlikely formication was present for the rest. Our data suggests that spontaneous moving sensations experienced during meditation may lack a purely bottom-up sensory, top-down attentional or pathological explanation.

Motor (Somatomotor)

Many varieties of motor activity have been associated with kundalini (Sannella, 1992; Greyson, 1993a; Vishnu Tirtha, 2000; Sanches and Daniels, 2008). A study of Buddhist practitioners (Lindahl et al., 2017) associated involuntary body movements with kundalini-like "surges of somatic energy." We examined abrupt physical movements, positioning movements, vocalizations and breathing changes. Our participants reported roughly similar incidence of these motor experiences (29–41% of all participants, 61% having at least one type) to other studies that include 66% for bodily "manifestations" (Poloma and Hoelter, 1998); 37% for involuntary movements (Lindahl et al., 2017), and 48% for "rushes shaking the body" (Woollacott et al., 2021).

Medical causes for spontaneous movements such as Tourette syndrome or myoclonus could be posited, but are unlikely. Tourette syndrome has been shown to have a prevalence of about 0.01% (Levine et al., 2019) and myoclonus was lower (Eberhardt and Topka, 2017). Since extreme psychiatric illness was not reported and would likely have interfered with completing the questionnaire, a kundalini-related process could potentially better explain the presence of these spontaneous motor experiences.

Some specific motor characteristics have been associated with kundalini-related involvement. P-47, who had not reported rising sensations in her back and was not included in KRSM, reported that when she was "very concentrated" in her meditation, she could sit straight effortlessly and would experience spontaneous deep breathing. Maintaining a straight posture while meditating is commonly recommended, but when occurring spontaneously, without effort, it has been considered characteristic of an active kundalini (Vishnu Tirtha, 2000). If this relationship is true, it suggests that kundalini can be active without the experience of rising sensations. In addition, effortless deep breathing implies parasympathetic activity (Jerath and Barnes, 2009), but being "very concentrated" implies strongly focused attention, arousal, and sympathetic activity (Britton et al., 2014; Lumma et al., 2015). The simultaneous presence of parasympathetic and sympathetic activation is a known pattern of autonomic activity (Hugdahl, 1996) and has been considered a potential component of some spiritual altered states of consciousness (ASC; Newberg and Yaden, 2018). Autonomic coactivation could contribute to some kundalini-related experiences.

Other participants had contrasting autonomic involvement. Nine reported unusual slowing or deepening of their breathing,

suggesting greater parasympathetic activity, a common observation in meditation studies (Benson et al., 1974; Tang et al., 2009; Olex et al., 2013; Katyal and Goldin, 2021). Nine other participants experienced rapid breathing or abrupt inhalation, sometimes in conjunction with an abrupt movement, suggestive of sympathetic activity (Hageman et al., 2008). Such experiences may include other modalities. For example, P-84 experienced rapid breathing and heartbeat at the same time as occasionally experiencing a very bright white light, all presumably sympathetically driven. These different breathing patterns were all included within the kundalini signs and symptoms identified by Sannella (1992) and imply kundalini activity may include a complex mix of autonomic influences and not just sympathetic and parasympathetic co-activation.

We found that somatosensory experiences were significantly related to motor experiences, with a trend toward a significant relationship with temperature experiences. Aspects of these three modalities have been described as related to kundalini activity. According to traditional explanations [e.g., Hatha-Yoga-Pradipika (Avalon, 1974)], motor experiences have been considered to result from the kundalini attempting to move through three blockages, or "knots" (*granthis*), in the sushumna channel. The ancient Yoga-Shika-Upanishad, thought to be composed *circa* 100 BCE to 300 CE (Flood, 1996), provides an analogy. It compares the process of piercing the knots by the upward rising kundalini with "piercing the joints of a bamboo stick by means of a heated iron rod" (Feuerstein, 1997, p. 110). Sannella (1992) contended that "kundalini can be blocked anywhere along its upward trajectory." According to Anandamurti (1993b, p. 130) the chakras are points of "fetters" that "the spiritual aspirant has to snap" and that the "kundalini has to pierce."

Temperature (Somatomotor)

Temperature change, while the least common modality for our participants, was primarily experienced as elevated heat. The generation of body heat is mediated by sympathetic processes and typically controlled cortically (Charkoudian, 2003; Amihai and Kozhevnikov, 2015). There are a variety of medical conditions that can cause excess body heat, but medical causes are considered unlikely, because most temperature experiences for our participants arose during meditation and lasted no longer than the meditative period.

Our reported temperature experiences differed qualitatively from a historical description of such experiences related to kundalini and meditation (Avalon, 1974, p. 241–242). Avalon (a.k.a. Sir John Woodroffe) reported, apparently from direct observation, that "intense heat" is experienced from an activated kundalini, with lower sections of the body becoming cold as the kundalini moves higher, ultimately leaving heat present only at the crown of the head. None of our participants reported this pattern of activity. Other research (Corneille and Luke, 2021) found that three KAS Physical symptoms questions referring to "unusual cold" in the body were among the least likely experiences to be reported on the KAS. As Woodroffe's description was not from empirical investigation, his claims seem to not be supported by current empirical data.

A recent study of individuals who had experienced "kundalini awakenings" (Woollacott et al., 2021) reported that energy rising up the spine was associated with "intense heat/burning pain" in 20% of their participants. However, none of our participants reported "intense heat" or "burning pain" (although, we did not specifically request that information).

Light (Audiovisual)

Multiple examples of light experiences that have been associated with kundalini are easily identified in traditional literature, such as from the Pashupata-Brahmana-Upanishad and Chandogya Upanishad (Feuerstein, 1997), by Kashmiri Hindu Tantric Abhinavagupta (Silburn, 1988; Muller-Ortega, 2004), and more current writings (Anandamurti, 1968; Krishna, 1993; St. Romain, 2017). Therefore, we were interested in descriptions of light experiences and their relationships with other experiences.

Under "Quality of energy rising up the spine," in the study by Woollacott et al. (2021), 18% reported experiencing "Brilliant light." Light that was "brilliant" in our study was reported by the same proportion of all participants, and it was the most common light intensity. Only half of those participants reported experiencing rising sensations in the spine or back, and only one reported both as part of the same experience (although descriptions combining modalities had not been requested). Similarly, only a third of participants experiencing consistent light experiences reported rising sensations and, while not requested, no one described a direct relationship between them. Thus, for our participants, more powerful visual experiences were not reliably associated with rising sensations.

A spontaneous visual experience without an external source is normally considered a hallucination (Waters et al., 2021). Sensory deprivation and perceptual isolation have been shown to induce spontaneous visual hallucinations (Merabet et al., 2004; Lloyd et al., 2012). In a Buddhist meditation study, "hallucinatory" visual experiences were associated by some participants with the degree of concentration that they had achieved (Lindahl et al., 2014). It was proposed that a possible mechanistic explanation of visual hallucinations during meditation is that increased cortical inhibition arises from greater mental concentration, consequently increasing neuronal excitability in inhibited areas. Fluctuating concentration could explain the variable quality of our participants' most common visual experiences which were primarily white, brief ("seconds") and "occasionally" experienced.

Imagination, repeated prayer practice, and cultural support have been proposed to promote spiritual hallucinatory experiences (e.g., seeing visions, hearing the voice of God; Luhrmann and Morgain, 2012). Such a process, however, does not explain spontaneous spiritual experiences different from what practitioners imagine or focus upon. Twelve of our participants reported non-drug related visual hallucinations. Eight of those were spiritually-oriented, of which seven were associated with the Guru. It is possible that imagination, repeated practice and cultural support could have promoted some of the visual hallucinations reported to us. One additional complex visual experience unlikely to be related to these

mechanisms (P-47 in **Table 3**) will be discussed in the Anomalous Experiences section.

As a whole, we were unable to identify a consistent relationship between visual experiences and rising somatomotor experiences. While Sannella (1992) included all of the visual experiences reported here within his kundalini-related experiences, our findings contain only one direct report (P-69) of a visual experience associated with rising sensations. This difference could be due, as suggested in the section on motor experiences, to kundalini-related activity that is not associated with noticeable rising sensations, and the fact that we did not specifically ask about which modality experiences occurred together with others.

Sound (Audiovisual)

Sensory deprivation for light experiences (Lindahl et al., 2014) was described as potentially causing "hallucinations" from cortical inhibition. This could also apply for sound. Culturally supported expectations could promote misattributions in which a desirable sound is identified when it was actually something else (Luhrmann and Morgain, 2012), which was suspected in at least one instance. Other factors, such as undiagnosed tinnitus (Henry et al., 2014), Musical Ear Syndrome (Low et al., 2013) and the more common "earworms" or "stuck song syndrome" (Beaman, 2018) could be responsible for some sound experiences. However, these types of factors do not appear to account for the full range of sounds reported by our participants.

Anandamurti (1999) proposed that meditators might hear a progressive series of sounds (first crickets, followed by ankle bells, sweet flute, gong or ocean, and finally om/aum) as they deepened their meditation and kundalini rose higher through the chakras. Among our participants, cricket sounds were reported most, which might be expected for the first sound in the sequence, since sounds associated with higher chakras would have had the kundalini also pass through the lowest chakra, with its associated cricket sound. The incidence of additional sound experiences did not follow the order of the proposed sequence. If there is relevance to this sound sequence, it is not discernable with the current available information and requires further exploration. It may be that incidence is not a good metric with which to identify this sequence.

It has been demonstrated that mental state changes, such as hallucinations induced by perceptual deprivation (Pütz et al., 2006) and induction of inner light/energy in Zen meditation (Lo et al., 2003) can be distinguished by changes in alpha EEG through using button presses to mark the experience onset. This technique could be a means of discriminating various meditation induced experiential states (Lindahl et al., 2014). This could provide an objective approach that may be useful for increasing knowledge concerning spontaneous auditory and other sensory experiences during meditation, as well as experiences involving rising sensations that suggest kundalini.

Mood (Affective)

Subjective experiences resulting from Yogic meditation have often been found to have a positive valence (Menezes et al., 2015; Patel et al., 2018; Katyal et al., 2020; Park et al., 2020). We found a high incidence of positive mood shift (69% of participants), similar to 75% for reports of positive affect among Buddhist meditators (Lindahl et al., 2017), and 70% for reports collected from the Religious Experiences Research Center archives at the University of Wales (Lockley, 2019), and higher than 32% for "mood and energy swing" in a group with "kundalini awakening" (Woollacott et al., 2021) and 46% for "positive affective states" from people reporting "awakening experiences" (Taylor and Egete-Szabo, 2017). This indicates our participants had a comparatively strong positive response to their meditation practices.

Of the 15 participants who reported rising energy sensations (KRSM), only two were in a group of participants ($n = 14$) who had used stronger positive terms (e.g., bliss, tremendous or unbounded happiness, elation, great joy, and exalted love) to describe the positive affective shifts arising from their meditation. This demonstrates another instance in which our KRSM kundalini measure based solely on rising somatomotor experiences fails to distinguish a feature (unusual or extreme emotion) that has been associated with kundalini (Sannella, 1992).

Adverse meditation events have also been examined recently (Cebolla et al., 2017; Anderson et al., 2019; Farias et al., 2020; Goldberg et al., 2021; Lambert et al., 2021). In particular, Farias et al. (2020) found an overall prevalence of 33% for adverse meditation events in observational studies. In the present study, the valence of a mood shift was identified from response explanations. We found only 6% reported any negative effect of their meditation on mood. The failure to specifically ask about positive and negative experiences might have promoted underreporting of undesirable outcomes. We also did not include measures that could have identified clinical issues that may have been present, as indicated in some prior studies (Persinger, 1993; Thalbourne and Fox, 1999; Antonova et al., 2016), or in conditions of kundalini syndrome (Sannella, 1992; Greyson, 1993b; Valanciute and Thampy, 2011; Benning et al., 2018). We did request reports of any treatments being received and only one participant reported receiving any medical treatment for a mood disorder. The lower incidence of negative experiences is consistent with our expectations and could demonstrate that the kundalini "awakening" within our sample may have been more effectively balanced through the comprehensive Tantric Yoga practices and proper guidance than that experienced in circumstances of kundalini "syndrome" (Suchandra et al., 2021).

Meditation and Psychological Measures

We had predicted, based on prior research (de Castro, 2015), that there would be significant relationships between the incidence of modalities and the amount of daily meditation (MDM). Contrary to expectations, there was a lack of significant relationships between the modalities and any of the quantity of meditation measures. This implies that experiences occurring during meditation may be independent of the quantity of meditation practice.

Moreover, contrary to expectations based on traditional literature concerning kundalini (Feuerstein, 1997; Anandamurti, 2020a,c), our KRSM variable demonstrated no significant

relationship with any of the modalities, using logistic regressions. This suggests that KRSM does not meaningfully capture any kundalini-related expression present within the six modalities. KRSM also had no significant relationship with any meditation quantity measure or the Supplementary Practices variable. This may indicate that individuals move through the meditation process on differing experiential paths, possibly due to differing proclivities when starting such a process. That kundalini-related experiences are highly variable appears consistent with the perspective that the way kundalini is expressed "is different for each individual" (Sarkar, 1978, p. 74).

There were also no significant relationships between any of the modalities and any of the trait measures (mindfulness, PA, or NA). KRSM also had no significant relationship with any of the trait variables. Thus, at least for this particular form of meditation, spontaneous experiences appear to lack any significance in relation to quantity of practices performed and psychological traits achieved. While some auditory and somatosensory experiences may signify progress in elevating the kundalini (Anandamurti, 1999), we have observed no indication that sensory experiences have any positive (or negative) associations. Cautions concerning caring about subjective experiences are present in some Buddhist meditation traditions, although there are differences of opinion: some considering meditation experiences to be signs of progress, and others considering them potential hindrances (Lindahl et al., 2017). Tantric Yoga literature also includes cautions that interest in specific experiences or abilities could potentially be contrary to the deepening of meditation (Anandamurti, 1992).

In contrast to the modality results showing no significant relationships, there were significant partial correlations (removing the age effect) for all three measures of the quantity of meditation practice with some of the trait measures, indicating psychological benefits occurred from the practice of meditation. This is consistent with our expectations based on prior research that showed greater years of meditation (YR) was associated with trait positive affect (PA; Easterlin and Cardeña, 1998), and LTH was associated with mindfulness and inversely with negative affect (NA). Also, consistent with expectations, quantity of daily meditation (MDM) was associated with increased mindfulness (de Castro, 2015). A relationship with kundalini expression could not be verified.

There was an additional strong partial correlation of MDM and LTH with Supplementary Practices. Supplementary Practices also had significant relationships with trait mindfulness and PA. Since LTH was based on both MDM and YR, and YR was not correlated with Supplementary Practices, individuals who put more time into their daily meditation may be more likely to observe more supplemental yogic practices. This probably represents a greater investment in the broader Tantric Yoga lifestyle. However, that does not appear to be the case for individuals with just greater YR.

Anomalous Experiences

While we systematically examined spontaneous meditation experiences in six modalities, qualitative reports also suggested consequences of spontaneous experiences outside these modalities. Changes in self-awareness are a fundamental part of deepening meditation and elevating kundalini (Anandamurti, 1982). We received one report (P-69) of an experience of merging into light while losing a sense of individual self-awareness and three others that reported experiences with a universal quality or oneness. Highly positive, emotional states resembling ecstasy were reported by 14 participants. One participant reported out-of-body experiences, seven reported "visions" of the Guru, 12 experienced "abnormal environmental illumination" and three heard spiritual voices. Of these multiple participants, only one who heard spiritual voices was receiving any medical mental health treatment. Physiological and psychological explanations that we have described may have accounted for some of the experiences, but we have also noted limitations in those explanations. Other reports of anomalous phenomena, such as psychic abilities and the capacity to heal, have been identified in kundalini awakening research (Woollacott et al., 2021), but despite consistency with historical spiritual literature, mechanisms of such experiences are currently unclear.

A variety of complex brain mechanisms have been proposed to explain ASCs, including neurophysiological (Wettach, 2000; Bünning and Blanke, 2005; de Ridder et al., 2007; Borjigin et al., 2013; Gschwind and Picard, 2016; Newberg and Yaden, 2018) and neuropharmacological mechanisms (Barker et al., 2013; Newberg et al., 2017; Nichols, 2018; Dean et al., 2019). Additionally, an expanded conception of consciousness has been proposed as potentially necessary to explain ASCs, particularly ones that lack adequate neurophysiological or neuropharmacological explanation (Parnia and Fenwick, 2002; Baruss and Mossbridge, 2017; Woollacott, 2020). It has also been noted that even when valid neurophysiological and neuropharmacological explanations are present, they are correlational and do not demonstrate causality, leaving open the possibility that experiences may originate from other possible influences and be expressed through known mechanisms (Beauregard, 2020; Moreira-Almeida, 2020).

Within our data, a relevant example would be P-69's experience of "kundalini" rising through the chakras beyond her control, culminating in merger of her self-awareness into a point of white light. This could be interpreted physiologically, such as through achieving a strong concentration which promoted cortical inhibitory mechanisms, or "deafferentation" (potentially parietal and occipital), together with including a preceding autonomic arousal to account for the rising sensations (Newberg and Yaden, 2018). While conceivable, it is unclear how completely this set of mechanisms would explain her full experience. P-69's experience is consistent with traditional Tantric Yoga concepts of a rising kundalini and the presence of light as a quality of a universally pervading consciousness (Anandamurti, 2020b). Both of these explanations could apply, as suggested earlier. Another example is P-47's visual experience and the second-hand report of the other person's related experience (**Table 3**). If fully accurate, they represent a complex shared ASC that would be difficult to explain by known physiological mechanisms. We consider it valuable to recognize the presence of anomalous experiences and note their potential importance, even if we cannot presently explain them. Further work is required

to distinguish the relative contributions of these different influences.

Kundalini

Our primary marker of kundalini-related activity (rising energy together with somatomotor experiences: KRSM) was unrelated to any of our other measures. However, the consistency of our findings with Sanella's broad analysis supports the contention that much of our findings might include kundalini-related influences which affect more than somatomotor experiences. Corneille and Luke (2021) observed that greater somatomotor experiences distinguished a group self-designating as having kundalini spiritual awakenings in comparison to a similar group that did not associate kundalini with their awakening experiences. However, Corneille and Luke's overall total scores for the KAS, did not differ for the kundalini and non-kundalini groups. Given the consistency of our findings with Sannella's analysis and the similarity of our findings to those in other awakening studies (Lockley, 2019; Woollacott et al., 2021), in Buddhist meditation (Lindahl et al., 2017), and in Christian prayer practices (St. Romain, 1991, 2017; Campbell, 1996; Poloma and Hoelter, 1998), it is possible that kundalini-related influences are broadly present in contemplative practices. A study of Buddhist practitioners (Lindahl et al., 2017) associated involuntary body movements with kundalini-like "surges of somatic energy." Evangelical participants of Luhrmann and Morgain (2012) also reported phenomena like a "jolt of energy" or an "adrenaline surge" that remained unexplained in their study, and those phenomena were unrelated to the influence of imagination, repeated prayer practice and cultural support. Understanding what is involved in the expression of kundalini-related phenomena could offer an important new avenue through which to interpret spontaneous meditation and contemplative experiences. Thus, it will be important to identify objective correlates of kundalini-related activity.

While physiological mechanisms unrelated to the kundalini phenomenon may explain some of the experiences reported to us, the large prevalence of such experiences, including simultaneous experiences in multiple modalities, suggests the presence of a unique kundalini-related phenomenon. Many participants also reported spontaneous experiences with anomalous qualities, which are difficult to reconcile with models of kundalini that are associated with purely sensory qualities. Instead, traditional literature formulates kundalini as a broader phenomenon encompassing a large variety of spiritual experiences and nondual meditation states (e.g., Katyal, preprint).[1] To derive a broader understanding of kundalini, and to potentially quantify the "depth" of kundalini experiences, future studies would need to be designed to investigate kundalini experiences using a broader range of questionnaires along with dimensional reduction approaches such as the Rasch scaling approach (Lange and Thalbourne, 2007; Lange, 2017; Padgett and Morgan, 2020), or other approaches used in modern Item Response Theory (Reise and Henson, 2003; Willoughby et al., 2011; Sauer et al., 2013; Choi and Asilkalkan, 2019).

[1]https://mindrxiv.org/ewb7z

Finally, we will briefly comment about two theories of how kundalini may be physically expressed. According to one theory (Bentov, 1988), kundalini-related experiences arise from brain structures resonating with breathing and heart rhythms. Bentov considered the traditional concept of rising spinal activity to be an illusion and considered the pattern of kundalini activity to follow the somatic representation of the primary somatosensory and motor cortex. Accordingly, he proposed that after rising from the feet and legs, somatic experiences would move upward through the spine and back, and from the head then progress to the face, throat and the abdomen. No one within our participants described a sensory progression moving from the face to the throat and then the abdomen. Two of the 15 participants in the KRSM group reported movement that was both up and down. However, both solely referenced the spine as the location of this process. Thus, our reports of rising sensations fail to follow Bentov's suggested somatic representation.

Recently, one of us proposed an alternative mechanism for kundalini expression (Maxwell, 2009). According to it, neural and glial gap junctions within the spine and brain form compartments that can be linked. A joined sequence of these compartments could create the "channel" (*sushumna nadi*) that yogis have long described. Kundalini would be expressed as a state change moving through portions of this channel that have been successfully linked and opened. Gap junctions, also known as electrical synapses, have been shown to form functional compartments that pass electrical signals throughout the central nervous system (Rela and Szczupak, 2004), form syncytial groupings among glia (Nagy and Rash, 2000; Tonkin et al., 2015), enhance synchronous oscillatory firing in neurons (Maex and de Schutter, 2007; Hu et al., 2020) and contribute to the control of biosynthesis and release of secretory products from all glands (Meda, 2018), among many additional functions. While brain mechanisms certainly have relevance for kundalini-related experiences, if traditional Tantric Yoga perspectives are accurate, spinal and other peripheral features should be included in any theory of how kundalini is expressed.

Limitations

One limitation of the present study is that the questionnaire was long, requiring about an hour to complete, which may have promoted brief responses and loss of detail. An alternative approach would have been to use phenomenological interviews to allow extended exploration of participants' experiences. Another major limitation is that, since many of the experiences may have occurred for the participants at an unspecified time in the past, they would be vulnerable to misattributions, faulty memory and culturally supported expectations.

The subjective responses had much variability. Grammatical variants and strong synonyms were considered to be the same. However, due to potentially different connotations, many similar terms were tallied separately, diminishing some scores.

Even though the participants performed a uniform set of meditative practices, which is novel for kundalini-related research, the differences in durations for the various meditative practices performed by the participants may have added uncontrolled variability within the meditation variables.

The questions for the different modalities were not structured identically. They were designed to optimize understanding each individual modality. Separating the experiences by modality artificially isolated components of the full experience. Having greater comparability would foster expanded statistical analysis (such as through Rasch scaling, other Item Response Theory approaches and Structural Equation Modeling) which is recommended for future research on kundalini-related experiences.

Our findings are further limited by lacking systematic analysis of Sannella's interpretive (i.e., cognitive distortions, major alterations of self-perspectives, and unusual or extreme affect) and non-physiological (i.e., anomalous and paranormal) experiences. This would be remedied by adding broader measures of positive and negative affect, as well as formal measures of self-awareness and anomalous experiences in future research.

CONCLUSION

The spontaneous meditation experiences reported in this exploratory pilot study provide the first quantification in a community sample of the incidence of sensory, motor and mood characteristics of the kundalini signs and symptoms identified by Sannella (1992), and particularly a sample that has specifically trained on the same kundalini awakening practices. While we do not have a specific model to represent the form of kundalini's experiential expression, the experiences that were reported to us resembled much of what Sannella suggested were associated with kundalini. The richness of the descriptive data that we collected will foster subsequent kundalini exploration. We observed that kundalini-related experiences in Tantric Yoga meditation were associated with mostly positive mood shifts, unlike past kundalini research, which until recently has been studied mostly from an adverse psychological perspective. We were unable to identify any significant relationship between our experiential modalities and the three meditation quantity variables. This indicates kundalini-related expression may involve inter-individual differences not mediated by the amount of meditation. We did observe, consistent with prior research, that greater meditation was associated with greater positive affect, less negative affect, and greater mindfulness. We also observed that participants having greater daily meditation (MDM) had significantly stronger scores for a set of supplementary yogic practices, representing adoption of a broader Tantric Yoga lifestyle.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: Open Science Framework: https://osf.io/cnghp/.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study in accordance with the standards of the American Psychological Association.

AUTHOR CONTRIBUTIONS

RM is the first author and conducted the research, analysis, and the majority of the writing. SK is the senior author and provided critical comments, edits, and context within the literature. All authors contributed to the article and approved the submitted version.

ACKNOWLEDGMENTS

We would like to thank Yusuf Bilgic for his expert guidance on performing the imputation. We would also like to express our grateful appreciation to Aaron Staengl (ayurvedaposters.com) for generating for us the digital artwork in **Figure 1**.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.863091/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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ORIGINAL RESEARCH
published: 30 June 2022
doi: 10.3389/fpsyg.2022.867110

Extending the Transformative Potential of Mindfulness Through Team Mindfulness Training, Integrating Individual With Collective Mindfulness, in a High-Stress Military Setting

Jutta Tobias Mortlock[1,2], Alison Carter[3] and Dawn Querstret[4]*

[1]Department of Psychology, City University of London, London, United Kingdom, [2]Centre for Business Performance, Cranfield University School of Management, Cranfield, United Kingdom, [3]Institute for Employment Studies, Brighton, United Kingdom, [4]Department of Psychology and Pedagogic Science, St Mary's University, London, United Kingdom

OPEN ACCESS

Edited by:
Philippe R. Goldin, University of California, Davis, United States

Reviewed by:
Warhel Asim Mohammed, University of Duhok, Iraq
Andrew Hafenbrack, Catholic University of Portugal, Portugal

***Correspondence:**
Jutta Tobias Mortlock
jutta.tobias-mortlock@city.ac.uk

Specialty section:
This article was submitted to Consciousness Research, a section of the journal Frontiers in Psychology

Received: *01 February 2022*
Accepted: *07 April 2022*
Published: *30 June 2022*

Citation:
Tobias Mortlock J, Carter A and Querstret D (2022) Extending the Transformative Potential of Mindfulness Through Team Mindfulness Training, Integrating Individual With Collective Mindfulness, in a High-Stress Military Setting. Front. Psychol. 13:867110. doi: 10.3389/fpsyg.2022.867110

Mindfulness has come to be considered an important approach to help individuals cultivate transformative capacity to free themselves from stress and suffering. However, the transformative potential of mindfulness extends beyond individual stress management. This study contributes to a broadening of the scope of contemplative science by integrating the prominent, individually focused mindfulness meditation literature with collective mindfulness scholarship. In so doing, it aims to illuminate an important context in which mindfulness interventions are increasingly prevalent: workplaces. Typically, the intended effect of workplace mindfulness training is to help workers manage stress better. Since mindfulness in organizations impacts individual and collective processes, the study blends the above literatures to create a cross-level "next-generation" Team Mindfulness Training (TMT) pilot. Its potential in helping individuals and teams to manage work stress better is investigated *via* a two-phase mixed-methods research study in high-stress military work populations, and compared to a conventional ("first-generation") 8-week mindfulness meditation program based on mindfulness-based stress reduction (MBSR). Results suggest that compared to the "first-generation" mindfulness program, TMT seems no less effective in raising individual stress management skills, and may hold more promise in generating collective capacity to manage stress and unexpected difficulty, linked to an apparent interdependence between collective and individual mindfulness capacity development. Based on these empirical results, the study contributes to theory in three important ways: first, it outlines how individual and collective mindfulness in workplaces may be interdependent. Second, it explains why "next-generation" workplace training interventions should apply a cross-level approach. And third, it illustrates how its transformative potential for people at work, individually as well as collectively, can be extended by moving beyond an inward-looking meditation focus in mindfulness training. The study contributes to practice by providing a detailed outline of the pilot TMT program, and offers a series of follow-up research opportunities to inspire further scientific innovation in workplace mindfulness training, especially

for high-stress work populations. The study's ultimate aim is to prompt a shift away from adapting clinically oriented, self-focused "first-generation" mindfulness training protocols, and towards *mindfulness as team sport*: a more prosocially oriented mindfulness science intent on generating wisdom and compassion, for one and all.

Keywords: mindfulness, collective mindfulness, mindful organizing, mindfulness interventions, military, randomized controlled trial, stress management, meditation

INTRODUCTION

Research Background

Mindfulness is a cognitive process (Vago and Silbersweig, 2012; Lutz et al., 2015) available to humanity to develop particular skills, centered around present-moment awareness and acceptance (Lindsay and Creswell, 2017). These skills often describe the *what* of mindfulness—paying attention to present-moment experience—and the *how*—with an open-minded, accepting attitude (Kabat-Zinn, 1994; Eisenlohr-Moul et al., 2012). The *why* of mindfulness may be even more important and is at the heart of the present inquiry. Mindfulness can be considered an important approach to cultivating transformative inner qualities "in the service of wisdom in difficult circumstances" (Kabat-Zinn, 2011, p. 5). Wisdom in this context helps individuals on one hand *understand* the nature of suffering and conflicts of interest, not only in their minds but also in the world. On the other, it generates transformative capacity to *release* human suffering and peacefully resolve intrapsychic as well as interpersonal conflicts.

Most mindfulness-based interventions (MBIs) today originate from the seminal mindfulness-based stress reduction (MBSR) program created by Jon Kabat-Zinn in the 1970s (Kabat-Zinn, 1982, 1994; Creswell, 2017). MBSR is one of a potentially infinite number of "skillful means" to generate wisdom and healing from suffering (Kabat-Zinn, 2011, p. 3). MBIs were originally designed as "participatory medicine," bringing together contemplative traditions and clinical medical science, to help hospital patients suffering clinical or mental health conditions find relief (*ibid.*). MBIs predominately use meditation—which can be defined operationally as self-regulation of attention (Goleman and Schwartz, 1976)—to cultivate wise, transformative awareness, so that it might become possible for people to take care of their wellbeing *by themselves*, in addition to receiving treatment for their medical conditions (Kabat-Zinn, 2011). This skillful way of being and encountering difficulty is, in today's everyday language, about managing stress. In simple terms, mindfulness training inspired by MBSR helps people develop valuable individual stress management skills.

Kabat-Zinn's seminal work spawned the so-called first-generation of MBIs, rooted in Buddhist traditions and designed for secular community settings in order to be "maximally accessible to people with diverse values and religious affiliations" (Crane et al., 2017, p. 991).

Over the last 30 years, psychology scholars and behavioral medicine experts have introduced MBIs to a variety of different contexts beyond hospitals (Creswell, 2017). MBIs have been extensively researched and their effectiveness in generating individual stress management capability is broadly confirmed. Systematic reviews and meta-analyses with clinical samples have demonstrated that MBIs are effective in reducing depression (Kuyken et al., 2015; Goldberg et al., 2018). Meta-analyses of MBIs with non-clinical samples indicate significant stress reduction (Chiesa and Serretti, 2009), increased well-being (Eberth and Sedlmeier, 2012), and higher quality of life (Khoury et al., 2015).

However, the transformative potential of mindfulness stretches beyond individual stress management. While "first-generation" MBIs focus on inner transformation and serve predominately as a clinical tool, a self-help tool, and a mental training tool (Crane et al., 2017), recall that the ultimate vision for MBSR included wisdom to relieve suffering and resolve conflicts in the face of difficulty not only *within* but also *between* individuals and in the world at large. This means mindfulness may be not only helpful for *individual* stress management but also for *collective* stress management.

Study Focus

Building on the conceptualization of Crane et al. (2017), this study explores "next-generation" theorizing on mindfulness training, in particular a shift away from MBIs serving as self-help tool and towards a social catalyst for transformation. Its focus is on illuminating an important context in which mindfulness interventions are increasingly prominent: workplaces.

More specifically, the paper seeks to build bridges across the individually-focused mindfulness meditation literature centered around MBSR and towards another mindfulness literature that is less intrapsychic in orientation and instead more focused on social and situational awareness: the collective mindfulness literature dedicated to studying team processes of shared cognition and action that help teams and entire organizations uncover and overcome unexpected stressors and thus "manage the unexpected" (Weick et al., 1999).

In contrast to a focus on *individual* stress management through MBSR and related mindfulness training programs, collective mindfulness is a social construct, defined as a group's capability to notice significant issues and emergent errors in situations and to jointly act on what they observe (Weick et al., 2000). In other words, employees acting mindfully on a collective scale manage stress *collectively*: they are able to anticipate, detect, and appropriately respond to unexpected, stressful problems (Weick et al., 1999; Weick and Sutcliffe, 2007).

Collective mindfulness arises out of specific social practices, actions, and communication patterns that liken the "collective mind" of a group of individuals who organize mindfully to a flock of birds flying in unison, with each bird constantly paying attention not only to their own direction, but also to every other member of the flock, and constantly aligning

individual action with the overall direction of the collective (Weick and Roberts, 1993).

Because collective mindfulness is enacted through a dynamic process of social action and interaction, it is also referred to as *mindful organizing* (MO; Sutcliffe et al., 2016), to emphasize its non-static, ever-evolving nature. Originally, the concept of MO was developed to explain how High-Reliability Organizations (HROs) develop capacity to avoid catastrophic failure and perform in nearly error-free ways despite operating in extreme, stressful conditions; however, its scope has expanded to also apply to teams and organizations that are capable of being aware of the status quo in order to improve it, refusing to operate on "auto pilot" (Fiol and O'Connor, 2003; Sutcliffe et al., 2016).

While MO may appear to align closely with standard management practice, Weick et al. emphasize that interpersonal skills in HROs are as important as technical skills (Weick et al., 1999). Teams who organize mindfully "are motivated to work for the benefit of others and are more receptive to others' perspectives and incorporate those perspectives into their work" (Vogus et al., 2014, p. 592): collective mind in action. The origin of this interpersonal mindset stems from prosociality; attitudes and behaviors intended to benefit others (Batson and Powell, 2003), and the capacity to be emotionally ambivalent, i.e., capable of experiencing positive and negative emotions at the same time, for example feeling hope as well as doubt (Vogus et al., 2014). Five collective mindfulness processes generate MO: (1) Sensitivity to Operations; (2) Preoccupation with Failure; (3) Reluctance to Simplify; (4) Commitment to Resilience; and (5) Deference to Expertise (Weick et al., 2000).

In sum, the prosocial nature and other-orientedness of collective mindfulness render it pertinent for the endeavor of the present study and its ultimate aim: expand the potential for mindfulness training to make a positive difference in the world.

To date, the collective mindfulness scholarship has largely bypassed prominent mindfulness science debates. This is probably because collective mindfulness is rooted in management science, not a combination of contemplative and clinical science. In addition, it conflicts with the assertion that mindfulness can only be understood from the inside out, as an embodied practice and first-person experience of awareness that is not about intellect or cognition, and instead nurtured through the second-person perspective of a highly skilled trainer (Kabat-Zinn, 2011). Finally, to the best of the authors' knowledge, no standard training protocol to generate collective mindfulness in organizations has been published in the peer-reviewed literature. This means that organizations interested in evidence-based methods to bring mindfulness to their employees tend to rely on "first-generation" MBIs, at least as a starting point for their learning and development initiatives.

Why This Study Is Timely

The integration of the individually focused mindfulness research with collective mindfulness scholarship is timely, for at least four reasons beyond the afore-mentioned aspiration of MBSR to contribute to healing and wisdom in an ever-increasing range of mainstream settings.

First, other-orientedness is embedded in Buddhist heritage, yet the contemporary debate on mindfulness frequently overlooks an integration of "the by-now almost traditional road to personal wellbeing with other-regarding actions that arise from other-regarding motives" (Van Doesum et al., 2013). In fact, the Dalai Lama emphasizes in his teachings that Eastern contemplative traditions anchor around the link between mindfulness practice and an altruistic mindset (Dalai Lama and Ekman, 2008). When it comes to practicing mindfulness, the Dalai Lama explains, "the correct motivation is the altruistic attitude" (Dalai Lama, 2005, p. 168).

Second, while prominent mindfulness debates focus on mindfulness as an inner quality (Bishop et al., 2004; Kabat-Zinn, 2005), mindfulness in organizations is generally considered as a concept that stretches beyond individual-level considerations. In fact, workplace mindfulness is a cross-level construct, embedded in interpersonal relations and interactions, emerging through meditative as well as nonmeditative practices, by individuals as well as by groups of people interacting with each other *mindfully* (Sutcliffe et al., 2016). Moreover, mindfulness is not the same as meditation. While meditation is generally considered a primary method for becoming mindful, mindfulness can arise organically in everyday life (Reina and Kudesia, 2020). In addition, leading mindfulness scholars argue that conflating mindfulness with meditation alone may be a Western misreading of Buddhist philosophy, at the expense of using other forms of mindfulness practice to cultivate valuable qualities (Lopez, 2010), and warn that an exclusive intrapsychic focus of mindfulness practice is liable to reduce its relevance to people's daily lives "off the cushion" (Brown and Ryan, 2004, p. 246). Indeed, the physical and mental health benefits of non-meditative mindfulness practices are well documented (Alexander et al., 1989; Carson and Langer, 2006; Haigh et al., 2011; Pagnini et al., 2015). This is relevant for debates on expanding the potential of mindfulness for workplaces because so far, fewer than one in seven United States adults have tried meditation (Clarke et al., 2018). If individuals or organizations are not interested in meditation for any reason, they should not be "doomed to a life of mindlessness" (Pagnini and Langer, 2015, p.365).

Third, this research responds to calls from mindfulness scholars urging a broader, more context-aware debate on how mindfulness may benefit people at work (Rupprecht et al., 2019) and for integrating more diverse schools of thought in workplace mindfulness research (Selart et al., 2020). The study integrates individual meditation-focused mindfulness practice, as spearheaded by MBSR and related intervention programs, with mindfulness practice that is interpersonal in nature, such as practicing compassionate attitudes and behavior, i.e., working for the benefit of other sentient beings (Dalai Lama, 2005), or managing stressful events collectively, as in mindful organizing (Weick and Sutcliffe, 2007). In so doing, the study aims to help address increasing scientific criticism of both of these seminal studies. For example, meditation-focused MBSR scholars warn that MBSR and programs deriving from it are seen as a "one-size-fits-all" approach (Van Dam et al., 2017), "essentially replicating clinical mindfulness research in the workplace" (Reb et al., 2020; p. 3), while MO scientists lament that the antecedents of collective mindfulness are poorly understood (Argote, 2006).

Finally, both are mature literatures, employing distinct research methodologies (MBSR and its derivatives draw largely on quantitative intervention studies while the collective mindfulness literature tends to focus on qualitative observational and case study work), yet few empirical integrations of these schools of thought exists to date (notable exceptions are Fraher et al., 2017; Yu and Zellmer-Bruhn, 2018; and Liu et al., 2020). This presents untapped opportunities for exploring synergies between them.

The Study's Research Approach

The present research approach is a multi-phase mixed-methods pilot study in a high-stress work population: military officers in training. Specifically, the study investigates the potential—in other words, potentially unrealized benefits—of a newly created "next-generation" mindfulness training intervention that combines essential features of "standard" individual mindfulness training with the hallmarks of collective mindfulness.

Two features of this newly created pilot intervention are important for explaining the underlying rationale for this study.

First, the intervention under study is named "Team Mindfulness Training (TMT)," leaning on the *team mindfulness* construct, a relatively recent mindfulness construct (Yu and Zellmer-Bruhn, 2018). This is because team mindfulness sits at an interpersonal level of analysis and is thus a meso-level construct between the individual-level focus often applied to individual mindfulness, and the organization-level lens typically applied to collective mindfulness processes. Team mindfulness is defined as a team's shared belief that team members' interactions are marked by attention and awareness of the present moment as well as nonjudgment in the space between individual team members, and this shared belief reduces conflict and antisocial team behavior such as interpersonal undermining of other team members (Yu and Zellmer-Bruhn, 2018). While Yu and Zellmer-Bruhn (*ibid.*) do not specify what types of interventions generate team mindfulness, they nonetheless argue that it represents a promising approach for team conflict reduction. The present work extends this scholarship by providing a comprehensive outline of a pilot TMT intervention program, targeting both individual and collective (interpersonal) mindfulness practices and processes, in order to advance understanding of how to generate team mindfulness and thus create mental space both *within* individuals and *in the space between* them.

Second, this work is aligned with Kudesia (2019) who argues that in order to understand the potential of mindfulness for workplaces scholars need a mindset shift from "borrowing," or adapting, extant mindfulness training approaches (as is the norm currently for workplace MBIs) towards "blending" concepts and ideas (Oswick et al., 2011; cited in Kudesia, 2019). Considering mindfulness *as team sport* does just that.

The research question (RQ) guiding this inquiry is:

Can TMT generate individual and collective stress management skills, and if so, how?

This paper is structured as follows:

First, the study's methodology is presented, including a detailed overview of the pilot cross-level TMT intervention for workplaces. Then, Study 1 explores the general potential of TMT, while Study 2 compares its potential to a slight adaptation of "traditional" MBSR. This is followed by a presentation of the study's findings. The paper concludes with a discussion of the findings in relation to theory-building and by generating recommendations for follow-up research and practice.

MATERIALS AND METHODS

Methodology Overview

The research methodology consisted of Study 1, a pre-pilot intervention of the TMT program with a small sample of junior military personnel ($n = 23$) from a British Army military training division, evaluated qualitatively ($n = 21$). This was followed by Study 2, a mixed method controlled pilot intervention with a second set of junior military personnel from four Royal Navy military training divisions (divisions are administrative units serving as work teams). A sample of 105 individuals participated in the intervention; for full details on participation in its evaluation please see **Supplementary Material**. In Study 2, participation in the TMT program was compared to participation in an MBSR intervention minimally adapted for a military context.

The quantitative part of Study 2 comprised a block randomized controlled comparison of TMT with MBSR (allocating participants to condition *en bloc* by the division to which they belonged). It followed a 2×3 between subjects repeated measures design, comparing TMT to MBSR (which served as active control condition). Outcome variables were self-reported perceptions of individual resilience (Campbell-Sills and Stein, 2007) and perceptions of mindful organizing (Vogus and Sutcliffe, 2007b) in participant divisions, administered using pen and paper. In addition, a computer-based working memory test (Unsworth et al., 2005) was used, serving as proxy for objectively measuring individual performance under pressure. These assessments were taken at three times: at baseline, i.e., immediately before the start of the pilot (Time 1); immediately post-intervention (Time 2); and at a 2 month follow-up (Time 3). The qualitative part of Study 2 consisted of semi-structured interviews about participants' experience of the pilot training ($n = 21$) at 2-month follow-up.

TMT Intervention Design

The core aim in designing this pilot "next generation" MBI is to maximize the potential of mindfulness to help individuals and teams manage work stress better, both individually and collectively.

More specifically, TMT integrates the five key processes of collective mindfulness (Weick et al., 2000) with the five key components of individual-level mindfulness practice deemed essential to form a genuine (individually focused) MBI: contemplative mindfulness practices such as observing the breath; a model of human experience explaining the causes of distress and how to relieve it; facilitating an approach-oriented and de-fused relationship with experience; promoting self-regulation of attention and positive qualities such as wisdom and compassion; and engaging participants in sustained mindfulness meditation practice and inquiry-based learning to develop insight (Crane et al., 2017).

Structure of TMT

The structure of the TMT mirrored MBSR for ease of comparison in the pilot, with individuals participating for 2 h in weekly sessions over an 8-week period. This choice reflected the need to keep the design of TMT comparable to MBSR (rather than a careful examination of the theoretical constructs under study before designing the intervention; this was not feasible because of the need for a comparative pilot evaluation).

In each training session, roughly half of the time was devoted to developing individual mindfulness-based stress management skills, as taught in the well-researched MBSR curriculum (Blacker et al., 2009). Participants were invited to practice both formal mindfulness meditation practices as well as to engage in individually focused reflections on how to manage personal stress more effectively, integrated into their lives and in ways that fit their specific context. As per prior research in the United States Military (Jha et al., 2015), this aspect of the intervention was only very minimally adapted from the MBSR protocol by Blacker et al. (2009).

The individual-level mindfulness training proportion was cut in half because of emerging evidence that shorter versions of the MBSR curriculum may be as effective as the originally developed version (Creswell, 2017). This may be particularly appropriate for work teams (Carmody et al., 2009), and enables a delivery team to keep the total contact time in line with standard expectations for "traditional" mindfulness training.

As Crane et al. emphasize in their (2017) article stipulating the five essential components of MBIs, adaptations based on relevant theoretical frameworks and tailored to a particular population (such as individuals working and serving in the military, as in the present context) are encouraged. This served as platform for the creation of the collectively focused part of TMT.

Therefore, the remaining half of training time consisted of collective mindfulness training elements (this time split was chosen predominately because it meant that TMT fit within the standard timeframe of MBSR).

Specifically, TMT participants were invited during each session to engage in experiential exercises and small group discussions, focused on developing collective stress management capacity in line with the five collective mindfulness hallmarks.

However, scholars agree that collective mindfulness emerges *indirectly* as a consequence of a particular "heedful" (Weick and Roberts, 1993) and prosocial way of interacting (Vogus et al., 2014). Interventions targeting a particular collective mindfulness hallmark *directly* are unlikely to be effective because collective mindfulness depends on leadership and culture that reflects social agreement on valuing mindful collective practices. By way of example, imagine you belong to a team, with an existing hierarchy of team leader and followers, based on rank and career history. Inviting you to defer decision power for each future team decision to the most knowledgeable individual independent of their position in the hierarchy would involve revisiting the team's established leadership and culture *before* this collective mindfulness hallmark can emerge.

Therefore, the five collective mindfulness hallmarks were used as indirect target outcomes for weekly interventions that directly promoted prosociality and open-mindedness at an interpersonal level, based on the assertion of Vogus et al. (2014) that these serve as affective foundation of collective mindfulness. At the interface between the individual and their relationship with others, this feature of the training is based on the observational insights of Fraher et al.'s (2017) study of United States Navy SEALs, suggesting that trust-based, pro-social and respectful work relationships foster multi-level "mindfulness in action."

TMT Session Content

Each session of the TMT focused on a specific topic.

The first session included a general overview of scientific evidence linking mindfulness with resilience and sustained performance at individual and collective levels in organizations. The starting point for the collective part of the TMT program was illustrating why and how mindful organizing, that is anticipating and responding to unexpected stressful challenges collectively, rather than individually, may benefit individual participants in their specific setting by helping them improve individual resilience and performance as well as the overall reliability of the entire team.

The session linked mindfulness with psychological safety, a shared belief that the team is safe for expressing suggestions or ideas that are important to the individual yet that might make him or her vulnerable to being ostracized from the group, and one of the most reliable predictors of team performance (Edmondson, 1999). Psychological safety overlaps significantly with team mindfulness (Yu and Zellmer-Bruhn, 2018). In the session, participants were inductively led to reflect on their own preconceptions about the link between psychological safety and team performance, exploring how this research looks and sounds in their own context. Subsequently, they were invited to discuss in small teams how they may collectively overcome the emotional difficulty involved in considering, let alone proactively discussing in a work team setting, fears of failure during a concrete upcoming stressful challenge. The overall intent of this collective mindfulness exercise was to generate motivation and commitment to responding to upcoming stressors as a collective unit, helping each other improve resilient performance under stress and pressure both individually and collectively.

Session 2 introduced the idea of situational as well as self-awareness, when tackling work problems and challenges. This session centered around the collective mindfulness hallmark "sensitivity to operations" brought to life through inductive exercises intended to gently help participants question their own assumptions about the types of information they tend to communicate (verbally and non-verbally) and the information they tend to focus on when interacting with others, especially when under stress at work.

Session 3 focuses on the collective hallmark "preoccupation with failure," continuing to jointly uncover the automatic judgments people at work tend to make about important normal aspects of work life, such as failing to succeed 100% of the time. Participants were invited to consider both positive and negative aspects that the topic "failure" brings up for them individually and in group discussions, in order to prompt a

shift in perspective and a changed relationship with this topic in their own work lives towards embracing difficulty at work in a more accepting, proactive way. Groups were invited to continue shifting their focus of attention in relation to this topic by exploring positive aspects that go hand in hand with perceptions of "failing" in their world of work, such as learning.

Session 4 helped participants develop a greater collective appreciation for "reluctance to simplify," in other words changing their relationship with complex work challenges. Participants were invited to bring this idea to life by engaging in a traditional group mindfulness exercise, based on the teachings of Levey and Levey (2014), sharing personal values and exploring where these overlap or diverge, and what this meant for individuals and the group as a whole. Leaning on Ely and Meyerson (2010), this exercise is linked to creating team micro-cultures of other orientation, by inviting the participants to explore how to create team cultures in which everyone serves as their proverbial brother's keeper to succeed, rather than reinforcing a work culture of proself motivation.

In session 5, the collective mindfulness theme was "deference to expertise," and here participants were invited to reflect in small groups on the positive and negative aspects of being considered an expert, and comparing and contrasting real-time rather than historically determined expertise. The aim in this was to open participants' minds towards looking for expertise in their work teams that may not align with traditional expectations of expertise (based on age, gender, rank, and so on). In this context, they were also invited to map out their personal social network, graphically illustrating who they communicate with for different needs, and encouraged to strengthen their social network further with a view to uncovering innovative sources of social connection and expertise.

Session 6 was focused on the collective mindfulness hallmark "commitment to resilience," encouraging adaptability in the face of unexpected challenge. At the heart of the inductive learning for this session was an exploration of the drivers and effects of unexpected interpersonal conflict, brought to life through role plays and group reflections. Based on Grant and Berry (2011), who found that prosocial motivation leads to individuals considering others' perspectives and questioning their own assumptions, this session focused on perspective-taking exercises (taken from Flaxman et al., 2013), to help participants strengthen their interpersonal awareness and emotional intelligence.

Session 7 brought together all collective mindfulness skills learning through a group exercise inviting participants to engage in a Pre-Mortem (Klein, 2007) about a significant future challenge specific to their own work context, thus playfully changing perspective and collaboratively planning how to avoid being unsuccessful in facing this real-world challenge.

The final session prepared participants for embedding mindfulness into their personal as well as their teamwork realities, leaning on standard MBSR curriculum recommendations for completing the MBI learning cycle.

Sessions were arranged so that participants worked in small groups both during the sessions as well as in self-organized fashion between sessions. Participants were invited to continue practicing what they have learned between sessions, by engaging in short pre-recorded daily mindfulness meditation practices as well as through 1–2 team exercises aimed at embedding collective mindfulness routines. In total, daily mindfulness "homework" meditations were kept to 10–15 min, to not overburden participants in their time commitments to practicing mindfulness between sessions, as they were also encouraged to meet with their fellow participants for 1–2 h between each session.

Delivery Approach

Because MBIs touch upon exploring human suffering, the TMT was delivered by two facilitators, one of whom is a trained therapist. This is in line with general practice in MBSR and related mindfulness programs (e.g. Neff and Germer, 2013), to be prepared for situations in which a participant may require the attention of a psychotherapeutically qualified facilitator.

In the present study, three experienced mindfulness facilitators alternated co-facilitating the training. Two of these had a long-term personal practice of mindfulness meditation (more than 10 years each) and extensive experience of teaching mindfulness to high-performance work populations. The third facilitator was a collective mindfulness expert and former military officer with extensive experience of providing military training.

Research Setting

The study was sponsored by the United Kingdom Ministry of Defence (MoD). The duration of the study was 21 months. The MoD appointed a steering group made up of military and civilian stakeholders with interest in the study; the military stakeholders represented all three Services of the United Kingdom military. The research team, headed up by the first author, consisted of three mindfulness trainers and three evaluation experts, and met with the steering committee on a quarterly basis to present and discuss the study's progress and findings.

During the first 6 months of the study, the researcher team conducted a series of site visits, informal interviews, presentations, and workshops at all three branches of the United Kingdom military, to ascertain the study context, to obtain initial feedback on the TMT design, and to determine two suitable and comparable host sites for the two planned research studies. Two sites were selected for Study 1 and 2, respectively: A British Army initial military officer training site (for Study 1), and a Royal Navy initial military officer training site (for Study 2). Both sites offer equivalent military training at two different Services of the United Kingdom Armed Forces.

These two sites were chosen because initial military officer training in the United Kingdom in each Service takes place mostly in the same location; is designed to be physically and mentally challenging over a sustained period, with notoriously little time to relax; and it simulates a diverse range of intellectual and professional performance trials for future leaders of an organization facing increasingly complex challenges in the twenty-first century.

Furthermore, a military setting was apt for a trial of "next-generation" mindfulness because its strong culture of self-sacrifice

and high dedication stood in potential conflict with a perception of mindfulness as self-help (Choi et al., 2020), thus approaching mindfulness training *as team sport* was considered potentially more fit for purpose.

Arguably, there are some parallels that can be drawn between the military context and the high-stress environment that numerous workers in today's conventional public and private sector organizations find themselves in at one time or other.

The research was subject to review by the Ministry of Defence Research Ethics Committee (MODREC), who gave a favorable opinion. Ethical approval to conduct the studies was also obtained from the first author's university ethics committee.

Data Analysis Strategy

The first author led the intervention and data analysis (but not the data collection; this task was completed by the evaluation team members). To ensure trustworthiness of the data analysis, the first author referred to a reflective journal they had built throughout the study, reflecting on the relationships, interactions, contextual understanding, and potential biases that may have formed during this experience, and recognizing that the researcher brought into the analysis their personal understanding of the study's context, built over numerous prior site visits, meetings, and informal discussions (Boyatzis, 1998).

A deductive thematic data analysis approach (Braun and Clarke, 2006) was applied to both sets of qualitative data, to focus the data analysis effort specifically on answering the research question in terms of improving participants' individual and collective stress management skills.

Study 2 was also evaluated quantitatively using regression analyses including effect size calculations, to answer the study's RQ whether and how TMT can generate individual and collective stress management skills, and compare its effectiveness against MBSR, serving as an active control condition.

STUDY 1: PRE-PILOT

Method

Study 1 was a pre-pilot intervention of TMT with British Army officer cadets in initial training ($n = 23$). The pre-pilot was evaluated qualitatively using a pen and paper survey ($n = 21$; two training participants declined to join the data collection effort) immediately upon completing the pre-pilot training intervention.

Participants and Procedure

All potential participants were at the start of their military career. Invited participants had been extensively pre-screened for mental health concerns by the host establishment prior to commencing initially military training; hence, standard MBI pre-screening was omitted (individuals with known mental health conditions had been excluded from military training). Eligible individuals were at least 18 years old and had been briefed about study participation at least 5 days before taking part.

Participants were drawn from one particular division at a British Army officer training establishment (all volunteered to participate in the training). There were 18 males and five females, 100% Caucasian, with a mean age of approximately 23 years. Timetabling constraints meant that the training occurred over 10 weeks, not 8 as intended.

Measures

Pre-pilot survey questions were administered at the end of the pre-pilot. They were open-ended and invited participants to reflect in writing about their overall impression of the program; what was positive; what was negative; how the program could be improved; and any other comments they would be prepared to share.

Results

Table 1 shows a summary of the three thematic codes used for the data analysis, alongside subthemes and illustrative quotes from interviewees. "Suggestions" served as third semantic backbone for the organization of findings, as this summarized additional relevant feedback from participants. Quotes are attributed to interviewed participant by adding a randomly allocated identifier 1, 2, etc., to each participant, which means that (P1) refers to Participant 1, (P2) to Participant 2, and so on. Each theme is illustrated further below.

Individual Stress Management

Three sub-themes emerged in this context: (a) self-awareness; (b) individual stress reduction skills; and (c) attitude change.

First, virtually all individuals in the sample suggested that their conscious awareness of themselves and their emotions had increased. In this context, an increased mind–body awareness was frequently coupled with a sense of helpful experiential acceptance, such as the following

> "*Awareness of my body and why it reacts. Realizing it's normal not weak.*" (P7).

In addition, the majority of training participants seemed to have learned skills to cope with stressful moments. Sixteen cadets mentioned "*better stress response techniques*" (P9) and methods "*to deal better with my worries and anxiety*" (P11). Insights ranged from "*skills taught to avoid stress*" (P6) to learning how to handle stressful situations more effectively. Furthermore, a sense of optimism seemed to imbue several reflections, such as "*I do not just have to cope with change, I can thrive in it*" (P4).

Collective Stress Management

The following four subthemes emerged on the impact of the TMT on participants in relation to others in the team as a whole: (a) social awareness; (b) openness towards difference; (c) helping others feel safe; and (d) collective stress management skills.

The first subtheme revolved around heightened social awareness, centered around *being* "*more mindful towards others*" (P5) and "*understanding others' feelings*" (P1). Several cadets indicated they had learned to be aware of body language and "*noticing non-verbal contributions*" (P12). In particular, several

TABLE 1 | Study 1 qualitative themes and subthemes alongside illustrative quotes.

Thematic code	Subtheme	Illustrative quotes
Individual stress management	Self-awareness	"Recognizing emotional discomfort is the first step to managing it." (P13)
	Individual stress reduction skills	"When I have felt frustrated or annoyed after something has occurred, I have used some of the mindfulness exercises to control my emotions, be more composed and think more clearly." (P16)
	Attitude change	"I can conquer things I never thought possible, mainly myself." (P6)
Collective stress management	Social awareness	"Everyone has more or less the same fears/doubts about failure as I do, and is equally invested in success." (P10)
	Openness towards difference	"You have to give everyone a chance to contribute, everyone has different styles and ways of seeing things that can be invaluable." (P18)
	Helping others feel safe	"The most essential ingredient of effective teamwork is that everyone in the group feels comfortable." (P15)
	Collective stress management skills	"It's better to manage it than to leave things unsaid!" (P2)
Suggestions	Less individual contemplation	"Less on individual coping techniques – much of it is easily accessible through apps like Headspace." (P12)
	More team mindfulness	"Putting more emphasis on the team mindfulness early on, so that we might practice it more." (P4)
	Focus on participants' context	"Understand our situation and tailor it for us." (P2)

cadets expressed a more conscious perception of how essentially similar their thoughts and feelings were to those of their fellow team members. The quote below illustrates this:

> "*Whilst everyone in the team is very different and brings different elements, we all have similar thoughts/goals.*" (P16).

Next, there seemed to be a recognition that it might be helpful to "*be more aware of everyone around me, not just those I naturally gravitate towards*" (P7). Twelve individuals discussed how the training had prompted openness towards difference. This openness expressed itself as an increased awareness of "*emotional discrepancies*" (P14), as well as an acceptance of different perspectives: eight cadets reflected on how the course has made them "*more aware of the way other people think*" (P9), and that "*people expect or want different things*" (P10).

Moreover, about half of the participants shared insights they had learned on effective teamwork. Six individuals indicated they had learned to become "*a better team leader and follower*" (P12) and spoke of a heightened awareness of "*how to help others and how to maximize team potential*" (P11). Specific examples of this focused on reflections about drivers of team effectiveness, outlining their "*understanding what the key attributes are a team truly needs*" (P16). This seemed to have impacted prior expectations of effective teamwork, as the statements below suggest:

> "*Intuitively you expect factors like structure and clarity to be the crucial ones when actually verbal turn-taking and discussing body language can be more important.*" (P8).

Finally, several officer cadets noted a change in understanding of how to draw on others to help manage stress. In particular, four individuals mentioned they had learned "*to be open and share vulnerability*" (P17). One officer cadet spoke of an "*acceptance about opening up to a group and teammates and how it can help me*" (P7), suggesting that this openness was deemed beneficial.

Suggestions

Participants' suggestions for improving TMT were grouped into three sub-themes: (a) less individual contemplation; (b) more team mindfulness; and (c) focus on the participants' context.

First, participants' feedback seemed to indicate a slight preference for socially focused, action-oriented learning. One officer cadet noted they preferred such "*more practical parts*" (P15). This preference may also be linked to the following perception:

> "*Much of [individual mindfulness] is easily accessible through apps like Headspace.*" (P12).

Additionally, some participants requested "*more focus on teamwork and social dynamics*" (P8). Two officer cadets indicated they found this aspect of the training particularly useful:

> "*Team mindfulness was something I struggled to understand initially, and I wish it had been more central to the course earlier on.*" (P15).

Finally, about a third of all participants suggested a more pronounced emphasis on tailoring the course to their particular work context, in short; "*understand our situation and tailor it for us*" (P2).

Summary

Results from the pre-pilot study evaluation were encouraging. Above all, survey participants reported generally positive perceptions about the training, relating a range of new insights and learning they linked back to the professional challenges in their work context. In addition, participants seemed to welcome the addition of the newly designed TMT components of the program, to help them manage stress better, not only individually, but also collectively. Finally, improvement suggestions revolved largely around contextualizing the training content more and changing the ratio of individual as opposed to team mindfulness practices. Some individuals even seemed to express a slight preference for team-based mindfulness practices over "classic" individual mindfulness meditation practice. Some caution should be exercised, however, given that fewer than a handful of individuals explicitly compared individual with team mindfulness in their feedback.

These data provided preliminary support for the argument that the TMT program may show potential. While these results were promising, the study's major limitation was twofold: First, no quantitative outcomes had been collected in Study 1, to

ascertain any changes in stress management capacity linked to participating in the training. And second, the study had not been set in context with a control group. To investigate the potential of the TMT program further, Study 2 was conducted.

STUDY 2: MIXED METHOD CONTROLLED PILOT

Method

Study 2 was a second trial of the TMT program: a formal mixed-method pilot study comparing TMT to a minimally adapted version of MBSR serving as an active control condition. The study implemented a 2 (TMT vs. MBSR) × 3 (baseline; post; follow-up) block randomized study design for the quantitative part, yielding a between-groups comparison of the TMT program (n=105).

The qualitative part of this study consisted of semi-structured interviews conducted over the telephone at the same time as collecting the quantitative follow-up data, inviting participants to share their experience of the program (n=21; two of these withdrew their consent to have their data analyzed subsequently). Both parts contributed to answering the study's RQ in comparison with "classic" mindfulness training based on MBSR.

Participants and Procedure

Royal Navy officer cadets in training at the beginning of their military career were invited to participate. Sampling procedure was identical to Study 1. Eleven individuals from the sampled population chose not to participate in the training intervention. Participants had been clustered into four military training divisions. Each division worked, trained, socialized, and prepared for performance assessments together; hence, a division served as proxy for a work team. Participants remained blind to the two conditions throughout Study 2. Both intervention types were named "mental fitness training" although it was made clear that all training was based on mindfulness science. Cross-group contamination was unlikely as divisions operated in friendly competition with each other. Each division had a similar composition of participant demographics, in that the training establishment had purposefully counterbalanced the divisions along demographic characteristics such as number of university graduates, females, age, years of work experience, individuals whose first language is other than English, and so on. The average age was approximately 23 years. There were 15 female participants.

The intervention group participated in the TMT program described earlier, after minor changes had been made to language and content, as per Study 1 participants' recommendations. The control group participated in a slightly adapted version of MBSR (notably omitting the mindfulness retreat, shortening the session length, and situating exercises in a military work context). Both conditions were led by the same instructors who had also led the pre-pilot sessions in Study 1. Training occurred weekly (with a 2-week gap between Session 4 and 5, because of operational constraints at the host site) over a 10-week period, conducted sequentially for the two intervention types, but alternating which of the two groups would be trained first each week. Session length was kept identical for both conditions.

Measures

Quantitative Measures

The following three validated standard measurement scales were included (it was not acceptable for the host institution to request more time commitment for study testing from participants).

Individual Resilience

Individual resilience was assessed using Campbell-Sills and Stein (2007) 10-item CD-RISC scale which has reasonably good psychometric properties. This scale was used because it is a shortened version of the most widely used assessment of resilience worldwide (Rees et al., 2015).

Mindful Organizing

Participants' perceptions about MO in their division were captured using the nine-item Safety Organizing Scale, assessing Weick et al.'s five processes of collective mindfulness (Weick et al., 2000; Vogus and Sutcliffe, 2007b). The scale has high internal reliability (α = 0.88; *ibid.*), as well as high discriminant validity in relation to related concepts such as organizational trust and commitment (Ausserhofer et al., 2013). Responses are given on a 7-point scale ranging from 1 (*not at all*) to 7 (*to a very great extent*). High scores on the Safety Organizing scale are linked to low organizational errors; for example, a one-point increase in Safety Organizing corresponds to almost 30% fewer hospital medication errors 6 months later (Vogus and Sutcliffe, 2007a). Total scores for Safety Organizing range from a minimum of 9 to a maximum of 63. Total scores are calculated by summing scores on all nine items. A higher overall score indicates higher self-reported MO. Examples of statements include "*We spend time identifying activities we do not want to go wrong*" and "*We talk about mistakes and ways to learn from them*."

Working Memory

Individual performance under pressure was operationalized using the working memory (WM) test by Unsworth et al. (2005). This is an objective computer-based test, measuring an individual's WM over a series of timed trials during which the participant needs to solve simple math problems while remembering and recalling letter sequences. WM is used in managing cognitive demands and regulating emotions, and WM span tasks have been shown to predict performance during demanding cognitive challenges (e.g., Engle et al., 1999; Kane et al., 2001). WM is a key component involved in cultivating cognitive mindfulness processes (Jha et al., 2010). Prior mindfulness research in military settings suggested that those with low rather than high WM capacity are more likely to suffer from emotionally intrusive thoughts, and used the same type of measurement to assess individuals' performance (Jha et al., 2010, 2015). Unsworth et al. (2005) showed that their

WM measure has both good internal consistency ($\alpha = 0.78$) and test–retest reliability (0.83), and they report that it correlates with other measures of WM capacity (construct validity). The top score possible is 75 and general population samples achieved scores ranging from 28 in the lower quartile to 66 in the upper quartile (*ibid.*).

Qualitative Measures

Participants were invited to share their perceptions of the program using semi-structured interviews with members of the data collection team, including what was positive; what was negative; how the program could be improved; and any other comments they would be prepared to share.

Results

Quantitative Results

Statistical analyses were conducted to examine the comparative effectiveness of the two intervention types by determining the effect of each intervention type, using SPSS version 25 (IBM Corp, 2017). The grouping variable represented the different intervention groups and had two levels ("Individual" vs. "Team" mindfulness training), and the within-group variable was "time" with three levels (Baseline [T1], post-intervention [T2], and 2-month follow-up [T3]).

Descriptive statistics are provided in **Supplementary Material**. First, it was examined whether there were significant differences between the intervention and control group on any demographics or measures at pre-test, and none were found.

The analyses further investigated whether there were any differences in outcomes between the two training types by comparing outcomes using a series of 2 (Group) × 3 (Time) repeated measures analyses of variance.

Individual Resilience

A significant main effect of "time" for individual resilience for both groups ($F[1.713, 122] = 8.666$, $p = 0.001$) was found, with a large effect size ($n_p^2 = 0.124$; Cohen, 1988) immediately after the groups had completed the interventions. In other words, a significant improvement in self-reported resilience could be detected. Participants in both groups reported significant increases in resilience immediately after the intervention had been completed ($F[1, 61] = 16.576$, $p < 0.001$, $n_p^2 = 0.214$). There was no significant difference between the groups ($F[1.713,122] = 1.733$, $p = 0.78$, $n_p^2 = 0.004$). This improvement was maintained 2 months after the intervention had been completed ($F[1, 61] = 5.109$, $p = 0.027$, $n_p^2 = 0.077$; medium effect size, Cohen, 1988). However, there was no significant difference between T2 (post-intervention) and T3 (2-month follow-up; $F[1, 61] = 3.794$, $p = 0.066$). In terms of magnitude of effect size, this may be a medium effect.

The data appear to show a ceiling effect of the self-reported resilience scores at baseline.

Working Memory

For working memory, there was a significant main effect over time, ($F(2, 120) = 3.958$, $p = 0.022$), with a medium effect size ($n_p^2 = 0.062$; Cohen, 1988). As above, there was no significant different between groups, ($F(2, 120) = 0.534$, $p = 0.588$, $n_p^2 = 0.009$). Participants in both groups reported significantly better working memory immediately after their interventions had been completed, ($F(1, 60) = 5.747$, $p = 0.02$, $n_p^2 = 0.087$), but these gains were not maintained at 2-month follow-up with both groups reverting to levels similar to those reported at baseline ($F[1, 60] = 6.967$, $p = 0.011$, $n_p^2 = 0.104$).

This data trend also seems to suggest that the 8-week mindfulness training format may be insufficient for meaningful cognitive gains in operational contexts to sustain.

Taken together, these analyses indicate that the TMT program appears as effective as the "standard" individual focused MBSR program in generating beneficial change in individual resilience and cognitive performance under pressure.

Mindful Organizing

There were no significant effects in the data for MO. However, there was a trend in the data suggesting that the two groups were differentially affected by their respective interventions, with the "Team" group demonstrating increased levels of MO over time, a trend that was not evident for the "Individual" group (see **Figure 1**).

Despite the absence of significant difference, the data trend for the intervention group seems to indicate that TMT may be more beneficial than "classic" MBSR in generating collective stress management skills. Theoretically, one would expect team-level perceptions of change to take longer to develop than over the course of several weeks; it takes time for teams to work together effectively in any work context. We will return to this point in the Discussion.

Qualitative Results

The same qualitative research method as per Study 1 was applied to help answer the RQ at the heart of this inquiry. Overall, participants from the TMT condition seemed to be able to discuss learnings that related to generating collective stress management capacity, more so than participants in the MBSR condition. This was in line with the rationale for conducting the present study in the first place. However, it is noteworthy that only individuals from this group indicated that they were able to apply their newly learned individual stress management skills during a highly stressful performance challenge during their officer training, i.e., when they most needed stress management skills. This suggests that the collective elements of the training might have created a collectively mindful team climate that welcomed the open application of such skills.

In **Table 2**, summarizing thematic codes, subthemes, and illustrative quotes or notes, quotes are attributed to individuals by their respective training condition using the following notation: I1 would refer to participant 1 in the Individual condition, while T2 would refer to participant 2 in the Team condition, for example.

Individual Stress Management

Interview data indicated that participants found the training valuable for managing their personal stress better, relating back

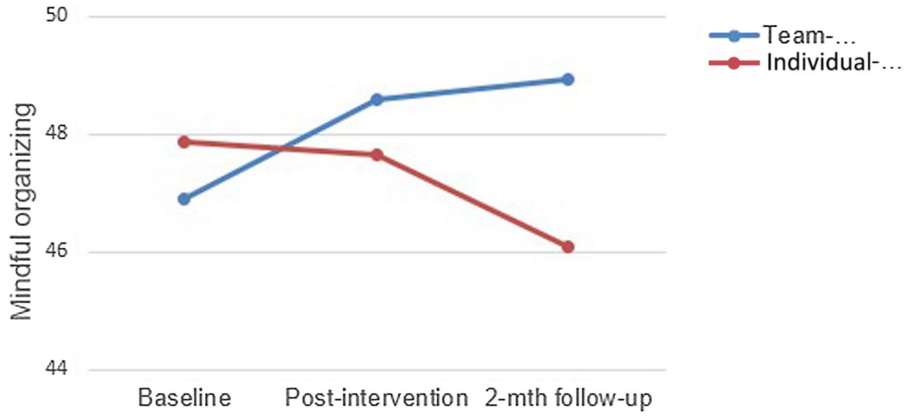

FIGURE 1 | Measures of mindful organizing over time for "Team" and "Individual" groups.

TABLE 2 | Study 2 qualitative themes and subthemes alongside illustrative quotes.

Thematic code	Subtheme	Illustrative quotes
Individual stress management	Individual stress reduction skills	"learning to be calm in stressful situations" (T12)
	Attitude change	"I have learnt not to worry about [critical] comments because I cannot control what other people say but I can control how I react to them" (T6)
Collective stress management	Social awareness	"The training made us think more about how we communicated with each other" (T2)
	Practicing mindfulness together	"'Right, everyone takes a deep breath', and sometimes four or five people will do it together for a few seconds." (T9)
	Collective stress management skills	"[we] would no longer be talking over each other during tasks" (T2)
Suggestions	Focus on participants' context	"need to have someone from the Forces to 'sell' the course" (I5)
	More team mindfulness	"The team building element was the main benefit out of all this" (T7)

work occasions where they had applied what they had learned to good effect. Many related that the mindfulness training helped them learn "*to be calm in stressful situations*" (T12), especially when their performance was tested, for example, giving presentations in front of senior audiences, before which many individuals would become nervous. One interviewee explained that a number of their team members would use the breathing techniques to calm themselves down, adding "*you could see that even during the presentation they were doing the breathing*" (T12). Several interviewees mentioned that noticing their response to stressful challenges had helped them change their attitude towards such stressors, recounting in particular that they had found it beneficial to learn how to label their emotions in order to let go, and get on with the task at hand. One officer cadet summed this up as follows:

> "*[Even] if you cannot always change the way you feel at the time, you can always notice how you react to things*" (T1).

Collective Stress Management

Half of the interviewees from the TMT group identified team-focused benefits, including (a) social awareness; (b) practicing mindfulness together; and (c) collective stress management skills.

First, several officer cadets indicated that the training helped increase their social awareness of others and their needs, especially in preparation of stressful challenges ahead. One interviewee suggested that the training prompted them to do the following:

> "*The training made us think more about how we communicated with each other*" (T2).

Second, it is noteworthy that only participants in the TMT condition shared experiences of collectively practicing individual mindfulness techniques with others, to help calm themselves down. For example, one cadet mentioned using the mindful body scan technique to help them relax with their roommate, explaining they "*both would be doing that in the evenings*" (T3). Other situations were mentioned during which one course participant would suggest practicing mindfulness together, including routine performance inspections during their day-to-day work. An interviewee recalled that sometimes a person would remind the group as they were lined up and waiting for the inspection to begin:

> "'*Right, everyone takes a deep breath', and sometimes four or five people will do it together for a few seconds.*" (T9).

Finally, about a handful of interviewees reflected on learning from the training in the context of a major performance

challenge that everyone had to complete shortly after the end of the training intervention, assessing individual and team performance over a period of several days and nights outdoors. Virtually every one of these individuals spoke of how much stress and conflict this performance challenge provoked in their teams on a continuous basis. For example, one interviewee recounted a situation during the performance challenge when the team was lost, which meant everyone in the group felt stressed. One of the team members spoke up and identified that team members were becoming argumentative and rash with each other, so the team "*decided to collectively do some breathing exercises together*" (T10). This, the interviewee suggested, helped the team members calm down and work out how to resolve the situation. Yet another interviewee related a conflict the team faced during the performance challenge, during which they used one of the team mindfulness techniques from the training to give everyone a say, openly and constructively discussing the problem. In the words of the participant:

> "*It really helped the group perform better – [we] would no longer be talking over each other during tasks.*" (T2).

While these comments indicate that TMT participants clearly experienced collective benefits, only five individuals specifically highlighted the benefits of learning to develop collective stress management capacity. Several of these suggested a focus on team development and communication "*definitely made a difference*" (T2).

In stark contrast to this, none of the interviewees from the MBSR group were able to recall any collective benefits of the mindfulness training to the division as a whole. One participant said:

> "*We were not much of a team so would not really expect to see team benefits.*" (I3).

Suggestions

Two subthemes are discussed here: (a) focus on participants' context; and (b) more team mindfulness. First, besides a variety of recommendations concerning session length (some suggested shorter, more frequent, training sessions, while others would have wanted longer sessions and train for a longer time), there was a general sense that the training should be more focused on the participants' context. The training set-up should "*clearly show the relevance of the training*" (I3) to the participants' specific work situation, and future training organizers would "*need to have someone from the Forces to 'sell' the course*" (I5).

Second, and in parallel to Study 1, there was an indication that team-focused mindfulness aspects of the training was welcome and should have been a more central feature of the training. The quote below sums up this sentiment:

> "*The team building element was the main benefit out of all this. Although perhaps we could have got to that aspect a bit quicker. I would have liked even more of it. It means that as a division we were ready for what was thrown at us. We did not have lots of hassle, we could trust in each other, take a collective deep breath, and get on.*" (T7).

Summary

Results from Study 2 extended the insights from Study 1 on TMT's potential and point to the following key findings: First, it appears that TMT seems no less effective in raising individual stress management skills than a "first-generation" MBI. In addition, the qualitative investigation of participant experience across both studies suggests that TMT may hold more promise in generating collective capacity to manage stress and difficulty.

Most intriguing, however, is the second key finding; an apparent interdependence between individual and collective mindfulness capability, specifically that collective mindfulness training element seemed to facilitate individual mindfulness capacity development. In the present study, an emerging collectively mindful team climate in the TMT group seemed to enable the application of individual mindfulness skills during moments of high stress and challenge. This means that when mindfulness was embedded in team relationships and social interactions, it seemed easier for individuals to apply newly learned mindfulness-based stress management techniques, especially when these were particularly needed. In contrast, the officer cadets in the "first-generation" MBSR training condition struggled to recall any benefits other than using techniques to fall asleep, and none mentioned using the techniques collectively.

A discussion of how these findings contribute to the theory and practice of "next-generation" mindfulness training for organizations is provided below, starting with the second key finding first.

DISCUSSION

This inquiry opened with Kabat-Zinn's humble assertion that MBSR is but one of a potentially infinite "skillful means" to bring wisdom into the world (Kabat-Zinn, 2011). The research question guiding the inquiry was whether TMT can generate individual and collective stress management skills, and if so, how.

The study's research approach consisted of combining two previously siloed mindfulness literatures in order to investigate untapped synergies and to stimulate debate on appropriate new ways to "blend" them (Oswick et al., 2011), rather than continuing to adapt "first-generation" MBIs.

This reflects a paradigm shift in the science of evidence-based interventions from named therapies (e.g., MBSR) to process-based approaches (Hofmann and Hayes, 2019). Process-based intervention science focuses on asking questions such as "what processes should be targeted, for whom, how, and in which context?" in order to design evidence-based processes and contextually specific means to improve outcomes for people (*ibid.*).

Based on the conclusions from the empirical work this study makes the following contributions to theory-building on the transformative potential of mindfulness training particularly in workplaces: (1) Individual and collective mindfulness in workplaces may be interdependent; and (2) mindfulness training beyond meditation may extend its transformative potential.

Interdependence theory is used to structure this discussion. Interdependence theory examines the role of social orientations

(e.g., cooperation or conflict) in situations of interpersonal outcome interdependence (Kelley and Thibaut, 1978). This structure was chosen for two reasons.

First, while a detailed understanding of intrapersonal (or intrapsychic) processes is important to advance mindfulness science, interpersonal processes and their impact on people's reality, motivation and behavior should not be ignored (Rusbult and van Lange, 2008), especially in work contexts. In other words, these processes create the emotional context in which individuals navigate their choices and action.

And second, interdependence theory can help create new linkages between mindfulness theorizing and the strong focus on ethical and contextualized conceptualizations of mindfulness (c.f. Purser and Milillo, 2015) and on other-orientation and interdependence in contemplative tradition that may have been overlooked in contemporary debates on mindfulness (c.f. Gergen, 2009). As the Dalai Lama argues, great wisdom emerges when people become "able to appreciate the interdependent nature of one's own and others' interests" (Dalai Lama, 2005, p. 109).

Interdependence Between Individual and Collective Mindfulness in Workplaces

With specific focus on work settings, the empirical results of this study point to an important yet understudied phenomenon in mindfulness research: when comparing a standard "first-generation" mindfulness intervention (targeting predominately individual mindfulness-based stress reduction skills) to an intervention that included a focus on collectively mindful relationships and interactions among participants, it seems that "first-generation" mindfulness training alone may be less effective in generating the "living foundation" (Kabat-Zinn, 2011, p. 7) that enables individuals to develop an embodied mindfulness practice *in situ* at work and draw on mindfulness especially when facing stress.

These findings contradict the long-held assertion that a "living foundation" for mindfulness can only be cultivated *from the inside out* (Kabat-Zinn, 2011). It would appear that in a work context, the transformative potential of mindfulness to generate wisdom and compassion for the self and for others may also be cultivated *from the outside in*, by promoting collective mindfulness, which in turn may promote individual mindfulness.

There are at least three reasons for observing this phenomenon.

First, collective mindfulness enables individuals to interact more "heedfully" (Weick and Roberts, 1993). This means they are able to: (a) balance their attention between self- and situational awareness; (b) shape and adjust individual action in line with the needs of others and the overall situation; and (c) create and maintain strong connections and learn from each other (*ibid.*). Therefore, work teams that organize mindfully have a mindful culture (Sutcliffe et al., 2016). The affective foundation for such a collectively mindful culture includes prosociality (Vogus et al., 2014), synonymous to the practice of compassion in the Buddhist tradition. Based on this foundation, a work culture can emerge that welcomes care and concern for individuals' wellbeing as much as focusing on performance outcomes. We thus speculate that collective mindfulness skills development may therefore be an important enabler of individual mindfulness, especially in work contexts where self-care may be deemed counter-cultural or frowned upon. Conversely, in the absence of a collectively mindful culture, individual mindfulness is less likely to thrive.

Second, interdependence and in particular prosociality not only benefits others but also improves the actor's own wellbeing (Aknin et al., 2013; Klein, 2017). Social engagement is a powerful antidote to stress, both by reaching out to others for help when stressed, and also by providing empathy and comfort to those feeling stressed (Porges, 2011). In other words, (work) stress may validly be reduced from the outside in as well as from the inside out. Therefore, training programmes such as TMT that promote social engagement as part of developing a mindful culture can extend the potential of mindfulness to transform how workplaces manage stress, individually and collectively.

Third, collective mindfulness generates metacognitive capacity (Kudesia, 2019)—at a collective level—because it is focused on *assumption management*. In other words, collective mindfulness helps shift a team's information processing style to deliberate engagement in the service of proactively identifying and examining the underlying assumptions that may prevent or facilitate resilient performance under stress and during unexpected challenges (Weick and Sutcliffe, 2007). A collective increase in metacognitive capacity can therefore facilitate—and legitimize—improved metacognition within individuals, a particularly valuable mindfulness skill for people at work (Kudesia, 2019). During stressful performance challenges, metacognitive capacity is particularly valuable, helping individuals apply newly learned skills—including mindfulness meditation practice.

In future, more mindfulness at work research should embrace a multi-level approach, investigating cross-level relationships between individual and collective mindfulness processes. Multi-level research in organizations is much needed yet rare (Rafferty et al., 2013). The multi-level nature of workplace mindfulness is important, because scholars have attempted to theorize on the cross-level benefits of individual mindfulness practice (e.g., Good et al., 2016). However, it is logically challenging to simply aggregate individual-level mindfulness practices into a higher level of analysis. This is because mindfulness is unlikely to manifest in the same way across every individual in any given group at any point in time. Similarly to other work concepts such as team performance, the performance of any work team cannot be ascertained by simply compiling individual performance contributions; some individuals contribute more than others at different points in time (Kozlowski and Klein, 2000).

Specific follow-up research opportunities include:

- What sequence of individual and collective mindfulness practices activate which other mindfulness mechanisms? Which dampens others? Which ones interact, which operate independently of each other?
- Which of the five collective mindfulness processes are more, or less, predictive for creating a collective foundation for mindfulness and stress resilience in work teams? How is each linked to individual mindfulness capacity?

- What dosage is necessary of individual and collective mindfulness training, and how much of either is sufficient to embed mindfulness in an organization?
- Can collective mindfulness be trained without individual mindfulness training at all, i.e., exclusively *from the outside in*?

Mindfulness Training Beyond Meditation Extends Its Transformative Potential

Interdependence theory suggests that most people do not think and act in neutral contexts. Today's interdependent world looks and sounds different from the monastic backdrop in which the venerable wisdom traditions were forged. They are the foundation for the current interest in mindfulness, yet more context-sensitive training approaches are needed for generating transformative capacity to help release human suffering and encourage flourishing in workplaces (Rupprecht et al., 2019; Selart et al., 2020).

Recall that the Dalai Lama emphasizes the need to complement "closed-eyes" meditative practice with an "eyes-open" focus on compassionate attitudes and behavior, to generate happiness in self and in the world (Dalai Lama, 2005).

Leading mindfulness meditation scholars argue that mindfulness is an umbrella term that describes a large number of processes and practices related to awareness, attention, and acceptance (Creswell, 2017; Van Dam et al., 2017). In addition, mindful organizing experts stress that non-meditative practices complement meditation in generating mindfulness in organizations (Sutcliffe et al., 2016; Reina and Kudesia, 2020). Nonetheless, the terms meditation and mindfulness are routinely used interchangeably in seminal mindfulness intervention publications (see Creswell, 2017; Van Dam et al., 2017). This indicates that the *practice* of meditation is conflated with mindfulness as an *outcome* of a possibly infinite number of "skillful means" (Kabat-Zinn, 2011, p. 3) to bring healing to individuals and society.

The empirical work presented here suggests that workplace mindfulness training that steps beyond a focus on individual meditation to target stress reduction may hold greater potential in transforming stress management capacity, especially at collective levels.

This goes against the notion that the transformative potential of mindfulness may only be unleashed through first-person experience of mindfulness meditation guided and nurtured *via* the second-person perspective of a highly skilled mindfulness trainer (Kabat-Zinn, 2011).

There are at least three reasons why moving beyond a meditation focus might extend the transformative potential of mindfulness interventions for workplaces, as outlined below.

First, in the present study, the second-person perspective provided by the mindfulness trainers in the TMT program included context-sensitive learning facilitation in mindfulness that went beyond teaching meditation. In addition, the training included peer-to-peer learning. The qualitative evidence reported herein for TMT generating mindfulness-based collective stress management skills is in line with recent evidence from similar high-stakes contexts in which mindfulness training was successfully provided by trainers who were domain experts yet had no significant meditation teaching expertise (Jha et al., 2020). This means context awareness and domain expertise may be more important than previously assumed, to render workplace mindfulness training fit for purpose.

Second, the present exploration prompts a re-examination of the axiomatic assumption that mindfulness should be cultivated predominately *via* meditation, and that meditation necessarily produces motivational states that stretch beyond an interest in personal stress reduction, for example relating to collective mindfulness (c.f. Choi et al., 2021). For example, recent research reports indicate counterintuitive effects of mindfulness meditation interventions on work-related outcomes: for example, lower work motivation after 15 min of mindfulness meditation (Hafenbrack and Vohs, 2018); no increase in critical thinking performance after 6 weeks use of the Headspace™ App (Noone and Hogan, 2018); and conflicting evidence on the effect of mindfulness meditation on prosocial motivation (Hafenbrack et al., 2020, 2021).

A close examination of the link between mindfulness meditation and prosociality may shed light on this phenomenon. While most of today's evidence-based mindfulness interventions are self-focused, intent on calming one's mind and taking on the stance of a nonjudgmental observer of one's thoughts and feelings, mindfulness scholars share a widespread assumption that mindfulness training cultivates beneficial outcomes not only for the self but also for others (see Schindler and Friese, 2021 for a review of this evidence). Indeed, recent meta-analyses report significant links between mindfulness and prosocial outcomes (Donald et al., 2019; Berry et al., 2020). However, the same research reviews also report publication bias and low probability of replicability. More pertinently, the meta-analysis of Berry et al. (2020) distinguishes between attitudes of compassionate, empathic concern, and actual prosocial behavior when such behavior would entail costs to the person providing prosocial support (knowledge sharing with a fellow worker, sharing one's home with a refugee, and so on), and found no reliable effect of mindfulness meditation for the latter.

This makes sense when considering that the target state of mindfulness training as self-regulation of attention (the aforementioned operational definition of meditation; Goleman and Schwartz, 1976) is being open and receptive, not motivated to engage in action (Ryan et al., 2021). In fact, the effect of mindfulness meditation on prosociality is moderated by how *independent* or *interdependent* individuals see themselves: for those with independent self-construals, its effect is to decrease prosocial behavior (Poulin et al., in press). This may help explain other recent research reports of mindfulness meditation dampening prosociality (Schindler et al., 2019; Hafenbrack et al., 2021).

Finally, scholars call attention to the adverse effects of mindfulness meditation especially in contexts of latent trauma, urging for a deeper understanding of potential harmful effects of meditation (Van Dam et al., 2017; Baer et al., 2019). Polyvagal theory (Porges, 2011) may help explain why someone who has (consciously or unconsciously) been exposed to traumatic stress in the past may not benefit from prolonged silent meditation practice: it can be experienced as immobilization, the body's

automatic response to overwhelming trauma, prompting a "freeze" response. As a result, the experience may be unpleasant or even cause harm. By the same token, Porges' (2011) theory also explains why a stronger focus on social engagement in mindfulness training for high-stress work populations (for example individuals serving in the military or working in other contexts where they may experience extreme stress or sustained work pressure) is an alternative antidote to stress at work—and potentially more effective: social engagement between humans who trust each other automatically calms people down.

Clearly, mindfulness-based intervention science needs to balance the need to maintain fidelity to the overall intent of mindfulness to transform suffering in the world on one hand with creating innovative approaches to advancing its scope in society on the other (Kabat-Zinn, 2011). However, a re-examination of the *de-facto* standard in mindfulness training may be timely. In this context, a re-assessment of the 8-week training duration may also be warranted, an arbitrary training timeframe for work populations, and perhaps too short for significant collective-level benefits to develop, as the study's empirical data suggest.

Specific follow-up research opportunities include:

- To what extent is mindfulness meditation practice an essential ingredient of a workplace mindfulness-based program? How does meditation compare in effectiveness to other, more prosocially oriented mindfulness practices?
- What is the potential and what are potential pitfalls of alternatives to the traditional student-teacher relationship in mindfulness training? What is the role of peer learning and of communities of practice in this?
- What training timeframes are appropriate for workplace mindfulness training? What different timeframe "anchors" beyond the 8-week format have utility? What (blend of) delivery formats is most beneficial for whom?
- When is which type of mindfulness training harmful, for whom, and under what circumstances?

Limitations

Several limitations pose threats to the validity of the empirical results presented in this study. First, combining individual mindfulness training, traditionally operationalized as an 8-week training program, with the concept of collective mindfulness and its five hallmark processes in equal proportion was a pragmatic choice, rather than a reflection that these two constructs are theoretically equivalent. While this is arguably an important first step in extending the scope and potential of mindfulness training, more careful follow-up examinations are needed to determine which construct or process relates to which other (sub-)mindfulness process and in what way. Second, quantitative assessments lacked a comprehensive measure of individual mindfulness. Third, an uneven number of individuals participated in Study 2's two-group qualitative assessment. Fourth, an uneven number of females and males participated in the quantitative evaluation and both genders were analyzed together. Fifth, the same author who developed and delivered the training also evaluated the data collected about its impact. Finally, only one specific combination of individual and collective mindfulness was examined in this pilot; this provides an incomplete theoretical picture of the potential that "next-generation" mindfulness training might (or might not) represent for individuals at work, especially those under intense constant pressure and scrutiny, as in the military. This is certainly but the first step towards a more comprehensive understanding of the transformative potential of mindfulness training in organizations.

CONCLUSION

For several years, mindfulness scholars have argued that workplace mindfulness research should embrace a multi-level approach, investigating cross-level relationships between individual and collective mindfulness literatures (Sutcliffe et al., 2016; Reb et al., 2020). The present study heeds this call by creating a cross-level pilot mindfulness intervention entitled TMT. This innovative mindfulness training program combines essential ingredients of a "traditional" individually focused MBI with the hallmarks of collective mindfulness. TMT was trialed with two high-stress military populations operating in a context in which dedication and self-sacrifice are prized values, and a public perception of meditation-oriented "mindfulness as stress relief" (Choi et al., 2020) may be counter-cultural, while the idea of *mindfulness as team sport* may be more fit for purpose. Hence, this was deemed a suitable setting to explore new and yet untapped ways in which mindfulness training may help cultivate "next-generation" transformative inner qualities, for the benefit of the individual as well as for all.

The study's empirical investigations indicate that TMT appears no less effective in generating individual stress management capacity than a "traditional" MBI, and it seems to show more potential for cultivating collective stress management skills. In addition, individuals' ability to apply their newly learned mindfulness meditation skills to stressful work situations may depend on the development of a collectively mindful team culture—in other words, individual and collective mindfulness development may be interdependent.

Drawing on interdependence theory to discuss these findings, the paper proposes that mindfulness intervention science and practice should apply a process-based approach (Hofmann and Hayes, 2019) to help extend the transformative potential of mindfulness training for workplaces, and ultimately in society. In particular, "next-generation" workplace mindfulness research should apply a multi-level approach to reflect the multi-level nature of mindfulness in organizations, enacted in non-meditative processes and social engagement as much as through meditative practice (Sutcliffe et al., 2016).

Concretely, this means combining and comparing meditative with non-meditative mindfulness practices and including relevant elements from individual and collective mindfulness in training design and delivery, to examine their respective impact for individuals and teams at work. The present study especially recommends that scholars should move on from an exclusive focus on meditation as primary tool of mindfulness training and explore potentially untapped benefits of "eyes-open"

mindfulness practices in workplaces. This may be particularly relevant in high-stress populations for whom meditation-focused mindfulness training may not always be most fit for purpose.

The ultimate aim of this work is to respectfully prompt a shift in focus for workplace mindfulness intervention science, away from defaulting to 8-week mindfulness meditation training to help participants manage stress by themselves, and towards a sense that people at work are interdependent, that they have each other's' back, and that stress management may be more of a collective responsibility rather than something that needs to be shouldered by individuals in isolation of others. Such a focal shift loops back to the altruistic aspiration of mindfulness in Eastern contemplative traditions.

In the words of the Dalai Lama; "(y)ou should not be content with working for your own personal benefit alone" (2005, 94). Cultivating capability to understand and overcome suffering and conflict, for one and all, is what the transformative potential of mindfulness is about.

DATA AVAILABILITY STATEMENT

Descriptive statistics for the study are included in the article/**Supplementary Material**, further inquiries can be directed to the corresponding author.

ETHICS STATEMENT

The studies involving human participants were reviewed by the United Kingdom Ministry of Defence Research Ethics Committee (MODREC) who gave a favorable opinion, and ethical approval to conduct this research was also obtained from the university ethics committee of the Cranfield University. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

JTM led the design, delivery, analysis, interpretation, and writeup of the study. AC served as Principal Investigator and contributed to the design of the study and ethical approval process, led the data collection of Study 2, and provided overall research guidance. DQ conducted the quantitative data analysis, co-created the qualitative data analysis for Study 2, and provided guidance on data interpretation. All authors contributed to manuscript revisions, read and approved the final submitted version.

FUNDING

The empirical field research for this study was funded by the United Kingdom Ministry of Defence, under the Strategic Edge Through People (SETP)2040 programme, reference number TIN 2.068 Task 7 Leveraging Workplace Mindfulness for Transformative Change, contract number DSTLX-1000069524.

ACKNOWLEDGMENTS

The authors sincerely thank U.K. Defence military and civilians who contributed time and encouragement to the study. We also acknowledge: Carol Cooper Chapman for technical advice; Dr. Dina Gray and Mark Davies who contributed to the study's training design and delivery; Dr Kate Spiegelhalter, Amanda Callen, Megan Edwards and Elaine Tyler for data collection, analysis and reporting support; Chris Tamdjidi for generous knowledge-sharing; Dr. Frederick D. Gregory for international linkages; and Cdre Andy Cree CBE for ongoing strategic vision. We thank Professors Tim Vogus, Kathleen Sutcliffe, Jochen Reb, Michelle A. Barton, Marlys Christianson, and Floor Rink for constructive feedback on earlier manuscripts, and the reviewers for their helpful comments.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.867110/full#supplementary-material

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers | Frontiers in Psychology

TYPE Conceptual Analysis
PUBLISHED 08 September 2022
DOI 10.3389/fpsyg.2022.884512

OPEN ACCESS

EDITED BY
Douglas A. MacDonald,
University of Detroit Mercy,
United States

REVIEWED BY
J. Shashi Kiran Reddy,
ThoughtSeed Labs, India
Urban Kordes,
University of Ljubljana, Slovenia

*CORRESPONDENCE
Sucharit Katyal
sucharit.katyal@gmail.com

SPECIALTY SECTION
This article was submitted to Theoretical and Philosophical Psychology, a section of the journal Frontiers in Psychology

RECEIVED 26 February 2022
ACCEPTED 12 August 2022
PUBLISHED 08 September 2022

CITATION
Katyal S (2022) Reducing and deducing the structures of consciousness through meditation. *Front. Psychol.* 13:884512. doi: 10.3389/fpsyg.2022.884512

Reducing and deducing the structures of consciousness through meditation

Sucharit Katyal*

Max Planck UCL Centre for Computational Psychiatry and Ageing Research, University College London, London, United Kingdom

According to many first-person accounts, consciousness comprises a subject-object structure involving a mental action or attitude starting from the "subjective pole" upon an object of experience. In recent years, many paradigms have been developed to manipulate and empirically investigate the object of consciousness. However, well-controlled investigation of subjective aspects of consciousness has been more challenging. One way, subjective aspects of consciousness are proposed to be studied is using meditation states that alter its subject-object structure. Most work to study consciousness in this way has been done using Buddhist meditation traditions and techniques. There is another meditation tradition that has been around for at least as long as early Buddhist traditions (if not longer) with the central goal of developing a fine-grained first-person understanding of consciousness and its constituents by its manipulation through meditation, namely the Tantric tradition of Yoga. However, due to the heavy reliance of Yogic traditions on the ancient Indian Samkhya philosophical system, their insights about consciousness have been more challenging to translate into contemporary research. Where such translation has been attempted, they have lacked accompanying phenomenological description of the procedures undertaken for making the precise subject-object manipulations as postulated. In this paper, I address these issues by first detailing how Tantric Yoga philosophy can be effectively translated as a systematic phenomenological account of consciousness spanning the entirety of the subject-object space divided into four "structures of consciousness" from subject to object. This follows from the work of the 20th century polymath and founder of the Tantric Yoga school of Ananda Marga, Prabhat Ranjan Sarkar, who expounded on the "cognitivization" of Samkhya philosophy. I then detail stepwise meditation procedures that make theoretical knowledge of these structures of consciousness a practical reality to a Tantric Yoga meditator in the first-person. This is achieved by entering meditative states through stepwise experiential reduction of the structures of

consciousness from object to subject, as part of their meditative goal of "self-realization." I end by briefly discussing the overlap of these putative meditation states with proposed states from other meditation traditions, and how these states could help advance an empirical study of consciousness.

KEYWORDS

meditation, consciousness, phenomenology, Tantra Yoga, Ananda Marga, states of consciousness, transcendent, non-dual

Introduction

While the scientific investigation of consciousness is a nascent field, a few decades old (Crick and Koch, 1992), the investigation of consciousness from a philosophical and experiential standpoint has been carried on for many millennia. Notably, many schools of Eastern philosophical and contemplative traditions like Yoga and Buddhism have not only engaged in rigorous experiential inquiry of consciousness spanning at least a few thousand years, but also embedded elements of such inquiry into their soteriological goals. Recent work has elaborated how certain Buddhist meditation traditions may inform a study of consciousness (Lutz et al., 2007, 2008; Grabovac et al., 2011; Josipovic, 2014). However, there is currently little understanding of consciousness from the standpoint of a tradition whose initial development likely predates and influenced the historical Buddha, whose subsequent development interacted heavily with development of Buddhist contemplative practices (Bronkhorst, 1993; Kalupahana, 1994; Sarbacker, 2006; Wynne, 2007; Gray, 2016), and which continues to be alive in the present day. I refer to the Tantric tradition of Yoga[1], which involves manipulating consciousness through meditation practice with the soteriological goal of experientially "realizing" consciousness in its "purest" or primordial essence (Gray, 2016). Here, I attempt to outline the psycho-philosophy of Tantric Yoga, and some of its associated practices used in attaining such "realization." I use for specificity, praxis from a living Tantric Yoga tradition, namely *Ananda Marga*, whose literature also offers philosophical advances to the age-old *Samkhya* philosophy (Anandamurti, 1998) that historically formed the bases of Yoga (Bharati, 2001; Burley, 2006). Situating Tantric Yoga practices and their outcomes within both traditional philosophy and a phenomenological model of cognition, I discuss how they could inform contemporary inquiry into consciousness.

Investigating consciousness through meditation

By most accounts, consciousness comprises the object present in consciousness (i.e., *what* one is conscious of) and the subjective aspects (the *who* that is conscious of that object) (Bliss, 1917; Bakan, 1958). As tasks for manipulating the former are relatively more straightforward, most theories of consciousness are developed to account for the object of consciousness (e.g., (Graziano and Webb, 2015; Dehaene et al., 2017; Brown et al., 2019). Recently, several authors have proposed that altered meditative states could be used to manipulate and study the subjective or subject-object interaction aspects of consciousness (Berkovich-Ohana and Glicksohn, 2014; Metzinger, 2020; Josipovic, 2021), though more clarity is needed in terms of the specific phenomenology of such states and the practices used to arrive at them.

There have been a few previous attempts at elaborating specific meditative traditions/practices with regards to how they can contribute to an empirical study of consciousness. For example, Wallace (Wallace, 1999) described the phenomenology of the Buddhist tradition of *shamatha*, or concentrated meditation practices where gradually deeper concentration is described as allowing meditators to examine consciousness—particularly, its subjective and pre-reflective attributes—in a more refined manner. Subsequently, Lutz et al. (2007) detailed Buddhist meditation practices and described three broad categories of practices: (1) those that involve developing single pointed concentration on a meditated object (or, focused attention), (2) those that involve cultivating a faculty of meta-awareness not directed toward any specific object to gain insight into a background awareness upon which mental activity transpires (open presence), and (3) those involving feeling loving-kindness toward others that is not directed toward a specific individual or a group of people (non-referential compassion). Of these, they propose the second one

1 Sometimes referred to as the "Tantric tradition of Hinduism" (Gray, 2016). I refrain from using the term "Hinduism" because of its colonial nature (Pennington, 2005; Korom, 2014). Also, widely different practices come under Hindu tantra, including ones with the objective of gaining "occult powers" that I exclude from my analysis.

as particularly relevant to the study of consciousness because it involves de-emphasizing to varying degrees, first, the object of consciousness, and subsequently, a subjective feeling of possessing a sense of self (Josipovic, 2014; Dor-Ziderman et al., 2016). This kind of experiential reduction is proposed to result in advanced cases in 'non-dual' states, where the subject-object structure of consciousness itself be eliminated. While Wallace (1999) and Lutz et al. (2007) were influenced primarily by Tibetan Buddhism, similar descriptions of the three categories of practices have also been presented from the perspective of a contemporary Theravada Buddhist tradition (Grabovac et al., 2011). These descriptions have been accompanied by studies investigating neural correlates of self-reduced or non-dual states in long-term meditators (e.g., Josipovic, 2014; Dor-Ziderman et al., 2016) and have been followed by recent theoretical work on the possibilities and implications of the idea of a non-dual or minimal consciousness on consciousness research (Metzinger, 2020; Josipovic, 2021).

So far, the use of meditation as an empirical method to study consciousness has mainly focused on Buddhist contemplative traditions (except, see Shear and Jevning, 1999). Despite the importance of manipulating and deducing aspects of consciousness in Yogic meditation traditions, little work has been done toward understanding how these schools may contribute toward an understanding of consciousness. One reason for the lack of understanding Yogic descriptions of consciousness is their heavy reliance on epistemologies that have not been efficiently translated into contemporary frameworks of cognition.

Recently, researchers have attempted to develop an understanding of how the Yogic system of philosophy (which also forms the basis for Tantric Yoga epistemology), namely *Samkhya* philosophy, could inform contemporary research on cognition and consciousness (Sedlmeier and Srinivas, 2016; Tripathi and Bharadwaj, 2021). *Samkhya* is considered to be one of the oldest philosophical systems in the world (Raju, 1985). According to *Samkhya*, mind and matter are a composite of two primordial essences. One, a "ground" consciousness, known as *Purusha*, which is the witnessing counterpart of mind and matter, but is in itself devoid of any mental or physical activity. And second, an operative or energetic principle (*Prakriti*) that "activates" *Purusha* to transpire physical and mental activity[2].

From the perspective of conscious experience, the intuition behind the two essences, *Purusha* and *Prakriti*, is that the former accounts for the fact that there *is* consciousness at all, while the latter accounts for the contents of experience. A metaphor sometimes used to illustrate the two *Samkhya* components is that *Purusha* is the light illuminating the room while *Prakriti* accounts for the contents of the room. *Prakriti* is proposed to further comprise three qualifying principles or *gunas*, namely, *sattva*, *rajas* and *tamas* that activate *Purusha*. *Sattva* is said to engender "desirable" mental qualities like equanimity, compassion, benevolent intellect, and spiritual curiosity. *Tamas*, at the opposite end, is said to make the mind dull, inactive, or lazy. *Rajas* is said to make the mind active, both in a positive (i.e., *sattvic*) sense of a drive to pursue one's life purpose and a negative (*tamasic*) sense of anxious or uncontrollable mental activity. *Rajas* is thus considered as positioned between *Sattva* and *Tamas*. Each individual's mind is theorized as a collection of the three *gunas* in varying degrees. In the historical *Samkhya* model of the mind elaborated by Sedlmeier and Srinivas (2016), the mind is functionally composed of three elements; a 'sense mind' that perceives sensory information, the 'ego mind' that attaches the perception to the individual's sense of self, and the 'intellectual mind' that reacts to the information. They also mention that the purpose of a *yogi* is to make the mind gradually more *sattvic* through meditation, though it is not clear how this process may be achieved. More broadly, it is also not currently clear if and how Yogic meditation states inform the *Samkhya* framework and whether such a framework in turn informs consciousness studies? In other words, is the use of the *Samkhya* framework for Yogic meditation simply historical baggage from a time when philosophical understanding lacked present-day sophistication, or is there something about specific meditation states that phenomenologically conforms to the *Samkhya* model in a way that would make it relevant for contemporary theories of consciousness? In the following sections, I address these points in light of a living Tantric Yoga tradition, namely *Ananda Marga*. I choose this specific tradition because *Ananda Marga*'s preceptor, Shrii Prabhat Ranjan Sarkar (also known as Shrii Shrii Anandamurti)[3], offers theoretical developments to the Yogic *Samkhya* model that map it to specific structures of consciousness, along with laying down precise meditation practices to induce states that purportedly make these structures of consciousness amenable to experiential

2 In the sense that *Prakriti* initiates both physical and mental activity upon *Purusha*, *Samkhya* is a phenomenologically derived theory of both mind/consciousness, and cosmology. One can envision that the development of such a philosophy may have had parallels to contemporary debates in consciousness studies around the "hard problem of consciousness" (Chalmers, 1995), i.e, how does the qualitative or experiential aspect of consciousness relate to something material like the brain. Indeed, one of solutions offered for resolving the hard problem is through panpsychic or cosmopsychic theories of consciousness (Brüntrup and Jaskolla, 2017; Goff et al., 2021), paralleling Yogic and Vedantic notions of consciousness (Vaidya and Bilimoria, 2015).

3 P. R. Sarkar was a prominent Indian philosopher and socio-political reformer of the 20th century (Acosta, 2010; Inayatullah, 2019). His 250 + published works (written down by his disciples based on his narrations) are divided into books on (1) philosophy and spiritual practices, and (2) topics including linguistics, socioeconomics, poetry and literature, history, agricultural practices, etc. Of these the former has been penned under the name Shrii Shrii Anandamurti while the latter under the name P. R. Sarkar.

reduction[4] and thereby analytical deduction (Anandamurti, 1970, 1998).

Defining Tantra and Yoga

I first clarify the terms Tantra and Yoga in the context of this paper as they are often used in a variety of different ways (Gray, 2016; Mallinson and Singleton, 2017), most of which are not relevant to this paper. The terms *Tantra* and *Yoga* can be traced back to written texts from at least fifth century CE (Gray, 2016) and fifth to third century BCE (Flood, 1996), respectively; though oral traditions refer back to much further back in time (Mallinson and Singleton, 2017; Bjonnes, 2018).

Vastly different traditions and systems of practice come under the broad category of Tantra (White, 2000; Gray, 2016). However, from the perspective of meditation practices (especially in relation to the exploration of consciousness), the common feature of these practices is contemplating something subtle (like the idea of a transcendental or a non-local consciousness) through a relatively gross or embodied form (e.g., a deity/Guru, a geometric pattern or *yantra*, a sound or *mantra*). In expounding *Ananda Marga* tantric practices, Sarkar offers a definition of Tantra based on its Sanskrit etymology (Anandamurti, 1994b). Sanskrit is an ancient language whose word constructions are an amalgamation of root sounds or words. Thus, by deriving the definition of *Tantra* from its linguistic roots, Sarkar intends to imbue *Tantra* with a primordial semantic essence that may have been lost in its transformation through the ages. The word *Tantra* is etymologically derived in two ways. One, where the word root *ta*(*m*) means mental staticity (much like its use in the word *tamas*, above), and second from the word root *tan*, which means expansion. In both cases, the word root *tra* means emancipation, or release from. According to Sarkar, *Tantra* is thus a system of practices that liberate the mind from mental staticity or that help expand the mind to the point that it is liberated from "mundane bondages" (Anandamurti, 1994b).

The word Yoga also appears in traditional texts with multiple definitions (Mallinson and Singleton, 2017; Bjonnes, 2018). Probably the most popular definition is the one appearing in the classical Yoga Sutras of Patanjali, dated between 400 BCE and 300 CE. This definition states, '*Yogas chitta vrtti nirodhah*' (Bharati, 2001; Desmarais, 2008; Bærentsen, 2015), roughly translating to, Yoga is the ability to control mental fluctuations. Another definition that appears in a later text called the *Jnana Samkalini Tantra*, states '*Sarvachintaparityago nishchinto yoga uchyate*' (Prajnanananda, 2010), or Yoga is a state where the mind is free from all thoughts. A third definition of Yoga is '*Samyoga yoga ityukto jiivatmaa Paramatmanah*' or Yoga is the unification of individual consciousness with Cosmic Consciousness (i.e., individual Purusa or *jiiva* with the Cosmic Purusa or *Parama Purusha*)[5]. This definition is thought to have first appeared in the text *Yoga Yajnavalkya*, estimated between 2nd century BCE and 4th century CE (Divanji, 1953; Mohan, 2000), though Sarkar attributes its existence to oral traditions much longer (Anandamurti, 1994a).

In his exposition of Yoga praxis, Sarkar, utilizes this third definition of Yoga, which he suggests is the one that most conforms with the etymological essence of the word Yoga (Anandamurti, 1994b). According to him, the word Yoga is derived from the Sanskrit root *yunj*, literally meaning union or unification (which are also derived from a similar Indo-Latin root). Moreover, this third definition corresponds to a non-dualistic interpretation of *Samkhya* in contrast from Patanjali's dualistic view (Schweizer, 1993; Tripathi and Bharadwaj, 2021), which conforms with Tantric styles of Yoga (Anandamurti, 1970, 1998)[6].

An updated *Samkhya* model of cognition

As mentioned above, in traditional *Samkhya* philosophy, the action of *Prakriti* on *Purusha* leads to the intellectual, ego, and sense mind (Sedlmeier and Srinivas, 2016; Tripathi and Bharadwaj, 2021). Here, *Purusha* is the underlying "ground" consciousness upon which all mental activity transpires. In this sense within conscious experience, the mind is defined as any

4 Note that the way I use the word experiential reduction in this paper is different from Husserl's phenomenological reduction. I use experiential reduction as eliminating a certain phenomenal quality from consciousness, which according to some (Bitbol, 2019) is more akin to the idea of Husserl's epoché, or suspension of the "natural attitude." Husserlian phenomenological reduction is then said to be the process of learning something about consciousness from the epoché, for which I use the word "deduction" here.

5 There are two key differences between the praxis-based *Tantric* adaptation of *Samkhya* philosophy and the original analytically derived *Samkhya* system. First, in the original *samkhya*, *Prakriti* is the dominant force (*pradhana*) over *Purusha*, while *Purusha* is a passive witness to *Prakriti*'s activity. Tantric adaptations, as well as Advaita Vedanta adaptations (Sharma, 2000), on the other hand assume the predominance of *Purusha* over *Prakriti*, i.e., it is the primordial "will" of *Purusha* over *Prakriti* that allows the activation of *Purusha* by *Prakriti*. A second and related difference is that while the original *Samkhya* philosophy is dualistic with *Purusha* and *Prakriti* being separate entities, Tantric and Vedantic *Samkhya* adaptations are non-dualistic. There are slight differences in Tantric and Vedantic interpretations of non-dualism, in that the former assumes a non-dual Cosmic entity *Brahma* that is a composite of *Purusha* and *Prakriti* (*Brahma* being likened to a page with its two sides being *Purusha* and *Prakriti*), whereas the later proposes a non-dual entity *Brahma* that is more equivalent to *Purusha* with *Prakriti* being casted as an "illusion." Moreover, the idea of primordial will makes the non-dual adaptations theistic in nature.

6 This third definition also differs from Patanjali's definition in that it has a sense of permanent cessation of mental activity akin to the Indian soteriological concept of *moksha* or *nirvana*, unlike control of mental fluctuations, which may be temporary.

kind of expression, movement or activity upon *Purusha* (this is a critical point of difference between the *Samkhya* model of cognition and contemporary cognitive psychology, where in the latter everything within conscious experience would be considered mind).

In his philosophical works, Sarkar further builds upon the *Samkhya* model by proposing that the three *gunas* influence *Purusha* to engender a hierarchy of structures of consciousness from subjectivity to objectivity. To illustrate this, he considers how an awake conscious experience presents itself to the first-person as expressed in their verbal description of it, and divides it into different experiential subcomponents (Anandamurti, 1998). He considers as an example, the statement "I am reading a book" (**Figure 1A**). Here, "book" is the object of consciousness. Sarkar describes the mental object as the "shape" taken by the "object portion" of the mind, which he labels *citta*[7]. The mental act of "I am reading," and in general any mental action, he attributes to *ahamtattva* or ego portion of the mind, what he sometimes calls the "doer I" (*aham* literally means ego, and *tattva* means essence). Next, he proposes that implicit within the mental action is the subjective quality of being someone who in turn performs the action. This existential feeling is immanent in the phrase "I am," where the subject of experience possesses a feeling that "I exist irrespective of what I do" (i.e., irrespective of the action performed by *ahamtattva*). Sarkar calls this aspect of the subject, *mahattattva* or the portion of the mind that gives an individual an "I" feeling or a feeling that "I exist" (*mahat* means great). Finally, he proposes that there is a further sense of phenomenological duality inherent in the conscious feeling of "I exist," where "I exist" or "I am" comprise two separate structures of consciousness; one an unqualified "I" and second the property that qualifies the "I" into experiencing itself. In other words, implicit within *mahattattva* (or "I am") is a pure essence of "I," which he also calls the witnessing consciousness or the "knower I" (i.e., the "I" that knows that "I exist") that is transcendental to mental activity. The reason he considers this "I" as transcendental is that it is devoid of even basic self-reflectivity and is thus not accessible as a conscious experience (and in that sense could be considered metaphysical or metempirical). It is upon this non-reflectable "I" that all mental experience (including the reflected sense of "I am") is said to transpire. To summarize, according to this framework, a conscious experience comprises three potentially dissociable aspects of the subjectivity – a pure witnessing consciousness, a sense of existential feeling to the individual, the doing portion of the mind – in addition to the mental object[8].

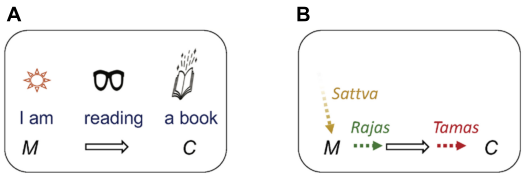

FIGURE 1
(A) The experience of "I am reading a book" is subdivided into the mental object ("book") or *citta* (depicted by C), the mental action performed on that object ("reading") or *ahamtattva* (depicted by the black arrow), an existential component of consciousness ("I am") or *mahattattva* (depicted by by M). Finally, the component "I am" is proposed to further comprise an experiencer ("I") and a bare experience ("am") devoid of the mental act and mental object. "I" is proposed as the unqualified background field or essence consciousness upon which all experience takes place depicted by the background encompassed by the rounded rectangle. **(B)** The three *gunas, prakriti, purusha, samkhya* gunas of Prakriti according to Samkhya philosophy qualify the background essence consciousness (equated to Purusha or witnessing consciousness in Samkhya). *Purusha* (background) qualified by *sattva*(*guna*) begets *mahattattva* (M). *Mahattattva* qualified by *rajas* begets *ahamtattva* (black arrow). *Ahamtattva* qualified by *tamas* begets *citta* (C).

Sarkar then connects the above dissociated structures of consciousness to the *Samkhya* framework (**Figure 1B**). He equates the witnessing "I" to *purusha* (also commonly known as *atman*). He proposes that *mahattattva* or the "I exist" aspect of the mind emerges by the activity of *sattvaguna* upon *Purusha* (specifically, by the metamorphosis of *purusha* by *sattvaguna* into *mahattattva*). Next, the activity of action-oriented *rajoguna* (the conjuncted word for *rajas* + *guna*) upon *mahattattva* results in the *ahamtattva*, the doing aspect of the mind. Finally, the activity of the static *tamoguna* (*tamas* + *guna*) upon *ahamtattva* results in *citta* or the mental object, which by nature is static. Through this formulation, he provides a systematic cognitive extension to the *Samkhya* framework.

Meditation as means to eliminate different levels of experiential dualities

Sarkar's philosophy outlined above implies a systematic dissociation of the components of consciousness culminating in what is considered the transcendent. The first-person experience of dissociating these components in consciousness is said to have transformative existential implications to the

7 Sarkar's concept of *citta* can exist in various levels of "subtlety" from crude (a physical sensations) to subtle (a thought or memory) to even subtler (e.g., an intuition before it becomes a concrete thought) (Sarkar, 1993). In other words, *citta* is the phenomenological form taken by mind irrespective of whether that form is concrete or abstract.

8 Note that Sarkar appropriates terms like *citta*, *aham*, and *buddhi* (he uses *buddhi* and *mahat* as synonyms) from the classical *Samkhya* literature but assigns slightly different meanings to them.

experiencer and in their relationship to others, central to the Tantric Yoga goal of self-realization[9]. Specifically, the three mental cognitive structures—namely the mental object (*citta*), mental doership (*ahamtattva*), and the existential aspect of mind (*mahattattva*)—induce different types of differentiations and dualities in consciousness. These differentiations within consciousness prevent the realization of the "true essence" of consciousness, which is free from all "bondages" and suffering, and is by nature transcendental and "infinitely blissful" (*ananda*)[10]. The differentiations and dualities are said to be reduced and gradually eliminated through a systematized set of meditation practices (known as *sadhana*) leading the practitioner to the undifferentiated or non-dual stance of consciousness (*purusha*). In his seminal 1955 work, Ananda Marga: Elementary Philosophy, Sarkar describes how the three stages of differentiation are eliminated stepwise (Anandamurti, 1998):

> "*... the preliminary saìdhanaì (intuitional practice) has to be carried out by the consciousness metamorphosed as citta, by which this projection of consciousness retracts into ahamìtattva. This leaves only ahamìtattva and mahattattva. So, the next entity to carry out saìdhanaì is the consciousness metamorphosed as ahamìtattva. It is to free itself from the qualifying influence of the principle of Prakrti creating it, by its dissolution into mahattattva. Thus, only mahattattva or pure feeling of "I" remains. This is the stage of savikalpa samaìdhi where only mahattattva or pure "I" feeling indistinguishable from the Cosmic "I" remains. After this, mahattattva carries out saìdhanaì and dissolves itself in the unit consciousness completely, freeing consciousness of the qualities imposed by the influence of Prakrti. It achieves emancipation from the bondage of Prakrti, and that is called nirvikalpa samaìdhi. Thus, the saìdhanaì or intuitional practice that human beings have to carry out begins with citta, to be followed by ahamìtattva and finally by mahattattva, which emancipates consciousness completely from the qualifying influence of Prakrti.*"

In other words, according to Sarkar, the first stage of *sadhana* involves suspending or "converting" the *citta* into *ahamtattva*. The second stage involves converting the *ahamtattva* into *mahattattva*. And finally, *mahattattva* into *purusha*. Additionally, in this passage, he also offers a cognitive definition for what are historically considered the two most advanced states of absorption in Yoga, namely *savikalpa* and *nirvikalpa samadhi* (Bharati, 2001). I elaborate on this in the next section about praxis.

The praxis of Tantric Yoga

The eight "limbs" of Yoga

Despite the large number of historical and extant schools of traditional Yogic practice, most (including Tantric Yoga) share a common underlying framework of practice known as *Ashtanga Yoga* (or the eight limbs/organs of Yoga), first believed to have appeared in the Yoga Sutras of Patanjali (Bharati, 2001).

The eight limbs of Yoga in order are, *yama*, *niyama*, *asana*, *pranayama*, *pratyahara*, *dharana*, *dhyana*, and *samadhi*. *Yama* and *niyama* consist of five ethical principles each to guide a yoga practitioner's conduct in relation to others and themselves, respectively. In most traditions of Yoga, the teacher (or *guru*) maintained a close watch on the conduct of the disciple before initiating them into the subsequent limbs. In the *Ananda Marga* practices as well, progress in meditation is considered inextricably linked to the extent one is able to follow *yama* and *niyama*.

Asana refers to the practice of yogic postures. This is arguably the most well-known practice in Western adaptation of Yoga (specifically Hatha Yoga) to improve physical health. However, in traditional accounts, *asanas* have two purposes: (1) preparing the body for meditation (*dhyanasana*), and (2) improving physical/mental health (*svasthyasana*) (Anandamurti, 1991). *Pranayama* is the practice of controlling respiration. By sufficiently controlling the breathing rate, a meditator is said to be able to concentrate better (Anandamurti, 1991).

The word *ahara* literally means food in Sanskrit but in the practice of Yoga it implies mental fodder or mental content. *Pratyahara* is the practice of withdrawing the mind, as much as possible, from mental content that distracts one's meditative concentration. This involves procedures for gating out both sensory content from the external world as well as distractive thoughts. The mind withdrawn from distractions is then directed to concentrate on the chosen object of meditation (hereon, the meditand). The practice of concentrating on the meditand is known as *dharana*.

While *dharana* is concentration on a mental object, the word that translates to meditation is the next limb, *dhyana*. The difference between *dharana* (concentration) and *dhyana* (meditation) is an important distinction that many Yogic masters have tried to expound upon. The most commonly

9 In the *Ananda Marga*, long-term practice revolves around the motto "Self-realization and service to all" (*Atmamoksartham jagathitaya ca*), a phrase originally attributed to the ancient Indian text, the Rig Veda (Singh, 2005).

10 Similar to the Buddhist view, experiential dualities are considered mental "imperfections" or "bondages." The soteriological goal of a meditator (*sadhaka*) is to be rendered free from these bondages. In Buddhism, the dualities are typically linked to the idea of *dukkha* or suffering that all beings naturally want to eliminate. In Tantra, a similar idea is framed from a positive perspective, in that consciousness in its unbound form (*purusha*) is by nature *ananda*, and the objective of "returning to" *ananda* is an inherent drive in evolution of the body and mind leading up to humans where this drive is expressed through existential curiosity (Anandamurti, 1970; Sarkar, 1993).

described difference is that *dhyana* involves an unbroken flow of consciousness upon the meditand (Vivekananda, 1915; Bharati, 2001; Sarbacker, 2006). On the other hand, *dharana* would be more of a sustained effort to focus on the meditand with occasional distractions breaking concentration. An alternative way to conceive this difference could be an effortful versus effortless state of attention (Bruya, 2010).

Sarkar expounds on the distinction between *dharana* and *dhyana* in two discourses from 1957 (Anandamurti, 1988c) and 1964 (Anandamurti, 1988d), as follows:

> *"the citta takes the forms of the image or sensation which is carried to it with the help of the sensory nerves... There is always a gap between two successive images, but due to the rapid succession of the images, the gap is not perceived... Since, the sensations of the external object are not continuous, the image in the citta is also not continuous. Thus, Dhaìranìa is not dynamic, for individual images which are formed on the citta, are all static and will not remain unless immediately followed by another image...*

> *The object in dhyaìna is always internal and so citta can take its form without the help of any external sensations. When there is no necessity of external sensations, there is also no gap between one sensation and another; and the form which the citta adopts in dhyaìna is continuous..."*

> *"... when you try to hold something external within your mental world it is called Dhaìranìaì. So in Dhaìranìaì, there is a static force. But when something is moving and that movement has been accepted by you as it is, it is called Dhyaìna. So in Dhyaìna there is a dynamic force. Dhyaìnakriyaì is just like a thread of molasses. When poured a thread is created; there is force, there is movement in that thread but it appears to be something static."*

According to the first quote, because *dharana* involves holding an external sensation that is non-continuous—consistent with recent cognitive science literature on discrete perception (VanRullen, 2016)—consciousness during *dharana* consists of discrete "static" mental objects. On the other hand, *dhyana* involves holding an internal object, which when done skillfully allows consciousness to take upon a "dynamic" or unbroken or continuous character. Moreover, the second quote appears to imply that unlike *dharana*, *dhyana* may not just involve stilling the mental object but the very process of meditating on the object (analogous to the apparent staticity of the flow of molasses beyond just the stationary molasses already poured in a container). This may be understood through the phenomenological concept of intentionality, according to which a conscious experience is said to involve a mental act originating from the subjective "pole" of experience and is directed toward the mental object (Husserl, 1998). While *dharana* involves stabilizing the mental object, according to the above description, *dhyana* may additionally involve a sort of "objectification" and stabilizing the mental act.

The word *samadhi* comprises *sama* + *dhi*, where *sama* is etymologically a cognate of the word "same" and *dhi* means flow of mind or flow of consciousness. *Samadhi* can thus be roughly translated as the sameness or unchangingness of experience. *Samadhi* is considered the culmination of Yoga practice and is attained by the "perfection" of *dhyana* (e.g., Sarbacker, 2006). *Samadhi* can be considered as a sort of trance state where meditation is perfected to the degree that it no longer remains a mental activity within consciousness (i.e., in the sense of the verb 'to meditate') but becomes a state where consciousness is said to be fully encompassed by the meditand. In other words, *samadhi* would involve complete suspension of the separation of experience into mental act and its object. One way this suspension could be achieved is by eliminating the mental act, leaving in consciousness only the mental object. However, a distinct feature of Tantric Yoga is that the object of meditation is often not just purely sensory, but one that supplements sensory qualities (such as, internal sound of a silently repeated mantra, an imagined visualization, etc.) with an idea embodied by those qualities. This is in contrast to non-Tantric styles of meditation like TM where the mantra, as the meditand, is taught to lack meaning (Shear and Jevning, 1999). The idea associated with the object is said to determine the mental qualities ultimately engaged and suspended in a particular type of *dhyana* and its ensuing *samadhi*. Accordingly, Yogic (and Buddhist) literature mentions many different types of *samadhis* (Anandamurti, 1988b, 1993; Sarbacker, 2006; Tripathi and Bharadwaj, 2021). I will return to these points on *dhyana* and *samadhi* later.

Stepwise elimination of experiential differentiation

As mentioned earlier, *Ananda Marga* meditation practices are formulated within a framework where consciousness is composed of three reducible components that constitute the mind (*citta*, *ahamkara*, *mahattattva*), which when experientially reduced are believed to lead to the irreducible (and thus transcendental) consciousness (*purusha*). The meditation practices are thus designed to reduce mental constituents of consciousness leading to the irreducible stage.

Each *Ananda Marga* meditator can learn up to six "lessons" of Tantric Yoga meditation (also known as *Sahaja Yoga* or *Rajadhiraja Yoga*) from an ordained instructor, known as an *acharya* (Anandamurti, 1987;

Taraka and Acyutananda Avadhuta, 2014)[11]. The lessons are taught gradually as the instructor ascertains that the meditator has made progress with the previous lessons. In the following section, I describe the phenomenological approach taken within some of these lessons for reducing the different structures of consciousness. My objective here is not to go into the specifics of each lesson[12], but instead illustrate the kind of conscious states the meditation practices purportedly enable. The different states are illustrated in **Figure 2** where *mahattattva* is depicted by the *M*, *citta* by C, and *ahamtattva* by the arrow connecting the two. *Purusha* is not represented by a letter but as the background upon which the three mental structures are expressed. The whitened portion within each panel reflects the component that is most salient in consciousness during a state while the dark portions are pre-reflective. Note that unlike models of cognition where arrows between hierarchies are bidirectional, the arrow here reflects the phenomenological flow of conscious experience like in intentionality (Husserl, 1998).

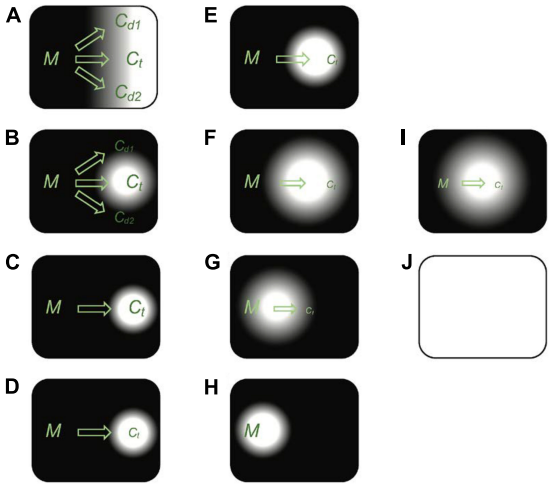

FIGURE 2
A depiction of the variety of Tantric Yoga meditative states of consciousness. The shades of white and black depict the components of consciousness that are salient and pre-reflective, respectively, to the first-person. The different sets of panels in the three columns are meditation states arrived through reduction of *citta*, *ahamtattva*, and *mahattattva*, respectively. **(A)** At the beginning stage the mental object includes several distractions (Cd1, Cd2, . . .) along with the meditative target (Ct). The target along with distractions are thus salient along with a feeling of doership, agency, or ownership of one's mental actions on the mental object. This is depicted by white Cs and partly white arrows. **(B)** Concentrative practices (*dharana*) enable selective enhancement of Ct's saliency. **(C)** Mental withdrawal (*pratyahara*) practices diminish distractions, making Ct even more salient. **(D)** Continuous sustained attention on Ct makes it qualitatively more subtle, almost as if receding into a blank background. **(E)** With citta reduced, the feeling of the act of meditating becomes salient – illustrated by the leftward movement of the white spot encompassing more of the arrow. **(F)** The mental act and object start to diminish within consciousness – illustrated by the smaller size of the arrow and Ct. **(G)** Almost at the same time as **(F)**, there is a conscious experience with a diminished sense of the act of meditation upon the mental object – illustrated by the white spot moving leftwards to cover M. **(H)** Mental act and object are eliminated from consciousness with only a bare existential consciousness remaining – *Savikalpa Samadhi*. **(I)** Phenomenological attempts to suspend all aspects of conscious experience including the mental act, mental object, and a sense of existentiality, into an idea of a witnessing consciousness transcending experience. **(J)** All experience suspended from consciousness – *Nirvikalpa Samadhi*.

Step 1 – Reducing citta

The scope and variety of possible mental objects is vast, including all sensations, perceptions, concepts, and thoughts. This large variety of what an individual experiences in their consciousness is efficiently summarized by enactive (or "4-e") accounts of the mind (Newen et al., 2018). According to enactive accounts, an individual's experience in the world is intrinsically related to their needs and actions in the world, their bodily constitution, and their embeddedness and extension into their social and physical environment (such an account elegantly encompasses both the biological evolution of an organism as well as the developmental trajectory of a specific individual). Due to the ever-changing nature of an individual's actions and needs, the object of consciousness is constantly busy and ever-changing over time. I illustrate this in **Figure 2A** where *C* is divided into C_t—the target object of meditation—and C_{d1}, C_{d2}—for distractions. At the beginning of meditation, the target and distractive components of *citta* have relatively similar saliency within the meditator's consciousness. There may also be a faint awareness of the mental act in the form of a sense of agency or ownership of one's mental actions (Reddy et al., 2019, 2020) (similar to the idea of a "minimal self" in cognitive science, Gallagher, 2000). In **Figure 2A**, this is depicted as a gradient from black to white starting from the arrow (representing agency) to multiple different *C*s (representing the high saliency of distractors).

One set of methods for silencing mental fluctuations in *Ananda Marga* meditation practices involves cultivation of concentration (*dharana*). This includes lessons for practicing breath control (*pranayama*) and training single-pointed concentration. These methods enable better selective application of attention on the target of meditation (**Figure 2B**).

Another set of methods for reducing the *citta* involve practices for eliminating distractions by restricting the enactive

11 There are also more advanced lessons a meditator can learn after several decades of practice called *Vishesha Yoga* but I leave them out for the purpose of this paper.

12 Like many esoteric traditions of spiritual practice, precise *Ananda Marga* practices are imparted to the practitioner secretly. My discussion of these practices is thus based on what Sarkar has revealed publicly through his various published books combined with inputs from senior Ananda Marga practitioners (40+ or 50+ years of meditation experience) and my own 12+ years of experience.

range within which the *citta* can vary. These methods constitute mental withdrawal (*pratyahara*) and are operationalized in two steps (Hewitson, 2014). The first step takes into account that the human mind has evolved and developed on this planet and is embedded in an individual's physical and social environment. It thus involves internal visualization for helping the meditator dissociate themselves for the meditation period from their physical and social environment, allowing them to face their own consciousness in isolation[13]. The second step takes into account that the experience of having a body (1) contributes to distractions from bodily sensations (e.g., aches, itches, etc.), and (2) plays a major role in engendering a sense of self within the bounds of one's body (Seth, 2013; Allen and Friston, 2018). This step involves internal visualizations to help the meditator withdraw their mind from the physical body. For most practitioners, these two practices may take years or decades to perfect. However, the emphasis at this stage is to be able to reduce the influence of embedded and embodied factors rather than eliminate them completely. The ensuing mental experience, less influenced by worldly and bodily factors (**Figure 2C**), is then ready to be focused on a meditand that is neither in the world nor in the body (at least theoretically for a beginner). Here, the object of meditation is typically a *mantra*, an associated visualization, and a meaning that connects the two (I discuss more about the meaning in the next subsection).

The final step in the reduction of *citta* occurs through the maintenance of concentration on the meditated object. As concentration is maintained, there is a sense of "fading away" of the experiential solidity of the sensory components of the meditated object (**Figure 2D**). As a result, the same sensory object appears in a more subtle or refined form with lesser effort. A similar process of "letting the mantra fade away" is also described in other practices (e.g., Shear and Jevning, 1999). Such a process may be analogous to sensory adaptation, which can lead to near elimination of unchanging stimuli from conscious awareness (Martinez-Conde et al., 2004).

Step 2 – Reducing ahamtattva

As the object of consciousness (*citta*) gets somewhat reduced within experience, what tends to become prominent in conscious experience is a feeling of 'being someone' (regardless of the sensory/cognitive content which that 'someone' experiences). This (initial) subjective feeling of 'being someone' typically involves a sense of ego or agency in the sense that "I am meditating (on the meditand)" (**Figure 2E**). This sense of ego is posited to carve an individuality within consciousness that enables one to think that they are separate from others and the world in the sense that the individual is the one performing the actions (and not that the actions are being performed within the context of the existence of the world as a whole). According to Sarkar it is this ego aspect of the mind that is engaged in a process of receiving enjoyment and suffering from the world (Anandamurti, 1998). This "self-other duality"—i.e., separation between one's feeling of an individual selfhood that acts in relation to the outside world—has parallels in contemporary cognitive science where the self in its affective and individual form is posited as a mental construct that is in a closed loop enactive/predictive relationship with the world (Seth et al., 2012; Hohwy, 2015; Allen and Friston, 2018); similar predictive models of action are also used to explain a sense of agency. As in many other meditative traditions, this self-other duality is considered an "imperfect" stance of consciousness within Tantra Yoga. The imperfection is multiple senses: (1) in that the individual does not perform actions isolated from the world but in interaction with it (and by virtue of its very existence), (2) in that the sense of ego entails affective states that are temporary in character and having the potential to lead to suffering, and (3) in that they "hide" a "purer" non-dual/transcendental consciousness beyond such temporary states where the world is not experienced as different from oneself that can serve as a self-actualizing or spiritual ideal.

As self-other duality is linked to performing mental actions upon the world, the objective of meditation at this stage is theoretically framed as suspending or converting *ahamtattva* (doer "I") to *mahattattva* (existential "I"). The same objective is also expressed by the meaning of the *mantra* during meditation[14]. To achieve this objective practically, the meditator is taught to initiate a *dhyana* in the form of a phenomenological shift with regards to the meditand. The shift involves conceiving of the meditand not just as the part of the mind that is the object of meditation (i.e., the *citta*), but *citta* combined with the doership (*ahamtattva*). In other words, the meditator now tries meditating upon a combination of the following as the new meditand, (1) whatever is left of the reduced object of meditation (i.e., *citta*), and (2) oneself as an individual performing meditation (i.e., *ahamtattva*). The objective of the meditation here is to reduce *ahamtattva* to *mahattattva*. Another way this process is instructed to the meditator is that they take the (combined) meditand as an "object" to an existential consciousness *(mahattattva)* as its subject while

13 Extreme dissociation is considered psychopathological. Thus, these practices are taught by ordained teachers who try to first ascertain that they would not have an adverse impact on the mental health of the meditator. Otherwise, a simpler version of the practice is taught not involving steps of *pratyahara*. According to Sarkar, a healthy social environment of meditators (or *satsaunga*) is considered essential to long-term progress in this kind of practice, which includes community support for alleviating adverse consequences of meditation. Supplementary practices that include awareness of one's body (e.g., *asanas*) and with society (e.g., service) are considered to provide a critical balance for the mind during meditation.

14 Though individuals are assigned different *mantras* for meditation, their meaning shares the common idea of, *merging the feeling of "small I" into a "big I"* (i.e., a sense of being an individual consciousness merging into a conscious state where a separate sense of individuality does not exist).

"allowing" such an object to merge into such a subject. Here, existential consciousness is explained phenomenologically as the residual part of their conscious experience from which an individual sense of ego or doership has been fully eliminated. When such a *dhyana* is initiated, it is not expected that the meditator would immediately arrive at a state where the actual sense of ego can be fully objectified or amenable to suspension (unless perhaps in a highly advanced meditator). Rather, at the beginning, the idea that one's *ahamtattva* is the object of *mahattattva* could itself be considered a conceptual form of *citta* (i.e., as a mental object, and not actually *ahamtattva*). In other words, the *dhyana* starts off as a schema or an idea about the state one is expected to attain. As the meditator proceeds through practice, they are supposed to use this schema of merging the individual ego/selfhood to a non-individualized existential aspect of consciousness (*mahattattva*) recursively with the skill of unbroken flow of consciousness (*dhyana*) to enter gradually deeper states where the sense of doership (*ahamtattva*) is diminished thus making meditation gradually more effortless (**Figure 2E**). Recall that according to Sarkar's definition of *dhyana*, a meditator ought to stabilize the mental act of meditation upon the mental object in a way that it appears static or still within consciousness. Such a phenomenological approach might make it amenable to a process similar to sensory adaptation but at a higher level of the cognitive hierarchy (i.e., involving the combined *citta* and *ahamtattva* as meditand). A momentary entry into such an experience of diminished *ahamtattva* may be reflected in reports by meditators of the kind "the meditation was done through me" (i.e., in my *mahattattva*) rather than "I was meditating" (as an agent and owner of the act of meditation). At the same time, a feeling of being conscious devoid of doership/ego (*mahattattva*) appears to become salient in consciousness (**Figure 2H**). During this process, meditators may start reporting experiences like emptiness of (contents of) consciousness, an expanded sense of space and time, limitlessness of consciousness, everything as consciousness, or a feeling blissfulness beyond mundane joys and pleasures (Piron, 2001; Gamma and Metzinger, 2021; Katyal and Goldin, 2021a; Maxwell and Katyal, 2022). With yet more skill, a meditator may also be able to momentarily attain a state of mental stillness where all mental action is entirely suspended (**Figure 2G**). Finally, in rare, advanced cases, a meditator is said to be able to achieve the state where neither *citta* nor *ahamtattva* remain active and all that remains is bare *mahattattva*, a non-reflexive feeling of being conscious, or the experiential state of "pure" consciousness (**Figure 2H**; Anandamurti, 1998). This state is known as *Savikalpa Samadhi* (*Sa* = with, *vikalpa* = concept or thought or feeling) and is anecdotally reported as involving the bare feeling of being a "blissful infinite consciousness" (Yogananda, 2005, Chapter 26; Pranavatmakananda, 2017, Chapter 18).

As *ahamtattva* is framed as an enactive "product," and is inextricably tied to an individual's otherwise strong beliefs about agency and ownership of mental and physical activity, its release of consciousness is not framed as an easy task (unlike self-transcending states from other traditions like TM, Shear and Jevning, 1999). Moreover, stronger or "thicker" such beliefs in an individual (Shoemaker calls properties that make an individual *that particular individual* "thick"; Shoemaker, 2011), the more meditation practice it would take to suspend *ahamtattva*. Thus, the state attained during meditation is also considered closely linked to one's everyday behavior and how "strongly" a sense of agency and individuality is experienced during such behavior[15].

Step 3 – Reducing mahattattva

The above-described meditation practices for reducing *citta* and *ahamtattva* are part of the "first lesson" of *Ananda Marga* Tantra Yoga (also known as *pranidhana* or surrender of ego). Reduction of *mahattattva* occurs through the sixth (and final) lesson[16] (also known as *anudhyana* or approaching transcendental consciousness in meditation). During a sitting session of meditation, a meditator typically performs the sixth lesson at the end. This is because for the sixth lesson, it is assumed that the meditator has already been able to clear the mind off most distractions and has entered a sufficiently deep state of meditation to start off.

As mentioned earlier, in Tantric Yoga philosophy, even the experience of pure consciousness (or minimal phenomenal experience; Metzinger, 2020) is considered to entail a duality between bare experience and its experiencer. In other words, the "purest" form of consciousness is not pure experience but (a postulated) transcendental source of such experience. The sixth lesson can thus be considered to begin with a postulation. The postulation is that in the absence of bare experience, consciousness assumes an unqualified stance of a proto, primordial, or essence consciousness (*purusha* or *atman*)[17]. If such a postulation is not agreeable to the meditator, they will not be initiated into the sixth lesson (and can continue

15 The second lesson of the Ananda *Marga* meditation system is proposed to help keep the sense of individuality arising from one's everyday behavior within bounds. This involves meditators undertaking "Cosmic ideation" (or *Brahmabhava*) within their minds before engaging in everyday actions (particularly, emotionally challenging ones). Cosmic ideation amounts to remembering that a larger transcendental entity (at the scale of the Universe) is doing the actions through them (Anandamurti, 1968). Such a lesson is supplemented by moral conduct rules (*yama* and *niyama*) to ensure that the meditators' actions are benevolent in nature (i.e., a meditator does not engage in socially or ecologically harmful behavior while undertaking Cosmic ideation).

16 The intermediate four are considered "helper" lessons to first and sixth lessons.

17 Because this consciousness is experienced through a physical structure, it is considered inherent to matter with its ontological basis being the Yogic concept of a non-dual absolute witnessing consciousness (known as, *Parama Purusha* or *Paramatman*) characterized by *Ananda* (or bliss beyond experience). The idea of *Paramatman* is equivalent to the Yogic concept of God. The postulation of such a consciousness is often presented as an ontological argument (Oppy, 2021) – that the essence whose attribute is consciousness (as we experience it) is a property of the Universal source.

with previous lessons). However, often the previous five lessons tend to induce gradually subtler blissful experiences in the meditator (Maxwell and Katyal, 2022) building a curiosity about the possibility of a "transcendental blissful consciousness" by the time they arrive at the sixth lesson of meditation.

Derived from the postulation of a protoconsciousness, the phenomenological approach of the sixth lesson is as follows. The meditator again starts by either reducing the *citta* and *ahamtattva* to the extent they can using above-described approaches or continuing from such a state after having done earlier lessons. Then through the aid of certain visualizations, the meditator induces a *dhyana* that their entire conscious existence is witnessed by a transcendental consciousness. According to Sarkar, even though transcendental consciousness is the "supreme subjectivity" and cannot be an object of the mind (Anandamurti, 1978), this kind of a phenomenological attitude of "objectivizing subjectivity" (through a mental idea of transcendental consciousness) is assumed at the start of meditation to subsequently allow oneself to "subjectivize this objectivized subjectivity" (i.e., "becoming" transcendental consciousness). Once this attitude is assumed, it is followed by repeated phenomenological "attempts" to let one's entire conscious experience be submerged or "surrendered" into an idea of a non-qualified transcendental consciousness completely beyond or devoid of conscious experience (meditators are provided more specific instructions on how to achieve this). Importantly, according to Tantric Yoga, such complete submergence is not possible unless the motivation of the meditator (Reddy and Roy, 2019) to go into the non-qualified (or *nirguna*) state is extremely strong (Anandamurti, 1994b). The motivation of the meditator to go from the qualified to the non-qualified stance of consciousness is termed within different schools of Yoga as *nirguna bhakti* (love of the non-qualified), *parabhakti* (love of transcendental subjectivity) or *kevala bhakti* (love of the state of "only-ness") (Anandamurti, 1988a, 1994b). The phenomenological approach of trying to enter the non-qualified state is sometimes likened to jumping into an infinite chasm where one will lose all identity and all experience in favor of the source of consciousness. Making that jump would thus entail a strong motivation by the meditator to do so, in the absence of which, the non-qualified state would remain out of reach even to an advanced meditator. This final non-qualified stance of consciousness is known as *Nirvikalpa Samadhi* (*nirvikalpa* = without *vikalpa* or without experience) or the state of *kaivalya* (only-ness). According *to Sarkar* (Anandamurti, 1970, *Ananda Sutram* verse 1-24), because *nirvikalpa samadhi* is absent of experience, it is an inferred state, and the proof of such a state (i.e., its distinction from all other states) is the lingering bliss unparalleled by any other experiential state (or non-experiential state like dreamless sleep) after one returns from it. In other words, this state—despite lacking experiential awareness—is still considered a unique state of meditation where consciousness is considered in its inactivated form based on the argument of continuity of the primordial substance whose property is consciousness in experience [see Thompson (2014) for a similar continuity argument in Indian philosophy applied to inferring consciousness during sleep].

Co-reduction of different structures

Note that while the above stepwise manner of describing experiential reduction of structures of consciousness aid elucidation, the manipulation of the different structures through meditation is neither strictly sequential nor independent. This is in agreement with Husserl's phenomenological principle of 'correlational *a priori*,' according to which the mental object and subjective feelings directed toward it are interdependent (Husserl, 1970; Gutland, 2018). For example, the reduction of the object simultaneously would "expose" the ego and existential feelings to different degrees depending on an individual's psychosocial history. The reduction of the ego would simultaneously expose the existential feeling. At the same time, long-term meditation is associated with a general decrease in ego aspect of consciousness where a long-term meditator is said to be able to experience waking consciousness with a reduced trait sense of individualized agency or self-other duality (Josipovic, 2021).

From state to trait

While *samadhis* are considered the objective of Tantric Yoga from a state standpoint, their attainment (including *nirvikalpa samadhi*) once or a few times is not a sufficient objective of meditation practice. In the long run, the objective of meditation is to be able to at will experience—even during a regular waking state (not formal sitting meditation)—the world not as something external to oneself but as constituted within (*ahamtattva*-reduced) consciousness and existentiality as constituted within a (*mahattattva*-reduced) transcendental realm that one can gain "access" to. This type of trait alteration through perfecting meditation states is sometimes known as *sahaja samadhi* (or easy samadhi; easy in the sense that one easily or rapidly accesses the experiential attributes of samadhi). While, a thorough development of sahaja states is beyond the scope of this article, as mentioned above, such an idea could be developed as trait reduction of ego aspect of consciousness in a manner similar to what has been described as non-dual awareness in a recent work (Josipovic, 2021).

Discussion

I offer a joint traditional, cognitive, and a praxis-based account of Tantric Yoga meditation states. I do so by first using traditional *Samkhya* philosophy and its recent developments

by Sarkar to arrive at what may be considered a theoretical phenomenological dissociation of structures of consciousness into the mental object (*citta*), the sense of performing a mental act upon the object (*ahamtattva*), an existential feeling invariant of the mental act and object (*matattattva*), and a proposed meta-empirical transcendental stance (*atman*) (Anandamurti, 1998). I then offer an account of the *Ananda Marga* Tantric Yoga practices that are used to translate this theoretical dissociation into a practical dissociation to validate the theory in the first-person. I briefly discuss the implications of the present work on consciousness research.

Citta and *ahamttatva* have clear parallels in contemporary consciousness studies. *Citta* can be considered synonymous with the contents of consciousness, which include both sensory (exteroceptive, interoceptive, or proprioceptive) and conceptual (thoughts, memories, emotions) objects. *Ahamtattva* includes among other features a sense of agency and ownership in relation to one's actions, body and mental contents in general. Both topics are extensively studied in cognitive science. Recent work moreover relates the two by positing the sense of agency or ownership as a higher-order cognitive process making (Bayesian) probabilistic predictions about (lower-order) sensorimotor contingencies (Hohwy, 2015). When it comes to the contents of consciousness, current research paradigms typically operate by manipulating the availability of sensory stimuli to perceptual awareness — i.e., when stimuli that become perceptually aware versus when they do not (e.g., backward masking, threshold detection, or visual illusions such as binocular rivalry). However, in such paradigms even when a subject lacks awareness of a sensory stimulus, it is not as if they are not aware of anything at all; they would, for example, still be aware of the background upon which the stimulus is presented. In other words, there is still an object present in consciousness, like the stimulus background or mask. Such paradigms thus tacitly assume that consciousness is equivalent to the object in consciousness and do not address the possibility of reducing (or removing) objectivity itself from consciousness. In recent years, several researchers have proposed the use of meditation-induced states of consciousness to investigate an "objectless" awareness (Lutz et al., 2007; Josipovic, 2014; Vago and Zeidan, 2016; Srinivasan, 2020), "awareness of awareness" (Gamma and Metzinger, 2021; Sparby and Sacchet, 2022), "pure consciousness" (Metzinger, 2020) or "consciousness as such" (Josipovic, 2021). The present work contributes to this literature by outlining a traditionally inspired cognitive framework for such states, which in turn enables an understanding of the heterogeneity of them. For example, the present work suggests that it may be appropriate to label such states in a graded manner as "object-reduced states" (e.g., **Figures 2D–H**) with very specific potential states being truly objectless [see Josipovic (2021) for how different objectless states may be phenomenologically approached by different meditation techniques]. Such an approach could potentially help achieve common ground and allow us to make sense of states from different traditions in relation to how they inform consciousness studies. A more practical consequence of this idea of object-reduced consciousness is that studies of such states would be better of using continuous qualitative scales (Dor-Ziderman et al., 2016; Katyal and Goldin, 2021a) rather than treating them as categorical (i.e., with object vs. objectless) as is done in neuroimaging designs using block-based contrasts (e.g., Josipovic, 2014; Winter et al., 2020). As with previous work on other meditation techniques (Lutz et al., 2019; Pagnoni, 2019), practices involving reduction of *citta* and *ahamtattva* could be understood mechanistically in terms of active-inference-based accounts of predictive processing. According to such accounts, higher-order cognitive processes are proposed to generate predictions about lower-order sensorimotor contingencies and the mismatch in such predictions act as signals that impel an agent to act upon the world to improve the accuracy of future predictions (Friston, 2010). Experiential co-reduction of *citta* and *ahamtattva* may work by withholding top-down propagation of predictions through so-called "meditative non-action" (Pagnoni, 2019). Our recent study offers a promising step in investigating this idea (Katyal and Goldin, 2021b). We recruited long-term Tantric Yoga practitioners and matched controls who reported their perception on a binocular rivalry stimulus before and after a period of meditation while measuring EEG. During binocular rivalry, separate images are presented to the two eyes, and individuals typically perceive only one eye's image at a time alternately with the other image every few seconds. We found that following meditation (that involved a combination of reducing *citta* and *ahamtattva*), the long-term meditators had prolonged periods of perceiving a mixture of two eye's stimuli. Moreover, the change in mixed percept durations following meditation correlated negatively with gamma-band phase-synchronization between parietal and occipital sites, suggesting a mechanism based in decoupling of lower-order sensory regions from higher-order regions where perceptual interpretations supposedly take place (Kleinschmidt et al., 2012). Follow-up studies could combine refined qualitative methods to understand how meditator's are phenomenologically approaching the mental object (here the rivalry stimulus) combined with neural and behavioral investigation to further understand mechanisms of reduced object and mental activity aspects of consciousness.

Reduction in object- and mental-action-related aspects of consciousness raise a critical question with regards to theories of consciousness. Is there a residual aspect of consciousness beyond these two aspects? Despite a plethora of popular consciousness theories (Graziano and Webb, 2015; Dehaene et al., 2017; Brown et al., 2019), none of them explicitly discuss such an aspect of consciousness. As mentioned above, such an idea is however consistently

being discussed in recent theoretical work inspired by meditation traditions (Dunne et al., 2019; Srinivasan, 2020; Josipovic, 2021). For example, Dunne et al. (2019) use the Buddhist Mahamudra literature to propose the idea of a "non-propositional meta-awareness," which they claim is "the aspect of consciousness that persists even after explicit focus on an object is dropped" (Dunne et al., 2019). They differentiate this aspect of consciousness from the kind of meta-awareness typically studied in psychology, which is propositional in nature with regards to mental content and is active only intermittently (e.g., a meta-awareness like: "I am [/am not] reading right now"). Conversely, non-propositional meta-awareness is a sustained phenomenal quality that runs in the background evaluating *how* one attends to the world. More recently, Metzinger (2020) has proposed that this kind of a background awareness (what he calls a "minimal phenomenal experience") may be a Bayesian representation of basic bodily processes involved in tonic alertness. Josipovic (2021), on the other hand, proposes such an awareness to be non-representational in nature. An alternative way of conceiving reports 'minimal phenomenal' experiences (Shear and Jevning, 1999; Gamma and Metzinger, 2021) based on the present framework could be that they lie along a spectrum of the amount of minimal representational content (such as tonic alertness) present in consciousness combined with a non-representational object-absent aspect of consciousness. And, when the content is fully reduced, the result is a purely non-representational conscious state akin to *Savikalpa Samadhi*. Testing such a framework, while challenging, is not impossible, would require combining advances in first- and third-person approaches. For example, recent promising work on decoding mental representations using neuroimaging (e.g., Gilboa and Moscovitch, 2021) could be combined with refined empirical phenomenological methods like micro-phenomenology that help participants gain access to pre-reflective aspects of experience (Petitmengin et al., 2018; Kordes et al., 2019) that a participant may have overlooked while reporting a minimal phenomenal experience (like the duality between me and my body).

Finally, in the above account, the idea of *atman* as attained during *Nirvikalpa Samadhi* is absent any experience (and is thus meta-empirical). While this implies that the possibility of *atman* is not amenable to reflective (or pre-reflective) empirical inquiry, there are still empirical questions in need of study. According to anecdotal accounts, *Nirvikalpa Samadhi* induces in the physical body a state similar to *rigor mortis* (or postmortem rigidity), the third stage of death characterized by a stiffening of muscles (e.g., Pranavatmakananda, 2017, Chapter 14, Para 3; see https://osf.io/c4uht/ for a video document; Devashish, 2012). However, unlike postmortem where this state onsets after ∼4 h, it onsets soon after samadhi, and unlike postmortem the meditator "returns to life" after the *samadhi* ends. Such a claim warrants empirical observation, and if proven would raise the philosophical questions about possibility of a "transcendental" state beyond conscious experience.

It should also be noted that, in Tantric Yoga, the experience of pure consciousness (*mahattattva*) is considered different from pure consciousness itself (*atman*) in that the latter is devoid of experience. In the context of current literature on meditation-induced non-dual conscious states (e.g., Josipovic, 2021), this may be a feature unique to this meditation tradition. However, it is possible that other traditions also have similar concepts [e.g., the final state of emptiness (*sunyata*) in some Buddhist schools or the final state of *fanaa* in Sufism may also be one empty of experience]. Future cross-traditional work where academic experts from many different traditions collaborate with experts in philosophy of mind (e.g., Siderits et al., 2011), could help arrive at the generalizability of the structures of consciousness elaborated in the present framework more broadly beyond this tradition.

In summary, first-person inquiry of advanced Tantric Yoga meditation states may offer key insights into consciousness and its components. At the same time, Tantric Yoga practices may offer a unique method for a systematic manipulation of consciousness that can aid its empirical study in ways that have not yet been amenable to inquiry in cognitive science.

Significance statement

Consciousness comprises a subject-object structure involving a mental action or attitude starting from the "subjective pole" upon an object of experience. "Objectless" meditation states are proposed as means to study subjective aspects of consciousness where the object of consciousness has been experientially reduced. Much of this work has been done using Buddhist meditation traditions. Another ancient Indian tradition of meditation, namely Tantric Yoga, also involves a rigorous manipulation of the subject-object structure of consciousness. Currently little is understood about how precise Tantric Yoga meditation practices could aid the study of subjective aspects of consciousness. In this paper, I expound on philosophical insight and practical procedures from a living Tantric Yoga tradition of Ananda Marga in relation to how they inform our understanding of consciousness. Specifically, Ananda Marga's preceptor, Prabhat Ranjan Sarkar, offers philosophical developments to the ancient Indian philosophical system of Samkhya, in a way that aids contemporary understanding of consciousness in its subject-object structure. Tantric practices taught by Sarkar are then developed in this framework to allow a meditator to gradually reduce from experience the object of consciousness followed by different aspects of subjectivity. The presented work is discussed in light of existing literature on meditation and consciousness research.

Author contributions

The author confirms being the sole contributor of this work and has approved it for publication.

Acknowledgments

The author thanks Richard Maxwell for feedback on an earlier version of this manuscript. The author thanks Christopher Gutland on feedback as well as pointing out the relevance of Husserl's idea of correlational *a priori* in the present context. The author also thanks Devashiish Donald Acosta (2010) for allowing the use of a clip from his documentary of an Ananda Marga Yogi who is in a state of *Nirvikalpa Samadhi*.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

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frontiers | Frontiers in Psychology

TYPE Original Research
PUBLISHED 30 November 2022
DOI 10.3389/fpsyg.2022.806500

OPEN ACCESS

EDITED BY
Tal Dotan Ben-Soussan,
Research Institute for Neuroscience, Education and Didactics, Italy

REVIEWED BY
J. Shashi Kiran Reddy,
ThoughtSeed Labs, India
Yair Dor-Ziderman,
University of Haifa, Israel

*CORRESPONDENCE
Eve Ekman
eveekman@gmail.com

SPECIALTY SECTION
This article was submitted to Consciousness Research, a section of the journal Frontiers in Psychology

RECEIVED 31 October 2021
ACCEPTED 18 October 2022
PUBLISHED 30 November 2022

CITATION
Ekman E, Koenig CJ, Daubenmier J, Dickson KG, Simmons V, Braun A and Goldin P (2022) Transforming adversity into an ally: A qualitative study of "feeding your demons" meditation.
Front. Psychol. 13:806500.
doi: 10.3389/fpsyg.2022.806500

Transforming adversity into an ally: A qualitative study of "feeding your demons" meditation

Eve Ekman[1]*, Christopher J. Koenig[2], Jennifer Daubenmier[3], Kate Greer Dickson[4], Vanessa Simmons[5], Amy Braun[6] and Philippe Goldin[7]

[1]Greater Good Science Center, University of California, Berkeley, Berkeley, CA, United States, [2]Department of Communication Studies, San Francisco State University, San Francisco, CA, United States, [3]Institute for Holistic Health Studies, San Francisco State University, San Francisco, CA, United States, [4]Pacifica Graduate Institute, Carpinteria, CA, United States, [5]San Francisco School of Nursing, University of California, San Francisco, CA, United States, [6]Stanford OBGYN, Winn Lab, Palo Alto, CA, United States, [7]Clinically Applied Affective Neuroscience Laboratory, University of California, Davis, Davis, CA, United States

Contemplative science has made great strides in the empirical investigation of meditation practices, such as how mindfulness, compassion, and mantra practices impact health and well-being. However, meditation practices from the Vajrayana Buddhist tradition that use mental imagery to transform distressing beliefs and emotions have been little explored. We examined the "Feeding Your Demons" meditation, a secular adaptation of the traditional Tibetan Vajrayana Buddhist meditation practice of Chöd ("Severance") in a pilot, randomized controlled trial in which 61 community adults from the U.S. with prior meditation experience and moderate levels of depressive and anxiety symptoms (70% female)were randomly assigned to one month (15 meditation sessions) of "Feeding Your Demons" practice or a waitlist control group. Written diary entries were collected immediately after each meditation session. We used an Interpretive Phenomenological Analysis approach to examine qualitative responses to two questions which probed (1) how participants made meaning of each meditation session and (2) how they thought it may impact their future thoughts and intentions for action. Five major themes were identified based on 20 codes developed through an inductive review of written responses across all participants. The themes included an enhanced sense of self-worth and confidence, empathy for the "demon" or rejected parts of oneself, increased self-awareness, an active-oriented "fierce" self-compassion, and an acceptance form of self-compassion. Overall, participants expressed an ability to reframe, or transform, their relationship to distressing thoughts, emotions, and experiences as they gained personal insights, self-compassion, and acceptance through the meditation process which in turn shaped their future intentions for action in the world. This research suggests that a secular form of a Vajrayana Buddhist practice may be beneficial for Western meditation practitioners with no prior training in Vajrayana Buddhism. Future research is warranted to understand its longer-term impacts on health and well-being.

KEYWORDS

MEDI, visualization, Vajrayana, self-compassion, emotion, qualitative analysis, RCT—randomized controlled trial, computational linguistics, imagery

Introduction

> "*Clouds in vast sky, Our demons are dakinis In the expanse of mind.*"
> (Greer Dickson, 2021)

One of the most powerful psychological skills that humans can cultivate is the ability to transform adversity into meaningful insight and personal growth. This type of mental training is at the core of the Buddhist contemplative tradition through many types of meditation practices from various Buddhist lineages. In the modern world, Buddhist-derived interventions (BDIs), such as Mindfulness-Based Stress Reduction and Cognitively Based Compassion Training, instruct individuals in a variety of mindfulness and compassion practices (Fredrickson et al., 2008; Goyal et al., 2014; Gu et al., 2015). These BDIs have been shown to reduce stress, anxiety, and depressive symptoms, improve emotional resilience, increase compassion and pro-social behavior, and promote overall health (Eberth and Sedlmeier, 2012; Jazaieri et al., 2013). Yet, there is a paucity of research on meditation techniques derived from the Vajrayana Buddhist tradition from Tibet (Wilson-Mendenhall et al., 2019, 2022). Vajrayana practices integrate a variety of techniques in addition to mindfulness, including active imagery, mantra, ritual, music, yogic postures and movements, breathing exercises, cultivation of altruistic intentions, and resting in non-dual awareness (Wallace and Shapiro 2006). These practices, conducted under the guidance of an authorized instructor, aim to increase meta-awareness and undo experiential fusion with constraining or (Greer Dickson, 2019) invalid concepts of self in order to arrive at a non-dual state of awareness. The cognitive structures of distorted views of self/other considered the root of suffering in Buddhist philosophy, collapse in this state, and experiential knowledge of the nature of consciousness itself arises (Dahl et al., 2015; Schlosser et al., 2022).

In this paper, we explore an adaptation of one specific Vajrayana practice accessible to non-Buddhists and its ability to enhance wellbeing through the reappraisal and transformation of distressing experiences into greater acceptance, compassion, and meaningful insight. Feeding Your Demons (FYD) is a secular, imagery-based contemplative process developed by Buddhist teacher Lama Tsultrim Allione that draws from the *Chöd* practice of Vajrayana Buddhism and combines it with Depth and Gestalt psychology (Allione, 2008; Jung, 1970). FYD shares many elements with traditional Vajrayana practices including active imagery, embodiment of and interaction with imaginal figures, cultivation of compassion, and resting in awareness.

In the sections that follow, we present an overview of literature related to the development of the FYD practice, including its historical origins in 11th-century Tibet and contemporary scientific literature on meditation.

Traditional origins of FYD

The Vajrayana Buddhist practice of *Chöd* (Tibetan term which means "to sever") was established by the 11th-century meditation master Machig Labdrön, one of the most renowned female teachers in Tibetan history (Allione, 2008). Understanding the core principle of selfless offering in *Chöd* is helpful to understand how FYD came about as a derivation of the original practice. In the *Chöd* practice, the meditator imagines consciousness moving out through the crown of the head, and becoming the deity *Tröma Nagmo*, the fierce blue-black *ḍākinī,* Sanskrit for "sky-traveler" which refers to a class of female deities who represent primordial wisdom. As *Tröma Nagmo*, the meditator imagines transforming her corpse into nectar and offering it to all sentient beings, satisfying their desires, purifying their illnesses and negativity, and guiding all to liberation.

The core aspect of the *Chöd* practice requires the practitioner to cultivate generosity through the imagined offering of that which we hold most dear, our own body. Allione adapted the main elements of *Chöd* practice into a more accessible and secular contemplative process (Sauer-Zavala et al., 2013).

FYD is a structured and manualized five-part practice guided by a certified FYD teacher. The process involves personifying and dialoguing with bodily, cognitive, and emotional states of mind, and nourishing, rather than avoiding or suppressing, thoughts and feelings which are perceived as aversive. FYD is practiced using two chairs set up facing each other. A pracitioner moves between these chairs as she engages in different phases of imagery, inquiry, perspective-taking, and reappraisal. In this context, the nominal "demon" refers to emotions, thoughts, and physical sensations that cause distress and hinder an experience of liberation. Here, liberation is the relief from, or reduction of, distressing states of mind and emotions. FYD involves five distinct steps; the first four steps entail embodied self-reflection, imagery, perspective-taking, and dialoguing with distinct aspects of the self. The fifth step cultivates a non-dual mental state. A brief summary of the steps is provided here, a full description of the FYD steps is provided in the Methods section below and in Figure 1.

In step one, the guidance is to connect with the nine relaxation breaths and identify a demon and connect to bodily sensations. In step two visualize the demon and ask the following questions: What do you want? What do you really need? How will you feel when you get what you really need? In step three move chairs, continue to visualize the demon, and respond to these questions: What I want is… What I really need is …When I get what I want, I will feel … In step four A again move chairs and visualize feeding the demon to completion and then visualize the ally and ask these questions: How will you help me? How will you protect me? What pledge do you make to me? How can I access you? In step four B once again move chairs, and continue to visualize all and respond to the questions: I will you help by … I will you protect by … I pledge to… You can access me by… In step five again move chairs, release questions and visualizations, and rest in spacious awareness. Following step five respond to questions in hand written meditation diary about FYD.

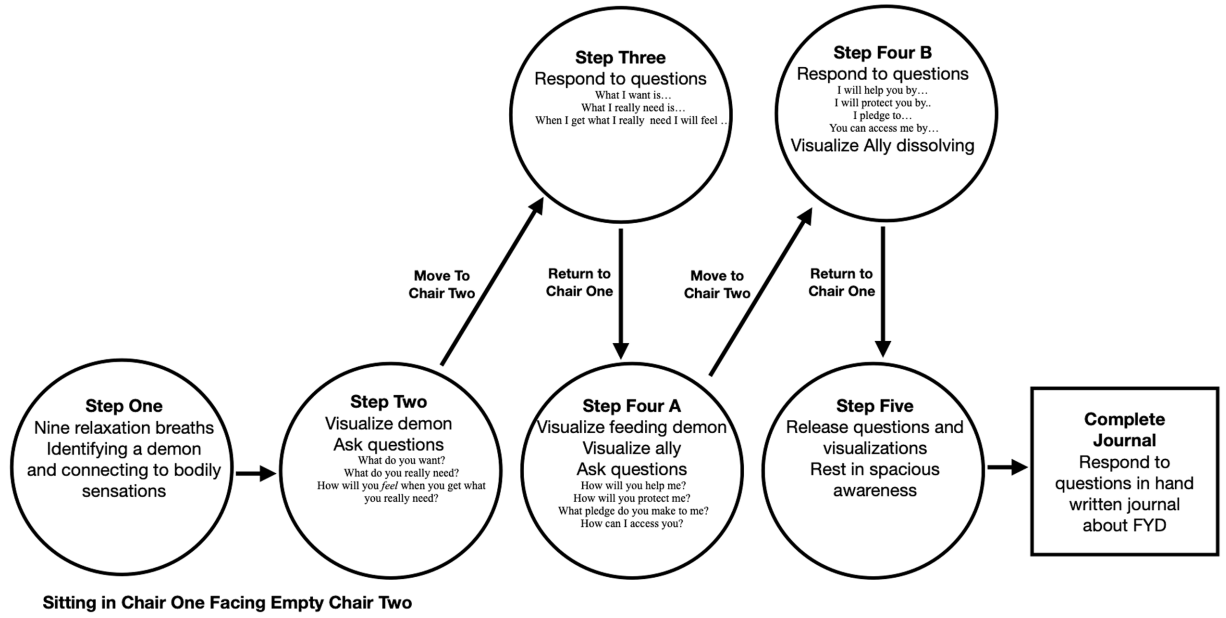

FIGURE 1
FYD meditation steps.

Psychological mechanisms of meditation

To better understand the distinct components of the FYD meditation process, we refer to a cognitive mechanisms framework of meditation practices proposed by Dahl and colleagues (Dahl et al., 2015). Their approach is based on cognitive and clinical scientific evidence that supports the classification of specific meditation practices (or techniques) into attentional, constructive, and deconstructive families. These three families of meditation practices are based on engagement with distinct psychological processes: (1) attention regulation and meta-awareness, (2) perspective-taking and reappraisal, and (3) self-inquiry. This framework suggests that the functional distinctions of each of the three families can be understood by their effects on three cognitive mechanisms associated with psychological inflexibility and mental distress: experiential fusion, maladaptive self-schema, and cognitive reification.

Before describing how the three families suggested by Dahl and colleagues relate to the steps of the FYD practice, we will define the mechanisms and examples of these practices here briefly. The *attentional family* addresses the process of attention regulation through meta-awareness including such practices as concentration and mindfulness-based practices (Dahl et al., 2015; Schlosser et al., 2022). Meta-awareness is awareness of what we are conscious of whether that is thinking, feeling, or perceiving, or as in non-dual states, awareness itself (Dahl et al., 2015). Strengthening meta-awareness increases the capacity to become aware of what is in awareness without being fully merged with it, for example, noticing thoughts, memories, and images but not being fully identified or experientially fused with them (Smallwood et al., 2007). Meta-awareness facilitates attention regulation and occurs during mindfulness practice the instant one become's aware of being distracted, for example thinking about a past conversation instead of focusing attention on the sensation of breath at the nostrils, one then directs attention back to the breath. The *constructive family* of meditation practices develop perspective-taking and cognitive reappraisal and include forms of meditation which imagine and extend feelings of care such as practices of the "four immeasurables" as found in the Tibetan Buddhist tradition: loving-kindness, compassion, empathetic joy, and equanimity. Perspective-taking involves imagining the thoughts and feelings of others, while cognitive reappraisal formulates a new way of relating to or interpreting one's own thoughts, feelings, contexts, and behaviors (Dahl et al., 2015; Schlosser et al., 2022). For example, cognitive reappraisal in a practice of compassion may involve shifting our mindset from a feeling of disheartenment to resilience by re-interpreting the meaning of a specific content and context. The *deconstructive family* of practices use self-inquiry to cultivate insights about interdependence and the changing nature of the phenomenal world, including ourselves. The practices in this family include analytical practices that investigate experience and consciousness and non-dual practices which can point to a direct experience of consciousness. Deconstructive practices interrogate beliefs and ideas about the self and the world which may usually be implicit and beneath the surface of our day-to-day consciousness. In Table 1, we outline each step of FYD and the related meditation practices, and potential mechanisms of action.

Examining mechanisms step one

The very first part of step one is engaging in what are called the nine relaxation breaths which use the breath to connect with bodily sensations; this is akin to a brief body scan, next the practitioner directs attention to bodily feelings associated with

TABLE 1 FYD steps and related meditation practices, and potential mechanisms of action.

Steps of feeding your demons	Meditation practice	Potential mechanisms of action
Step 1: Identify bodily sensations related to a difficult situation	Attentional Family: Body Scan, Mindfulness of bodily Sensations, Thoughts and Feelings	Interoception, Meta-Awareness
Step 2: Imagine and communicate with a personal demon	Constructive Family: Guided Imagery, Imagery/Imagination	Perspective-Taking, Reappraisal, Emotion regulation
Step 3: Switch Places with the demon	Constructive Family: Guided Imagery, Deity yoga	Perspective-Taking, Reappraisal, Emotion regulation
Step 4a: Imagine feeding the demon what it needs	Constructive Family: Compassion Practice, Guided Imagery, Body Offering,	Empathic Concern, Generosity, Compassion
Step 4b: Imagine and communicate with a personal ally (transformed demon)	Constructive Family: Compassion and Loving-Kindness Practice, Guided Imagery, Deity Yoga,	Reappraisal, self-Inquiry
Step 5: Rest in spacious awareness	Deconstructive Family: Non-Dual Practices, Open Monitoring,	Meta-Awareness
Journaling in FYD diary	Constructive Family: Reflective Writing	Meaning-Making

a personally salient or challenging situation. This first step addresses how the meditation practitioner is typically experientially "fused" or identified with the contents of the mind. The practitioner is guided to intentionally redirect attention to bodily sensations associated with thoughts and emotions related to the chosen situation. The act of observing sensations provides a basis for cultivating meta-awareness of when we become caught up in those thoughts and feelings (e.g., cognitive fusion with thoughts, memories, images, and sensations; Smallwood et al., 2007). The practices used in this first stage of FYD includes connecting with breath, and sensations in the body associated with a difficult experience, this difficult experience will be used as the demon through the five steps of the practice. This is similar, but not the same, as body scan and the mindful awareness of body sensations, thoughts, and feelings, as they shift and change which are included in Mindfulness-Based Stress Reduction training (Khoury et al., 2015).

The process of sensing the physiological condition of the body is known as interoceptive awareness, which also involves incorporating sensations into higher-order cognitive functions, such as appraisal, emotion, and decision-making processes (e.g., Mehling et al., 2012; Farb et al., 2015; Khalsa et al., 2018; Daubenmier etr al., 2013). Mindfulness practices such as body scan practice and bringing close attention to breath are thought to increase the accuracy of interoceptive processes that enhance emotional awareness and emotion regulation (e.g., Farb et al., 2015; Fischer et al., 2017). A meta-analysis and recent review of the neurological mechanisms of mindfulness meditation found reliable activation of the insula, which processes interoceptive information, suggesting that enhancement of bodily awareness is a key mechanism of mindfulness meditation (Falcone and Jerram, 2018; Young et al., 2018). FYD includes a unique approach to bodily awareness starting with step 1, but also apparent through each step, as will be explained below, through its integration of emotional awareness and imagination-based practices.

Examining mechanisms steps two through four

As we see in Table 1, steps 2–4 of the FYD process can be classified as constructive contemplative processes that actively engage self-schemas to cultivate perspective-taking and reappraisal. Specifically, the practitioner allows the challenging situation-related bodily sensations to arise as a mental image of a demon in the space directly in front of the practitioner, to verbally interact with the demon, physically reposition oneself to take the demon's perspective, then feed or nourish it such that it transforms into a mental image of an ally who provides support and encouragement and subsequently dissolves back into the practitioner. These mental images of demon and ally are the practitioner's own creative and spontaneous mental projections of self-schemas.

Steps 2–4 entail intentionally and systematically altering thoughts and emotions *via* imagery, perspective-taking, and cognitive reappraisal. These steps share some resemblance to Loving-Kindness Meditation (LKM), compassion meditation, and guided imagery. LKM often includes the use of words or phrases of kindness that are silently directed toward oneself and others. Compassion practices engage with imagination to recall images of oneself and other people in moments of suffering and send compassion using images and verbal phrases. LKM and compassion meditations have been extensively investigated as stand-alone practices. LKM was found to enhance psychological wellbeing and improve positive affect (Fredrickson et al., 2008; Zeng et al., 2015); compassion practices have also been shown to increase empathy and modify neural circuitry related to caring (Lutz et al., 2008; Klimecki et al., 2014). FYD uniquely directs compassion and loving-kindness toward one self while engaging in a dynamic dialog with one's difficulties personified as "demons" or "allies," rather than repeating a static set of phrases directed toward one's conventional sense of self or other as in other LKM and compassion practices.

Guided imagery is considered a mind–body intervention with some resemblance to the FYD practice in its creative engagement of the imagination through the senses. Guided imagery is a modern practice created to alleviate psychological distress or reduce chronic pain. It uses audio guidance to generate imagined peaceful sensory experiences, which create stress-reducing calm scenes and situations for healing. In hospital-based settings, guided imagery of calm nature scenes has been used to treat symptoms of cancer and improve quality of life (Trakhtenberg, 2008). In contrast, imagery-based meditations used in Vajrayana Buddhism have a broader range of images infused with an understanding of emptiness (*Śūnyatā* in Sanskrit), the mental insight that validly realizes the absence of a mistaken view of phenomenon as permanent, isolated, and not dependent on other causes and conditions (Khyentse, 2007). In FYD practice, the demon and ally imageries are beyond the scope of traditional guided imagery, as the demon may even temporarily increase distress, although both include the use of imagination (Amihai and Kozhevnikov, 2014). In a study examining Vajrayana imagery-based meditation, researchers found that the process of imagining compassion was similar to a behavioral simulation of compassion in generating sensorimotor patterns in the brain that can lead to compassionate behavioral action (Wilson-Mendenhall et al., 2022). Thus, imagining oneself nourishing and satisfying the desires of another being may increase pro-social attitudes and compassionate behavior towards oneself and others in the non-imaginal, real world.

Examining mechanisms step five

The fifth and final step of the FYD meditation exemplifies the deconstructive family of contemplative practice. Specifically, the practitioner is guided to enter into a silent state of resting in openness without reifying a sense of self, in which non-dual experiences may arise. Dahl and colleagues use the term "open monitoring" to describe this practice which includes "awareness-oriented open monitoring," a sustained recognition of the knowing quality of awareness itself, and "'object-oriented open monitoring" which is awareness of thoughts, precepts, and sensations arising in awareness. Deconstructive practices can lead to "minimal phenomenal self." This minimal phenomenal self emerges through deconstructive practices that reduce the dominance and intensity of cognitive-linguistic-sensory self-related processes which exist across various neural networks in the brain and contribute to maladaptive self-views such as self-criticism and negative ruminations (Dahl et al., 2015). Deconstructive non-dual practices aim to down-regulate and minimize cognitive activities that generate the self-view of an observer as separate from what is being observed (Lutz et al., 2008; Metzinger, 2010). In Buddhist traditions, non-dual practices are thought to scaffold insights into the nature of self-related views by helping to dissolve their primacy; instead of thinking negative thoughts are true, we may directly observe the insubstantial nature of thoughts themselves. Phenomenological research has explored the basis of this non-dual experience through the reports of participants whose felt experience of non-duality is more than a concept (Metzinger, 2010; Berkovich-Ohana et al., 2013). Non-dual practices can provide direct experiential insight into the ever-changing and interconnected nature of all living and non-living entities (Meling, 2022).

Immediately following the FYD practice is the use of a meditation diary which provides questions for structured reflection on what has occurred in each step in a meditation diary. This reflection happens after the guided meditation is complete and the meditation diary. This reflective process following the guided meditation is another interesting feature of the FYD practice, one which can also support the process of cognitive reappraisal. This reflective process following the guided meditation is another interesting feature of the FYD practice, one which can also support the process of reappraisal. As a stand-alone intervention, expressive writing through journaling about an emotional experience has been an intervention with demonstrated benefits for psychological wellbeing for three decades (Pennebaker, 2018). While not included explicitly in the model proposed by Dahl and colleagues, the process of personal meaning-making may also arise from self-inquiry, which are then consolidated in written reflections, which may, in turn, shift maladaptive self-schemas and facilitate coping with stressful events (Park, 2010; Martela and Steger, 2016).

Thus, the FYD meditation constitutes a complex sequence of practices that scaffold movement through meditation states associated with attentional, constructive, and deconstructive families within a single meditation session. Unlike other types of meditation practices associated with one of the three families of meditation classification proposed by Dahl and colleagues, the FYD process integrates features of attention regulation, emotion awareness, reappraisal, imagery, verbal interaction, and perspective-taking. However, these multifaceted and multidimensional types of meditation practice have not been extensively empirically studied in the context of cognitive and clinical science.

The current study

The current study is an analysis of a pilot, randomized waitlist-controlled trial examining the effects of the FYD meditation on psychological wellbeing (Goldin et al., in press). Results of the main study found that FYD practice over 1 month showed that compared to WL, FYD was associated with greater decreases in stress symptoms and increases in self-compassion among community practitioners with prior meditation experience. The goal of the current study is to explore qualitative, open-ended responses to two specific FYD meditation diary questions that probed how practitioners (1) made meaning of what occurred in each meditation session and (2) attempted to integrate insights into future intentions and actions in their everyday lives.

10.3389/fpsyg.2022.806500

Materials and methods

Participants

We recruited a community sample of participants *via* Listservs, social media, and Buddhist meditation centers. Participants were required to have a minimum of 3 months of meditation experience and not have high levels of depression, anxiety, and stress symptoms as assessed by the Depression Anxiety Stress Scale, a validated self-report tool (Lovibond and Lovibond, 1995). There were no other exclusion criteria. We were interested in FYD for participants who are regular meditators to see how this practice could be different from their usual practice. We defined regular practice as at least 3 times per week for 15 min per session. The DASS manual has cutoff scores to classify mild, moderate, and severe levels of symptoms of depression anxiety, and stress: mild 5–6; moderate 7–10 Anxiety: mild 4–5, moderate 6–7 Stress: mild 8–9, and moderate 10–12. We did not exclude people based on the DASS; participants reported a mild to moderate range of depression, anxiety, or stress symptoms; no one reported severe levels of depression, anxiety, and stress symptoms.

From February to May 2018, 107 potential participants first provided informed consent and then completed an online screener to collect demographics and contact information. Potential participants were given a unique identification number to complete the quantitative measures of self-reported psychological functioning. The first 61 participants who completed the baseline assessments and met the inclusion criteria were then randomly assigned to either FYD ($n = 30$) or WL ($n = 31$) groups. Participants included 61 community adults (70% female, mean age = 44.05, $SD = 11.20$; 43.5% Caucasian, 39% Asian, 9.3% Hispanic, and 8.3% other). One participant dropped from FYD and one participant dropped from WL. There was no group difference, $t(58) = 0.57$, $p = 0.57$, 95% *CI* (−4.33, 2.46), in years of meditation experience between the FYD group, *Mean* = 7.56 years, $SD = 5.73$ (range: 0.25–18), and the WL group, *Mean* = 8.55 years, $SD = 7.48$ (range: 0.25–27).

Study design

In this randomized controlled study, qualitative data were collected *via* a structured meditation diary completed after each of up to 15 FYD meditation sessions completed during the 1 month of meditation practice. Quantitative data included validated self-report measures collected at baseline and after 1 month of the FYD meditation versus no training waitlist (WL) control groups. Participants were randomized into FYD meditation training and WL control groups with equal probability using a digital random number generator (random.org). After completing the waitlist control period, WL participants were offered the 1-month FYD meditation.

Procedure

After completing all baseline assessments, participants were randomly assigned to either FYD or WL. Participants completed the same self-report assessments again at post-FYD/WL. Participants received the FYD training at no cost. Participants who completed the post-WL assessments were offered FYD and were given diaries to use with the study. All participants provided informed consent prior to completing the online screener in accordance with the Institutional Review Board at UC Davis.

FYD contemplative process

As explained above, Allione (2008) created the FYD practice as a simplified and secularized version of the traditional Tibetan Buddhist Chöd meditation. What follows is a specific description of the five sequential steps of the FYD process as it would be experienced by the meditator. In step one, while seated the practitioner chooses a challenging issue they are experiencing like anger, pain, cancer, addiction, or anxiety, which is identified in the FYD process as a "demon." The practitioner locates associated sensations of the demon in the body, and notices the texture, temperature, and color of the sensations. In step two, the practitioner allows the sensations to be personified visually as the demon and notices the demon's color, size, character, eyes, emotional state, gender (if it has one), and other characteristics. The practitioner then asks the demon three questions: "What do you want? What do you really need? How will you *feel* when you get what you really need?" In step three, the meditator switches seats to the empty chair in front, inhabits the demon's body, notices how their original self looks from the demon's point of view, and answers the three questions from the perspective of the demon.

The fourth step of FYD actually has several components. Initially, the practitioner returns to the original chair, views the demon, and feeds it by mentally (a) creating an infinite amount of nectar that has the quality of the answer to the third question, "How will you *feel* when you get what you really need?," or (b) dissolving the body and transforming it into the nectar that has the quality of feeding the demon what it would have when it gets what it really needs. This second option is more in line with the ancient Buddhist practice that FYD is based on. When the demon is satiated with the nectar, it transforms into the practitioner's ally, a profound helper. The practitioner takes note of the color, size, character, eyes, and gender (if it has one), and asks, "How will you help me? How will you protect me? What pledge do you make to me? How can I access you?" Once again, the practitioner stands, switches chairs, becomes the ally, and answers the questions speaking as the ally, noticing how their normal self looks to the ally. When done answering, the meditator returns to the original chair.

In step five, the meditator initially receives the energy of the ally, and then the ally dissolves into the meditator. Once she has

completely integrated the energy of the ally in their body, the meditator can choose either to rest in awareness or to visualize herself not identifying with any construct or visualization and then resting the mind in the space that follows. In both cases, the practitioner enters a state of mental spaciousness, described as resting in awareness of the present moment without projection, elaboration, or amplification. Following this final step, the meditator is cued to return to her body, taking particular note of any changes she feels in her body from before her FYD session. Having completed the practice, the meditator then fills out her meditation diary which invites a phenomenological recounting of the FYD process, for example asking about the color, shape, texture, and gender of the demon and ally and the words and phrases spoken by the demon and ally. In our study, we added two additional questions to the meditation diary inviting reflection on the overall experience of the FYD process and what might be learned from this. These additional questions invite the practitioner to re-integrate the new information from her FYD session on both an embodied and cognitive level.

FYD instruction and guidance

Lopön Chandra Easton was the primary meditation teacher in this study. She has completed an average of three meditation retreats per year since 1992, and has been a meditation teacher since 2001. She has taught FYD since 2010, after being trained and certified to teach FYD by Allione. Each of the four certified FYD facilitators had to complete at least 108 FYD sessions as part of their teacher training with Allione and Easton. Easton conducted an initial 2-h FYD orientation for all study participants and FYD facilitators, and also supervised each of the FYD facilitators during the study. To support the FYD practice, each participant was provided audio, video, and text-based instructions, the FYD book by Lama Tsultrim Allione, and three one-on-one FYD sessions with a single FYD facilitator.

Participants were asked to complete 15 sessions of FYD within 30 days. We gave each participant a paper diary to complete after each of the 15 FYD sessions. The diary asked participants to respond to questions about the FYD process and their understanding of the experience (see below in Measures).

Measures

This study focused on participants' qualitative diary, which we used as the primary data, collected after each FYD meditation session. The diary entries included a total of 13 questions aimed to prime the participant to reflect on their experience immediately before and after each ~30 min meditation session; these questions were drawn from the standard reporting form of FYD which is used following the guided meditation of FYD. We adopted an Interpretive Phenomenological Analysis (reference) approach for our content analysis of responses to two specific questions presented in the FYD meditation diary:

1. How do you make sense of this (e.g., the FYD meditation) experience? What was new? What was familiar?
2. What, if anything, would you like to carry forward into your life from this (FYD) session?

We chose responses to these two questions because they probe current insights and reflection on future integration of FYD meditation experiences. The decision to ask participants to complete a paper meditation diary to fill out was explicit. The research team wanted participants to have an intimate experience with writing, as is done in the standard teaching of the FYD meditation technique. Our hope was that this format would encourage a more faithful experience of personal processing of the meditation and encourage participants to feel more free and willing to share their experiences candidly.

Following completion of the study, participants returned their diaries to the meditation center or mailed the diaries to the research team for data entry. A team of transcribers manually entered the de-identified diaries to a secure online form that created an excel format for the data analysis. Missing entries were noted by transcribers, illegible words were noted, and additional notes were shared in the online form. Out of a total of 59 possible diaries, we found that 45 (75%) participants completed 10 or more FYD sessions, with 38 (63%) completing all 15 sessions within 30-days. The text from the diaries was each manually uploaded to Dedoose data management software (Dedoose Version 8.0.35, 2018) to conduct Interpretive Phenomenological Analysis-informed content analysis, iteratively develop codes from the data, and fashion themes from these codes and source diaries.

Data analysis

Using a standard reporting form as a meditation diary is a standard part of the FYD process, but as mentioned above, we focused our analysis on two additional questions added to the end of the diary that ask participants how they make sense of and carry forward insights from their session.

The structured diary questions were analyzed using an Interpretive Phenomenological Analysis (IPA) informed approach to coding (Shinebourne, 2011; Wright-St Clair, 2014). IPA is commonly used for semi-structured interviews and diary-based studies. Our approach is IPA-informed, the format of the diaries is not conducted in the traditional IPA long form narrative interview or diary but is captured over many time points. IPA's inductive, interpretive analysis fits our analysis goals through its emphasis on the participant's perception of an event instead of an objective or purely phenomenological recounting of an event. The participants' description is the driver for creating a theoretical understanding of IPA. Close examination of the participants' reflection on how they make sense of their experience allows insight into what can be the intangible and at times the ineffable process of FYD. The

phenomenological descriptions of demons and allies were not included in this study in order to focus more specifically upon the participant's reflective process of meeting and dialoguing with complex emotional material. IPA seeks the essence, "the intuitive structure of meaning," that can be built from individual descriptions of their experience (Creswell et al., 2007). IPA is particularly well suited to exploring how a participant makes sense of non-ordinary states of consciousness and transformation, and has been used in the analysis of participant experience of psychedelics (Agin-Liebes et al., 2021).

We used a typical case sampling technique, a type of purposeful sample that emphasizes cases that are not unusual, atypical, or extreme (Patton, 2001) by selecting five (out of a possible 15) responses per participant focusing on the two final questions from the meditation diary. The analysis of these responses was primarily driven by an IPA-informed conventional qualitative content analysis (Hsieh and Shannon, 2005), in which codes are inductively derived from the data. We applied an IPA approach when reflecting on and synthesizing the individual inductively derived themes into larger themes with an intention to use participant-driven descriptions of the meaning and value of their emotional experience to capture what is called in IPA literature the essence of the experience (Pope and Mays, 1995; Vaismoradi et al., 2013). The qualitative team (EE, CJK) used an iterative coding process with transcripts within Dedoose data management software (Dedoose Version 8.0.35, 2018). First, we developed an initial codebook based on an inductive review of ten transcripts each. We discussed our initial codes, combined them when appropriate, and retained unique codes. Following the initial phase of codebook development, we generated approximately 20 codes in total. Next, these authors divided the remaining participants and reviewed five random entries from participants who completed at least 10 diaries across the 30 days. We applied initial codes separately and generated new inductive codes when needed to capture the meaning of the meditation experiences in the data. This is a high number of participants and responses for IPA-influenced analysis; however, the responses were short and averaged from one to four clauses per entry. The coding team met regularly to discuss code application, code continuity, new inductive codes, collapsing/condensing redundant codes, and preliminary themes throughout the coding process.

Results

After the diary research team (EE, CJK) completed initial inductive coding and meta-level analysis of the diary entries we invited (KGD) a certified FYD facilitator and scholar to engage in an interpretive process. The IPA process generated three major thematic dimensions resulting in eight total thematic categories. Participant responses to the first question are described as Meaning-Making, and responses to the second question are described as Steps to Action. The additional thematic elements are described as other qualitatively significant dimensions. See Table 2. Primary Themes and Sub-Themes from Diary Entries.

Meaning-making: Putting the pieces together during the FYD meditation

In meaning-making, participants reflect on the experience they had and how to understand it in the context of this session, other sessions, and their life. The themes point to both self-understanding through connecting with confidence and worthiness, and an ability to turn toward and feel empathy and care with the difficult emotional material which arises in the FYD session.

Realizing Confidence and Worthiness (n=134; 26% of diary entries)

The Confidence and Worthiness theme describes a common experience participants shared about an overall sense of validation. We built this larger theme from individual codes, including *a feeling of strength being revealed, confidence in expression, an affirmation that my own experience is real and valuable, and recognizing my needs and desires as powerful*. The thread connecting these codes is a growing self-evaluation of intrinsic value and capacity in participants' lives more generally. As participants make sense of their FYD experience, they gain clarity about what they need, want, and feel empowered and/or deserving to have. Very often participants find what is needed is a loving presence. This is a quintessential learning of the entire FYD process. One participant reflected:

The little boy (that) the demon turned into reminded me of a happy and independent part of me that I am disconnected from. The nurturing woman actually came to check on him and admire his play happily. This I think is the part of me that is a caregiver to others but [the meditation helped me create the possibility] that I can also do the same for me (Participant 4010).

In this quotation, the participant emphasized that the transformation from demon to "little boy" ally helps them to recognize a part of themselves they feel they no longer have connection to in their everyday lives. The participant independently recognizes that every image is an intrinsic part of themselves, waiting to be discovered and mobilized to bolster internal confidence. For example, the recognizable "caregiver" checks in on the boy's wellbeing and enjoys observing his happiness as a shared happiness. While the participant sees themselves in the caregiver, the meditation helps them to realize they can be their own caretaker, monitoring their own inner child's safety and happiness. This affirms the participant's sense that they have the intrinsic ability to caretake themselves and they can do so from the perspective of a benevolent caretaker, confident in their ability to nurture and worthy to benefit from loving attention.

10.3389/fpsyg.2022.806500

TABLE 2 Primary themes and sub-themes from diary entries.

Primary theme	Sub-theme	Number of participant reports (%)	Representative quotations
Meaning-Making How do you make sense of this experience? What was new? What was familiar?	1. Realizing Confidence and Worthiness	134 (26%)	I've wanted to have a child for many years now. I've struggled with fear that it will not happen, I'm too old and missed my chance. This gave me a deep sense of hope, do not give up. This is new. (Participant 4016) I have felt for many years that my heart has been closed to much feeling so the deadened charred sense is familiar. My ally experience of ACTUALLY ENJOYING being me (or just being) is totally new. (Participant 4020) In psychology, "attachment secure" is better! For a personality built on balanced views it's probably easier for myself to dismiss thoughts going in self-hatred. (Participant 4031)
	2. Developing Empathy for the Demon	124 (24%)	It is like I'm trying to tell myself I'm okay. That I have nothing to fear. New: the demon had more personality that the other sessions. Usually they are empty, devoid of characteristics, more symbolic. This time I could sense that it was happy once but was now terrified. Familiar: The ally was someone I wanted to study but I never learned about. Like someone I tell myself I know, but deep down I know nothing about them. (Participant 4001) Heavy heart, dad's judgment is there, good to recognize I need to clean it out (Participant 4035)
	3. Expanding Self-Awareness and Responsibility	110 (21.5%)	The running/panting girl being held back is my 16 year old self let go of to have everything she "wants." I want rich to be my family at that time. Now, I feel my mind is somehow his intensely grasping/demanding but life feels less secure if I feel blamed at times. I want to believe in the bolt version of my twenty can feel empowered to make my own way not needed to hold on tight to that which I should have. (Participant 4046) I've experienced similar insights, realizations; what was new, was the depth and breadth of the insights. Almost a sense of how my mind "clings to the bones of the body." So much clinging and Fear. And then guidance from Machig to let go, "detach," release," and my mind would follow her instructions. And awareness of being a Self beyond form naturally arose [drew a heart here]. (Participant 4078)
Steps to Action What, if anything, would you like to carry forward into your life from this session?	1. Cultivating Fierce Compassion	117 (23%)	I can inwardly generate the motivation to keep trying and not give up, not dependent on outside factors. I can be brave and trust that my destiny is to be free, not to be trapped! (Participant 4060) I feel like the anger is masking a fear or softness that's being protected. It feels weak or not in control but wants to be seen as strong and able to rule and be forceful. Also, with new energy I still want pleasure and affection but it seems different. (Participant 4075)
	2. Nurturing Compassion	112 (22%)	The feeling of vibrancy. The re-boot of love and preciousness of myself. The carrying of my own loving, present and attuned and protective mother inside. (Participant 4037) I'm somebody's "sweet baby." A knowing that of course I'm not a piece of shit like my demon says. Babies are sweet and special and all that. Just space was created between that belief and reality. (Participant 4074)
Other qualitatively significant codes	1. Reframing and New Understanding	74 (14.5%)	I cannot wait for others to be their real selves, I just have to be me, no matter what others are doing. (Participant 4007) It could be nice to trust my capacity to listen to my wisdom. The force is not in a battle. I could think more in terms of being a soul than just a human. It's not a question of surviving in front of difficulty but transcend them. (Participant 4031)
	2. Trusting in the FYD Process	67 (13%)	That I would like to continue to work with this demon as she needs lots more healing. Also, that FYD may be another way to access and work with this trauma in addition to my regular therapy. (Participant 4020) I am hoping that with a consistent practice that releasing years of built up emotional pain will help relieve some of the physical pain. I guess we'll see. (Participant 4071)
	3. Experiencing the Numinous	32 (6%)	Let water evening cleansing time be my ritual to let go and be in the moment. (Participant 4046) go outside and get grounded and recall the feeling of being connected. Think about karma over the span of many lifetimes and protect it. (Participant 4053)

One of the most common reflections in this theme was that participants were able to recognize an unwanted aspect of themselves that they did not previously see clearly and, as a result of recognizing that negation, expressed compassion for themselves. For example, one participant described an insight into their current state:

I get debilitated by seeking others' approval and cannot speak up for myself or prioritize my needs for fear of losing that approval. I also see how ingrained this demon became when I was in an ongoing abusive relationship for 2 years as a teenager. It was new to feel the energy of belief and encouragement to move beyond—it's hard for me to generate that from within. AND, I can! (Participant 4060).

This participant recognizes being "debilitated … and cannot speak up for myself and prioritize my needs" out of fear of others' disapproval. The meditation helped to identify and acknowledge the core problem—seeking others' approval in ways that serve to discourage their own voice. This characteristic was linked with the demon through an abusive relationship as a teenager that has calcified in their emotional lives. The process helped generate "energy of belief and encouragement" as an inner source of strength, validating their self-worth and confidence.

Participants similarly reflected that the demon and ally are both elements of one's subconscious, and facing this duality can bring forth a sense that the hurt and the healing are both contained within. One participant described this dimension of worthiness as related to hedonic cravings coupled with moral judgment levied against themselves:

My victim demon is so dependent on outside indicators of care and really believes she is weak and perhaps undeserving of love, whereas the ally is inseparably connected with her strength and power and feels no need to make a show of that—just to use it to live. It was new to have confidence based on internal resources and not outside praise, and familiar to be desperate for care and concern from others (Participant 4060).

This reflection connects the "victim demon" that depends on external validation to counter the feelings of weakness and "perhaps undeserving of love." By contrast, the ally "is inseparably connected with her strength and power" and has no need for external validation. For this participant, the demon and ally are two sides of the same coin, vying for existential validation, and both exist within the participant's experience. The meditation process helped bolster confidence and reliance on "internal resources and not from outside praise." Recognizing the demon's emotional logic helps the participant generate a new self-confidence and regain a new sense of self-worth.

Developing empathy for the demon (*n*=124; 24% of diary entries)

In making sense of the experience, Empathy for the Demon describes the participant's experience of connecting to the demon with understanding and care. This theme synthesized the following individual codes: *demon as a neglected part of the self, realizing the demon is something one can usefully work with, and realizing the demon wants recognition.* The overall meaning of this theme is that through engaging with the FYD process, the participant first interacts with and subsequently comes to perceive the demon in a new way that is intrinsically associated with the participant's own life experience. For example, creating a form for the demon can allow authentic communication and understanding between the participant and the demon, as the following quotation illustrates:

I'd connected with my inner child once or twice before and discovered similar themes, but I do not think I appreciated or examined the frightening, screechingly loud depth of it before. We'd never really TALKED like that and I'd never admitted before—to myself or anyone else—a truth I felt guilty for. She's right, I've hid her and acted as though I hate her. (Participant 4061).

Despite prior experience having "connected with my inner child" this participant recognized instead of similar visual and emotional motifs. Participants reported demons showing up in their imagery as forgotten and under-attended aspects of themselves, particularly in the past. However, within the meditative frame, the "once or twice" experience roars it's significance to the participant, as she does not "think I appreciated or examined the frightening, screechingly loud depth of it before." This suggests a previously unknown emotional salience of her inner child and, potentially, her own actual childhood. The meditation process asks participants not only to visualize the demon but also to interact first by asking a set of standardized questions and then to listen to the (lack of) answers. This participant suggests that she and the demon "never really TALKED like that." In this instance, interaction with the demon helps create a direct connection with the neglected aspects of herself that the demon represents. Through this interaction, she was able to admit "a truth I felt guilty for," a truth that "I've hid her and acted as though I hate her." Interacting with the demon led to realization of a truth buried in the participant's memory and created a psychologically safe space to encounter this forgotten part of herself, ultimately, an act of compassion for the demon and, by extension, herself.

The Developing Empathy for the Demon theme emphasizes that interaction with the demon within the frame of the meditation enables an opportunity to develop empathy for the demon and, by extension, themselves. One participant described empathy for the demon in the following ways:

I try to keep my sorrow small and contained but it accumulates in the tightness of my body and my perspective (usually worried, discontent). It was new to sit with the depth of my sorrow. (Participant 4012).

In this description, the participant shifts from deliberately "keeping my sorrow small and contained" in the body to becoming present with the difficulty by "sitting with it" to experience the depth of the sorrow. Affirming the demon's experience helps participants turn toward their own difficult emotions, such as worry, sorrow as described above, and despair. Participants describe that the meditation provided a technique to literally look challenging emotions "in the eye." Throughout their responses, participants describe a willingness to be with, and even appreciate challenging emotions, as the following quotation suggests:

I often have head, neck, arm pain on my left side to the point of needing PT [Physical Therapy], so I found it interesting to see what inner experience it may be linked to. This demon feels very linked to my "inner child" who underwent trauma. I was in therapy talking about her earlier today, so not surprised she made an appearance. (Participant 4020).

This participant describes that persistent pain throughout her body requires routine Physical Therapy. In this reflection, she reports using the FYD meditation to explore what parts of her inner world might be related to her pain. The demon "feels very linked to my 'inner child' who underwent trauma," suggesting an association between prior trauma and, for her, manifesting in a physical expression of pain. Other participants also describe their projected visual images of the demon related to current psychological therapy and other therapeutic modalities in which they engage, such as acupuncture, massage, and yoga, among others.

Developing Empathy for the Demon is facilitated by the FYD process, which includes generating both an image and dialog with these neglected, difficult parts of oneself. The meditation process facilitates empathy building as a three-part process. First, to acknowledge the presence of challenging emotions in their lives, which they frequently report dis-attending. Second, to feel how those challenging emotions affected and continue to affect them personally in their emotional, physical, and social lives. Finally, to validate those emotions, transforming them into realizations about themselves and validating the presence of those emotions as a part of themselves that can be fed and nourished.

Expanding self-awareness and responsibility (*n*=110; 21.5% of diary entries)

Participants described insights and understandings about themselves and encouraged a desire to shift and grow. This theme came from the codes: *current and past self play role in current problems, the mind can amplify negative emotions, perspective taking-putting myself in other shoes, and realizing one's own actions are harmful to both self and others.* Together, these codes express the ability for self-awareness, empathy for self and others, and the responsibility of reflection for personal transformation. Participants described how the meditation helped expand their self-awareness, particularly with challenging emotions, like fear, anger, and addictive craving. In the following reflection, this participant describes an increased knowledge of the role of fear in his behavior:

I am seeing that I am driven numb out of fear. What was new was how quickly I could participate in re-framing, redirecting my experience, and changing my (addictive) craving into understanding. What was familiar was the initial experience of "this will not work." (Participant 4014).

Displaying a deeper awareness of the experience of difficult emotions, in this case fear and addictive craving, as well as an ability to work with the difficulty instead of shutting down. What is notable is the shift from "the initial experience of 'this will not work'" to a deeper understanding between the relationships of fear and craving as it operates in his life. As a result of his meditation session, he felt that understanding transform from a perceived negative state, craving, into a sense of increased self-awareness, in this case, understanding. Other participants similarly expressed increased personal responsibility for challenging emotions, as the following quotation illustrates:

Age 12 is when I started blaming my weight and looks for everything that went wrong, self-hate began. New, she was resilient, did her best, familiar, sadness, her weight, wanting to eat more to be fed (Participant 4036).

Starting at an early age, this participant describes her self-perception at age 12—weight and looks "for everything that went wrong," that generated the beginning of her narrative that "self-hate began." After this meditation session, the participant saw a new side of herself, rooted in that distant time, but now transformed into a new woman "resilient, did her best, familiar… wanting to eat more to be fed." Reflecting on the meditation experience helped her articulate the roots of self-hate and take responsibility for the resilience that helped her re-shape her established narrative.

Some of the most powerful experiences participants describe include realizations about themselves including areas of their emotional lives that are difficult to bring awareness, either because of trauma or other mental health issues that are difficult to process. For example, in the following excerpt, the participant describes a destructive pattern with their daughter:

I have been suppressing my guilt and sorrow around my daughter's alcoholism and her anger and blame toward me. The newness was actually pinpointing a moment that symbolizes the dysfunction in our relationship (Participant 4083).

The participant describes feeling "guilt and sorrow around my daughter's alcoholism" and the resulting challenging behavior the daughter expresses toward her, namely "anger and blame." The process of FYD offers an opportunity to reflect on difficult experiences and consider one's role in their interpersonal relationship. Specifically, the meditation session enabled "pinpointing a moment that symbolizes the dysfunction," enabling the relationship a new possibility. Participants describe their sessions as manifesting feelings of empowerment by taking responsibility for their part in these relationships instead of self-blame or feeling victimized.

The theme of Expanding Self-Awareness and Responsibility highlights how participants are empowered to see and become aware of the limits they place on themselves in their emotional and social lives. In their reflections, participants suggest taking responsibility for the roles they do and do not play is significant to expanding self-awareness. Because the FYD meditation process encourages both a literal and a metaphorical projection of difficulty as the demon, the sensory details of projecting, feeding, and transforming the demon may play a role in how participants report expanding their self-awareness.

10.3389/fpsyg.2022.806500

Steps to action: Applying the FYD meditation to everyday life

In the steps to action, participants consider how they will use what they experienced going forward in their daily lives. The themes of compassion are very strong, both compassion for one's experience that is caring for things and people as they are and compassion which wants change and confrontation for one's less helpful habits and ways of thinking. Out of the coded data segments, we created two themes to synthesize participant's perspectives. We synthesized these under the title "Steps to Action" because in these two themes participants expressed how they intended to apply their FYD meditations to their everyday lives.

Cultivating fierce compassion (*n*=117; 23% of diary entries)

The theme of Fierce Compassion described a number of different reflections that centered around awareness and strength. The codes included in this theme are: *snap out of it, build defense mechanisms, build self-confidence and self-reliance, I need to challenge myself, and I recognize my own strength*. Fierce compassion is defined as being both loving and action-oriented, often with the quality of cutting through what is no longer serving, sometimes with force. The codes out of which we synthesized Cultivating Fierce Compassion provided insight into how participants not only recognized, but actually put their own inner strength to use for personal transformation.

When discussing how they imagined using their inner strength, participants frequently described apparently intractable interpersonal and family and sometimes social difficulties they felt held them back in some way. For many participants, they described specific techniques for how they imagined using their inner strength as well as the possible consequences of their actions, as the following excerpt shows:

I want to break down my views of family and see where they are coming from so I can cultivate compassion and equanimity. I want this weight and burden to be gone and I want to slow down my world to make sure I do not create bad karma with vengeful words that hurt (Participant 4053).

The technique this participant expresses to "break down my views of family and see where they are coming from" is part of the process they see as a next step for them after the meditation ends. They describe working with family dynamics and history as part of "this weight and burden" they carry inside, and an integral part "to slow down my world." Moving from the meditation experience to enact concrete action—"so I can cultivate compassion and equanimity" and "not create bad karma with vengeful words that hurt" how they envision applying the FYD lessons to their life. The participant describes a clear, caring, and forceful determination to not only accept what has happened in the past but to commit to changing it in the future.

While some participants point to seemingly intractable personal and social issues as the source inspiring transformation of emotional challenges, including addictive craving, other participants point to inner courage. Looking their demons directly in the eye without backing down requires courage, as the following excerpts illustrate:

Keep addressing this demon to get to the root as it seems to feed many aspects of my life and I have the sense of confrontation around this at every turn (Participant 4083).

I have not relayed my anger to the person I'm feeling it at because she is extremely delusional. I'm holding it in huge fists and fury of the demon. What I did not see is how hurt I am by her actions and how much I need to set boundaries of compassion and for myself. This relationship is for finding true wisdom in common—the wisdom is internal (Participant 4052).

The first participant points to dual persistence: the presence of the demon who he "sense(s) … confrontation around … every turn" and to the necessity of persistence to consistently face that demon in his life. The second participant describes the intensity of anger she feels through the demon who is "holding it in huge fists and fury." However, when mustering courage to face that fury, she realizes "how hurt I am" by the other person's actions. In fact, when staring down the demon, she realizes some possible solutions: "I need to set boundaries of compassion and for myself" of a valued personal relationship in which she might still "find true wisdom in common" with the other person. Setting compassionate boundaries is made possible for this participant by seeing clearly the repressed anger which manifested through the demon. Facing that demon creates an understanding of their own wisdom.

Overall, the theme Cultivating Fierce Compassion illustrates how participants create internal courage needed to "stare down" the demon sitting across from them. Looking their demons directly in the eye without backing down requires courage and persistence, which the meditation process helps them safely achieve. While creating internal resources out of thin air may seem impossible, participants describe meeting adversity where it finds them. Through their meditations, participants discover they are stronger and more resourceful than they initially imagined.

Nurturing compassion (*n*=112; 22% of diary entries)

Compassion has many manifestations. As the prior theme suggests, one form compassion can take is the forceful energy of fierce compassion. However, participants also described a softer, more gentle form of compassion rooted in quiet acceptance and the embrace of vulnerability. We call this theme "Nurturing Compassion" because it is composed from the individual codes *self-love and compassion, a renewed belief in self, vulnerability to others as strength*. The thread connecting these codes is the vulnerable compassion grounded in self-affirmation, self-acceptance, and self-love. Together, these ideas combine to form a second form of compassion infused throughout the diaries and exemplified by the following participant's reflection:

I can be happy on my own and love and care for myself without feeling so left out. I can include my different parts in my wholeness and let them nourish one another (Participant 4010).

As a result of the meditation session, this participant affirms their ability to "be happy on my own and love and care for myself" as an individual "without being left out" of normative social gatherings. This participant describes strong feelings of love directed toward the "wholeness" of oneself—this is done not by 'getting rid' of the demon, but "I can include my different parts in my wholeness and let them nourish one another. By including all the parts, this participant suggests an integrated view of self.

In their post-meditation reflections, participants often emphasized that they, themselves, were the source of nourishment, instead of an exterior source. For many participants, the source of feeling "cut off" from their own self-love from formative years of their childhood or young adulthood, as the following excerpt shows:

That I can generate those feelings of love and belonging myself. I can now know that I had these experiences as an infant, but I can repair them. And that I can access these positive emotions by looking into my heart to draw forth my love and strength. (Participant 4014).

The meditation session enables this participant the ability to "generate those feelings of love and belonging myself." Traveling back in time to their infancy, they seem to be sending a message to their infant self that "I can now know that I had these experiences," thereby affirming the fullness of nurturing experience, even one in the distant past. Visiting the past supports a feeling of confidence and strength in the present to heal past wounds is another aspect of nurturing compassion. Through the meditation process, they can hold the experiences of the past in a loving container in the present. This allows for the possibility of re-integrating past memories or trauma, as in memory reconsolidation.

Other participants described demons as embodying challenging people in their past or current lives. In these cases, Nurturing Compassion helped, at minimum, to lower negative affect toward these individuals and, at maximum, to begin an internal process of healing from social rifts. In the following excerpt, the participant's meditation session generated the demon as a Father figure with whom the participant experienced abuse:

Felt as I was feeding my "father" that I was also feeding his father. Huge compassion came for my father as I felt the abuse from his father, also from feeling how hard it felt to be "him" and yet, so much love available, letting go of anger (Participant 4016).

During the feeding activity of the meditation, this participant expresses she was "feeding my 'father'… I was feeding his father." This cross-generational event generated "Huge compassion" because while feeding her father, "I felt the abuse from his father" and "feeling how hard it felt to be 'him.'" The idea that this participant could generate compassion in a linked, cross-generational cycle of abuse points not only to a re-framing of the experience she had as an abused child, but to the need to nurture the wounded child that was once her father. Compassion for past hurt and abuse creates space for new understanding, insights, and letting go. Finding ways to release the emotional pain of past hurts is a critical area in FYD.

The theme Nurturing Compassion helps to coalesce the gentler side of compassion rooted in acceptance and self-love. Strikingly, many of the descriptions participants use to describe their experiences with this theme suggest challenging and traumatic events from their past and present. This suggests that rather than something that is "soft," Nurturing Compassion is, in fact, itself a challenging activity to bring compassion and understanding to neglected aspects of the self that have experienced trauma, abuse, and exclusion sometimes from an early age. Overall, the theme of Nurturing Compassion helps balance with its more aggressive form to create a more balanced approach to taking action in participant's personal lives as a result of the FYD meditations.

Other qualitatively significant dimensions

While the quantity of similar codes can be a good indicator for qualitative trends across a dataset, quantity alone is not necessarily the only way to gauge significance. Participants' diaries included a smaller number of qualitatively significant ideas that, while fewer in number, were still meaningful to include because they offer insight into the range of experience participants describe during and after the FYD meditation experience. While these codes are insufficient to construct themes themselves, four qualitatively significant categories include Reframe, Trust in the Process, The Numinous, and reflections on the FYD Meditation Process itself.

Reframing and new understanding (*n*=74; 14.5% of diary entries)

The FYD process creates a deliberate process for finding a new perspective to look at and reflect on painful or challenging experiences. The codes included in this theme are *forgiveness to others, a shift in how I understand my problems, body as a source of wisdom, and being present with difficult emotions.* The thread connecting these codes is that something present in participants' everyday lives—their body, their emotions, their difficulties—are reframed. Rather than something intractable, physical, emotional, and interpersonal experiences are cast in a new light with new opportunities. In the following excerpt, the participant describes his capacity for self-reliance as something newly discovered:

It could be nice to trust my capacity to listen to my wisdom. The force is not in a battle. I could think more in terms of being a soul than just a human. It is not a question of surviving in front of difficulty but transcend[ing] them. (Participant 4030).

Reframing current challenges, he suggests the "force is not in a battle," where *the force* is his way of describing his internal wisdom. Rather than a battle metaphor, he imagines it "more in terms of being a soul" with a life of its own with its own ability to "transcend" difficulties. This participant shares the simple wisdom

of being able to look at one's experience without aggression or denial and move beyond survival. Similarly, another participant describes how she wants to "adjust my mindset" in the following excerpt:

The soft openness of a cuddly new bear cub, I want to meet my life experiences with that, and to adjust my mindset that I have to avoid feeling weak or else I am weak, let that fear go knowing that fully embracing and allowing my feelings helps me to be strong. (Participant 4064).

She visualized the ally as the "soft openness of a cuddly new bear cub" as a new way to meet life experiences. Instead of having to "avoid feeling weak," she reframes the idea of weakness as directly related to her fear "knowing that fully embracing and allowing my feelings helps me to be strong." The insight and reframing often includes a willingness to be with emotions, to be open, this exemplifies a feeling of acceptance.

The theme Reframing and New Understanding illustrates the result of the process, a calm mind after the FYD meditation can be as transformative as the actual imagining process itself. Reflection on lessons learned and how those lessons can help inform one's life is how the FYD meditation facilitates inner transformation.

Trust in the FYD process (*n*=67; 13% of diary entries)

Participants described feeling supported by the process and encouraged to let the FYD work continue. The codes included in this theme are *dedication to continuing the process, considering next steps, trust in the ally to guide us to help us*. The thread connecting these codes is dedication to learning the FYD process as a salve for their wounded inner lives. Participants discussed persistence to practicing the meditation techniques, promising regular practice, as well as compassion for inner demons and healing from transformed allies. Many participants described their trust in the process with pithy aphorisms to help them remember general lessons learned from the meditation process, as the following excerpts show:

Being ok with myself when I feel like I do not have a plan or agenda, relaxing into the unknown, and know I am protected by my inner ally. (Participant 4010).

Being able to access the feeling of security I got when an ally seeks love, protection from me. (Participant 4049).

With calm, we see truths of life. (Participant 4031).

Many participants describe a sense of protection from the ally which can be used after the meditation session and in life provides participants with confidence and ease. Feelings generated from the ally themselves or as a result of the ally's presence are frequently described. Many participants described trust in the FYD process through what they want to remember as a result of the meditation:

The light. Bright wisdom my ally. The understanding that I do not need to keep trying to get something, it can just be given if I step back and be still (Participant 4067).

Heart connection, remembering the words and advice from the ally. (Participant 4015).

One participant emphasizes "The light. Bright wisdom my ally," while another participant emphasizes "Heart connection, remember the words and advice" as meaningful results of the meditation session. These participants describe feeling a sense of insight gained from the ally that can be taken with them into the rest of their life. Together, the codes and excerpts assembled to create the theme Trust in the FYD Process characterizes aspects of the meditation process and its result that participants find particularly meaningful to carry into their lives.

Experiencing the numinous (*n*=32; 6% of diary entries)

Throughout the data, participants describe the FYD meditation as a source of ludic activity and the numinous, defined as the mysterious awe-inspiring mystery of being alive, generated as a result of the meditation process. Meditators recounted a range of beings, creatures, and objects taking various natural forms, including eagles, snakes, flowers, and crystals, as well as more imaginative forms, including angels, fluffy-feathered balls, and winged horses. The essence of these responses included the awe inspired by nature as a source of healing and the inspiration generated by wonder and play. The range of these responses included both natural and supernatural elements. Some meditators combined natural elements with their body or from their imagined body's perspective:

How gorgeous I felt to be a swan. And how simple the transformation was once I recognized what I really need (Participant 4064).

View of the sea from a whale's body had a vastness in quality (Participant 4030).

Adopting natural forms helped participants see new things about themselves and their situation, which was refreshed by association with actual animals they know, such as a swan and a whale, and perhaps even see in everyday life. Imagining oneself occupying the graceful body of a swan or a whale transforms one's limited sense of self into something new. Other participants recounted imagined, supernatural beings:

How great it was to be the winged horse. How beautiful and bright and fun it was. The idea that all of that can be mine (Participant 4064).

How absurd it is to be jealous. That even being small and green does not make you unloveable. (Participant drew a smiley face to accompany this comment) (Participant 4072).

Participants imagined themselves magically transformed into figurative creatures symbolizing forms of being well beyond the confines of their usual everyday lives. Horses with sweeping wings helped participants imagine "all that can be mine" from the air and on the ground "being small and green" helped them imagine jealousy as a loveable absurdity. These playful images created new perspectives and opportunities to see everyday problems—the demons—in a new light by offering figurative opportunities for being out-of-the-ordinary as a result of the FYD meditation practice.

Participants also experienced nature as a source of healing and inspiration. Participants expressed their fears, desires, and insights as enacted by or facilitated through metaphors and similes of nature, the natural world, and its various processes. Through these images, participants compared their experiences of past limiting ideas, challenging emotions, and protective tools for healing, cleansing, and a new sense of being-in-the-world. For example, in the following quotations, participants relate their experiences during the FYD meditation as helping to facilitate healing processes they want to cultivate outside of the meditation:

The volcano breaking open is like my heart opening. I'd like to carry forward that remaining open, teachable, and compassionate [as] imperative to my recovery (Participant 4036).

Remember to use the protection tool I know, psychic, auric protection is key. Crystals are my tools and little helpers (Participant 4045).

For many participants, the natural world served as a model for transformation of the emotions through physical means. Invoking earth and fire, crystal, air, and water, participants expanded their awareness beyond their physical senses to envision their bodies intimately connected with natural processes and structures. These images suggest that participants' mental and emotional health internally are directly supported by the natural, external environment present around them, literally or figuratively, suggesting an incipient ecopsychology (Vakoch and Castrillón, 2014) in which the multiple relationships between humans and the natural worlds are inextricably interrelated.

Discussion

The goal of this study was to examine the experience of the FYD meditation process using written diary responses to two specific questions: how participants understand and make meaning from their FYD meditation experience, and what insights participants might carry forward into their everyday lives. Participants answered these questions having just completed the FYD meditation, which makes them a particularly rich source for reflections on the meditation. Participants reported significant shifts in how they perceived their "demons" both during (Meaning-Making) and after (Steps to Action) the FYD meditation practice, transforming the relationship to their difficulties by reframing those challenging experiences in new, often unexpected ways. This process converges with the Dahl framework presented in the introduction as participants made their way through the steps engaging in attention regulation and meta-awareness, perspective-taking and reappraisal, and self-inquiry. Overall, the qualitative analysis explores the insights associated with the transformation of difficulties through the FYD meditation process.

Reflective writing

Methodologically, our study suggests that completing a meditation diary may be a potential part of any benefit in the practice. Journaling and expressive writing about difficult emotional experiences has been found to improve both subjective and objective measures of health and wellbeing (Park, 2010). A written phenomenal recounting of the FYD meditation is part of the FYD practice, however the two reflective study questions added at the end may have combined FYD with the benefits which the process of written emotional expression about the FYD meditation (Pennebaker, 2018). When we designed the study, we had not considered that journaling after the meditation may, itself, have been part of the potential mechanism for change. However, in reading the powerful written reflections it is plausible, even likely, that the writing about FYD may potentiate the meaning-making of the experience (Park, 2010; Martela and Steger, 2016). The written responses to the summative questions: *How do you make sense of this experience? What was new? What was familiar?* revealed compelling narratives of newly found confidence, empathy, and self-awareness.

Completing the post-meditation diary gave participants an opportunity to potentially shift how they narrate and create the meaning of their demon after the end of the meditation (Lichtenthal and Neimeyer, 2012). The demons are drawn from autobiographical memories which are not fixed but can shift and change over time. It is through a narrative telling of salient autobiographical experiences that one can engage in the process of making meaning (Fivush et al., 2017). While we cannot claim that the response to the second question (*What, if anything, would you like to carry forward into your life from this [FYD] session?*) will translate to day-to-day behavioral shifts, writing as a reflective process supports a skills transfer of action in the world. The study of reflective inquiry shows that the practitioner's ability to learn and access former knowledge is greatly increased by personal reflection (Bolton, 2006). This closely resembles the quote by education and psychology pioneer John Bugg (1934) "We do not learn from an experience, we learn by reflecting on an experience."

Writing in the diary possibly supported a shift in the emotional tone, and attitude toward demons which may be a step toward not only managing the emotional discomfort of the experience but lead to more fundamental shifts in how participants find meaning and relate to themselves, others, and the world. In this light, it is not surprising that these questions offered an opportunity for the rich new insights that were shared in this paper.

Perspective-taking and reappraisal

In responses to the question on meaning-making, we discovered that participants substantially reframed the needs, and wants of their demons and often experienced an empathy for these demons. Imagining and conversing with the demon can

allow the space to be curious about the experience of the demon and give rise to feelings of care instead of distress or overwhelm (Lamm et al., 2007). The participant's difficult emotions may be regulated through both an ability to create a distance between oneself and the demon, a self-other distinction, and new way of relating to the demon through perspective-taking and reappraisal (McRae and Gross, 2020).

The maladaptive self-schema of feeling bad and wrong about the demon can be shifted through personifying and dialoguing with the demon. The imagery process involved in these meditation steps was a catalyst for a new appraisal of the demon as deserving of care which helps regulate the difficult emotions associated with the demon (Lamm et al., 2007; Ekman and Halpern, 2015). Although what the demon represents (e.g., broken relationships, addiction, past trauma) remains real, the emotional difficulty around the demon can shift.

A significant number of participants made meaning of their experience by reporting a feeling of new confidence and worthiness as they reappraised their needs and desires as fundamentally worthy. When caught in a negative rumination about difficulties, individuals may not have easy access to this rich and fresh process. Negative rumination is a considered a transdiagnostic aspect of psychological distress, depression, and anxiety (McLaughlin and Nolen-Hoeksema, 2011). Perspective-taking through visualization of a demon is an interesting area to continue to explore in the study of FYD.

Compassion flexibility

In the Steps to Action, participants envisioned how they can move their insights from the meditation experience into the rest of their lives. Participants articulated twin compassions, one fierce and one nurturing; the ability to re-frame and create new understandings of themselves in relationship with others (fierce) and a dedication to trust in the FYD process itself nurturing; (Neff and Germer, 2013; Neff, 2021). The self-compassion expressed by participants may be facilitated by the explicit process of perspective-taking and reappraisal through the FYD steps in contrast to a stand-alone single meditation on self-compassion. In particular, fierce compassion is a unique combination of care, strength, boundaries, clarity, and action. Nurturing compassion, on the other hand, is characterized by tender acceptance of one's feelings, comfort, and reassurance that one is not alone. Caring about the alleviation of suffering is core to compassion; however, its expression can take many forms. In the traditional iconography of Avalokiteshvara, the Tibetan Buddhist deity of compassion, there are one thousand arms of compassion (Khyentse, 2007). Each arm has a different way to address suffering, some offer pots of tea, others a sword for cutting through, and each of these arms has an eye that can see the suffering clearly. Through the process of visualizing and self-inquiry, participants may be able to discover how to best respond with compassion to their own suffering. Fierce and nurturing were both well represented in participant responses suggesting "compassion flexibility," embodying the ability to respond with firm, fierce or gentle, nurturing perspectives of care. Recent research reviewing the benefits of self-compassion training support a connection between practices of self-compassion and emotion regulation; kindness and care toward oneself is a potential method to reduce reactivity and rumination (Inwood and Ferrari, 2018).

Compassion flexibility aligns with the constructive practice family and more specifically relational practices which Dahl and colleagues associate with improving our wellbeing by improving our experience of connection and strengthening empathy (Singer and Klimecki, 2014; Dahl et al., 2015). Empathy for the stress or suffering, usually of another, can create a feeling of overwhelm and distress; however, when empathy includes compassion, the difficulty or struggle can be met without distress (Singer and Klimecki, 2014; Ekman and Krasner, 2017). In this study, participants expressed empathy for the demon and a dynamic, flexible compassion for their difficult experiences. The constructive family practices, especially compassion, are associated with the process of de-reifying, or reducing maladaptive self-schema by extending compassion not only to oneself but to all beings (Chodron, 2007; Khyentse, 2007). While FYD does not explicitly include a process of generating compassion for all beings, the ability to feel empathy and compassion for one's own distressing emotional experience could strengthen empathy toward others' distress (Ekman and Krasner, 2017).

Negative self-schema

The deconstructive family of practices can reduce identification with negative self-related beliefs which impede our sense of wellbeing. In FYD, participants engage in a process of inquiring into and changing—or transforming—difficult thoughts and emotions about their pain and difficulties, with the potential to change how they see themselves. This process of undoing maladaptive self-schema through constructive practices of perspective-taking, reappraisal, and self-inquiry and deconstructive practices of open monitoring shares qualities with the ancient practices of developing equanimity. The participant's reports of deep care while not being merged with their experiences feels like a stance of equanimity toward their own difficulties. Equanimity is only mentioned once in the Dahl framework as an outcome of constructive practices; however, equanimity can bridge the deconstructive family of practices with the constructive family of practices of compassion, kindness, and joy. Equanimity connotes not just non-reactivity, but calmness with a sense of wholeness and self-assurance in the face of one's own and other's difficulties (Khyentse, 2007; Fronsdal, 2008; Desbordes et al., 2015). For example, one might consider equanimity as not just enduring life's hardships, but as maintaining wellbeing amid difficulties. Thus, although not explicitly mentioned by participants, the FYD process of inquiring into and feeding the demon may have fostered an

equanimous stance toward their distressing situation and related painful thoughts and feelings embodied by the demon. Future research may examine the role of equanimity in fostering wellbeing in FYD.

Cultivating equanimity entails the ability to hold both positive and negative experiences (or perceptions) together and could entail a broader perspective on one's challenges and sense of self (Sahdra et al., 2011). Allione quoted the creator of Chöd, "As long as there is an ego, there are demons. When there is no more ego, there are no more demons either!"—Machig Labdrön (Allione, 2008, p.107)." The dissolution of self is believed to be an essential feature of advanced meditation which gives rise to greater and more sustained states of equanimity (Millière et al., 2018; Nave et al., 2021).

One unexpected finding from this study was that participants reported robust experiences with the numinous, the feeling of awe, and playful wonder of the natural world. Participants detailed descriptions of supernatural beings and natural phenomena conventionally viewed as inanimate but vibrating with life made lasting impacts on participants and their transformed relationships with their demons and themselves. Investigating how a meditation like FYD can help understand these liminal experiences may also help create additional understanding between Tibetan Buddhism and states of ordinary optimal experiences.

Limitations and future directions

Although *Chöd* is an ancient practice, its secular version, as FYD, is a new practice in the field of secular meditation and psychology. As the first study on the FYD process with a limited sample size and unique sample of community meditators, the findings are not conclusive. The population of this study involved experienced meditators with at least 3 months of prior meditation experience and so we cannot generalize findings to those with no prior meditation experience. On the other hand, findings are encouraging in that participants with no prior experience with Vajrayana Buddhist meditation reported benefits from a secular, adapted version of a traditional Vajrayana practice. The potential positive impact participants found through this practice warrants further study and development of both to understand the potential benefits or risks for less experienced meditators. In the main study, some participants experienced increased distress with the FYD practice. Further research can identify more clearly what steps of the practice might lead to what types of benefits or risks.

Although we randomly assigned participants to FYD training vs. waitlist group for the main study outcomes, for this paper, we analyzed all participant responses together across groups. Future studies will benefit from using a randomized control design with an active control condition to determine whether non-meditation-specific effects contribute to FYD-associated changes. For example, each practitioner was given initial training and three guided meditation sessions with a meditation coach. We did not measure the working alliance between the meditation practitioner and coach which may have influenced outcomes. Also, our study examined the effect of up to 15 meditation sessions within 1 month. In contrast to other standard meditation programs such as MBSR, MBCT, and MSC each of which is 8 weeks, our 1-month duration of training was relatively short. Thus, future studies will want to examine whether a longer dose of training is associated with stronger and different outcomes. We focused on the analysis of written responses to two specific questions about the experience and learning from the practice. There may be other important experiences that can be assessed with the addition of interviews or second-person interviews.

There was no formal assessment of "adverse events" and one participant did leave the study after the first session due to difficulty with the practice; another had challenges throughout but decided to stay. These challenges were shared with study staff for advice and support. In future studies, a more specific assessment of adverse events should be included.

Conclusion

This article explores the benefits of FYD as a unique practice drawing on the Vajrayana Buddhist tradition that integrates mindful attention with imagery and dissolution practices. Results of the qualitative analysis suggest that FYD supports perspective-taking, reappraisal, reduced identification with maladaptive self-schema, and increased compassion for self. Further study is needed to ascertain which elements of the FYD process are most helpful, what doses are optimal for whom, and larger sample sizes to investigate the benefits and risks of FYD.

FYD's unique blend of the psychological and spiritual also begs the question whether these two aspects of wellbeing require one another, or if they are even separate categories.

Data availability statement

The original contributions presented in the study are included in the article/Supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

The studies involving human participants were reviewed and approved by Institutional Review Board UC Davis. The patients/participants provided their written informed consent to participate in this study.

Author contributions

EE led the qualitative study design, data collection, study team, analysis, and writing. CJK was a primary collaborator on the analysis of the qualitative analysis of the diary data and in writing up results. PG is the principal investigator of the quantitative study and leads the computational linguistic analysis for this paper. KGD contributed to the writing of the literature and analysis and framing of the paper. JD provided editorial feedback and writing direction. Chandra supported editing. AB and VS were research assistants in the study who helped to gather, clean, and prepare the data for analysis. All authors contributed to the article and approved the submitted version.

Funding

This study received funding from Tara Mandala. The funder was not involved in the study design, collection, analysis, interpretation of data, the writing of this article or the decision to submit it for publication.

Acknowledgments

We acknowledge the contributions of the participants who offered their time and diligence to complete the assessments and diaries. We are indebted with gratitude to the efforts of Lopön Chandra Easton who lead many of the FYD sessions with participants and helped to organize the study team, the volunteers who transcribed and organized the study materials including Celeste Young, Kailah Prince, and many other volunteers from San Francisco State University and Tara Mandala. We thank Tara Mandala for the financial support to run the study. Lastly, we thank the yogini Machig Labdrön for the creation of the Chöd practice offered freely in her time and those who have preserved the teachings.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyg.2022.806500/full#supplementary-material

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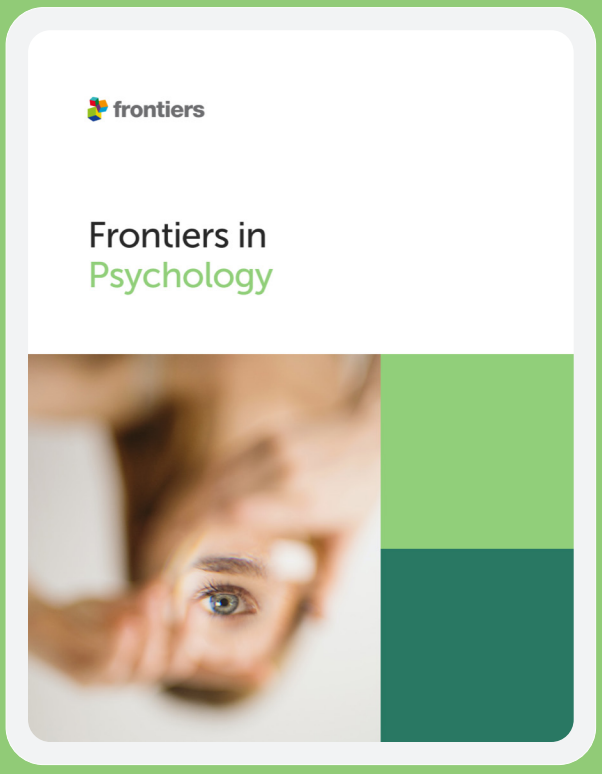

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