

The Variety and Differential Effectiveness of Meditation Techniques and Yoga Components

Dissertation

zur Erlangung des Doktorgrades der Naturwissenschaften

— Dr. rer. nat. —

der Fakultät für Human- und Sozialwissenschaften der

Technischen Universität Chemnitz

vorgelegt von

Karin Matko

2021

Dekanin

Prof. Dr. Anja Strobel (Technische Universität Chemnitz)

1. Gutachter

Prof. Dr. Peter Sedlmeier (Technische Universität Chemnitz)

2. Gutachter

Prof. Dr. Stefan Schmidt (Universität Freiburg)

Tag der Einreichung: 22.01.2021

Tag der Verteidigung: 10.06.2021

Online unter: <https://nbn-resolving.org/urn:nbn:de:bsz:ch1-qucosa2-752576>



There are only two ways to live your life. One is as though nothing is a miracle. The other is as though everything is a miracle.

Albert Einstein



There are only two days in the year that nothing can be done. One is called yesterday, and the other is called tomorrow, so today is the right day to love, believe, do, and mostly, live.

Dalai Lama



ACKNOWLEDGMENTS

A dissertation is not written overnight and I would like to thank all the people who supported me on this journey over the past few years. First, I thank my supervisor Peter Sedlmeier for his kind, intelligent, and unwavering guidance. Thank you for your open-mindedness, our fruitful discussions, and all of your feedback. You always took the time to answer my endless questions and I really enjoyed working with you. I would also like to thank my mentor Stefan Schmidt who was most helpful in envisioning my future scientific journey and kindly agreed to evaluate my thesis. Moreover, I would like to thank my two collaborators. Thank you Ulrich Ott for our stimulating conversations, your feedback and your friendly advice. Thank you Holger C. Bringmann for training me in your inspirational intervention and for all your help in our project. I am grateful to the Free State of Saxony for supporting me and parts of this project with a scholarship.

Furthermore, I would like to thank all of my colleagues. Thank you Johannes and Markus for patiently answering all of my statistical questions. Thank you Isabell and Eva for your women's power. Thank you Ritesh for being a congenial roommate and co-meditator. Over the course of time, I got to know a lot of inspiring and supportive people. I thank Anita Todd, Gesa Kappen, Mathis Trautwein, Vanessa Potter, Michael Tremmel, and Kathleen Schkade for reading and giving hugely helpful comments on parts of my thesis. My thank also goes to Lisa Quasten, Christin Block, and Felix Neuhaus who supported me in preparing and conducting the extensive and quite demanding intervention study. I thank Annika Sternkopf for her help in preparing and screening some of my data. Likewise, I thank all the wonderful scientists and practitioners who I met during various conferences who gave me the feeling of being part of a larger community. Also, I wish to express my deep gratitude to all the hundreds of people who made this research possible by participating in the studies.

Of course, my friends and family have contributed greatly by their trust, appreciation, and sincere encouragement of my work – thank you all! Thank you Catharina and Sarah for providing me with a workplace when everything else was closed during the pandemic. Thank you mom, dad, and Nastja for being always there for me. My infinite gratitude and love goes to my daughters Alma and Tara who were very understanding when their mom was working long hours. Last but not least, I wish to thank my dear husband Johannes. Thank you for taking care of things at home and being my unceasing source of resilience.

TABLE OF CONTENTS

ACKNOWLEDGMENTS	i
TABLE OF CONTENTS	ii
1. INTRODUCTION	2
THE VARIETY OF MEDITATION PRACTICES	2
INFLUENTIAL FACTORS ON MEDITATION’S EFFECTS	3
OVERVIEW OF CHAPTERS	4
2. WHAT DO MEDITATORS DO WHEN THEY MEDITATE?	8
INTRODUCTION	8
STUDY 1	11
<i>Method</i>	11
<i>Results</i>	12
<i>Discussion</i>	15
STUDY 2	16
<i>Method</i>	16
<i>Results</i>	18
<i>What Do Meditators Do When They Meditate: The Commonalities</i>	18
<i>What Do Meditators Do When They Meditate: The Differences</i>	22
<i>What Do Meditators Do When They Meditate: The Combinations</i>	31
<i>Discussion</i>	37
CONCLUSION.....	42
3. HOW CAN MEDITATION TECHNIQUES BE CLASSIFIED?	44
INTRODUCTION	44
METHOD.....	50
<i>Procedure</i>	50
<i>Participants</i>	51
<i>Materials</i>	52
RESULTS.....	53
<i>Differences Between Traditions</i>	57
DISCUSSION	60
<i>Meditation Is Inherently Embodied</i>	61
<i>Expanding Focused Attention and Open Monitoring</i>	62
<i>Limitations and Future Directions</i>	63
CONCLUSION.....	65

4. WHAT EFFECTS DO DIFFERENT COMPONENTS OF YOGA HAVE?.....	68
COMPARATIVE INTERVENTION STUDIES	70
META-ANALYSES COMPARING DIFFERENT SUBGROUPS OF INTERVENTIONS	76
DISCUSSION	84
5. WHAT MAKES YOGA EFFECTIVE?.....	88
INTRODUCTION	88
<i>Aims and Methodology of the Present Study</i>	90
METHOD.....	93
<i>Procedure</i>	93
<i>Participants</i>	94
<i>Treatment: MBLM and its Components</i>	96
<i>Measures</i>	99
<i>Data analysis</i>	101
<i>Tau-U</i>	102
<i>Multilevel Modeling</i>	102
<i>Missing Data</i>	103
RESULTS.....	104
<i>Adherence</i>	104
<i>Well-being</i>	105
<i>Stress</i>	112
<i>Life Satisfaction</i>	117
<i>Potential Explanatory Variables</i>	117
<i>Dose-Response and Experience-Response Relations</i>	120
DISCUSSION	122
<i>Framing Mantra Meditation Enhances its Effects</i>	124
<i>Specific Combinations of Practices Yield Different Effects</i>	125
<i>Limitations and Future Directions</i>	127
6. CONCLUSION AND OUTLOOK.....	132
BIBLIOGRAPHY.....	137
APPENDIX A – LIST OF 309 MEDITATION TECHNIQUES.....	158
APPENDIX B – ADDITIONAL TABLES FOR CHAPTER 2.....	170
APPENDIX C – FULL RANKING SEQUENCES OF PREFERRED MEDITATION TECHNIQUES IN 12 MAJOR MEDITATIVE TRADITIONS.....	176
APPENDIX D – STUDY MATERIALS DESCRIBED IN CHAPTER 5.....	184
APPENDIX E – ADDITIONAL TABLES FOR CHAPTER 5	189
APPENDIX F – ADDITIONAL FIGURES FOR CHAPTER 5.....	200
ZUSAMMENFASSUNG	208
CURRICULUM VITAE	212

Chapter One

Introduction

1. INTRODUCTION

Meditative practices can be found across many different cultures and spiritual traditions. Originally, meditation was taught and used to achieve self-realization or connect to the spiritual (West, 2016). While the ultimate aim was often quite similar, the actual method for getting there differed considerably across traditions. Christian meditators repeated the name of Jesus in their hearts, Tibetan Buddhists created visualizations of deities, and Sufi dancers persistently span around their own axis—and are still doing so today. Some traditions devised elaborate systems with collections of diverse practices for spiritual seekers. Two such systems are the Buddhist noble eightfold path and the eightfold Yoga path (Sedlmeier & Srinivas, 2019). Both eightfold paths comprise different forms of meditation and moral virtues serious practitioners should follow. Furthermore, the Yoga eightfold path includes collections of breathing exercises and body postures (Feuerstein, 2012). The Buddhist eightfold path, on the other hand, entails meditation techniques as well as training in higher wisdom, that is, recognizing the *Four Noble Truths* (Harvey, 2012). Following these paths with their variety of practices is supposed to enhance spiritual progress. However, this variety of practices and combinations of practices makes their scientific investigation challenging.

Research into meditation began some 60 years ago when the hippie movement brought Eastern spiritual practices to the West (Schmidt, 2014). First a rather exotic study subject, meditation has recently become extremely popular, both in the public as well as in social and neuroscience (Van Dam et al., 2018). Yet, with this increasing interest, it became clear that previous research had suffered from several shortcomings. To date, there is no overarching theory of meditation, or even a suitable definition for the umbrella term “meditation” (Awasthi, 2013). The methodology of prior studies was often poor, and variables were chosen ad hoc without referring to specific theories (Sedlmeier et al., 2016). Although, recently, several researchers proposed working mechanisms of meditation (Berkovich-Ohana & Glicksohn, 2017; Hölzel et al., 2011; Vago & Silbersweig, 2012), there has been a lack of systematic research investigating the suggested links and mechanisms. Furthermore, research was frequently limited to a small selection of meditation techniques, such as mantra meditation or mindfulness meditation, disregarding their inherent variety.

The Variety of Meditation Practices

In fact, meditative practices are so varied, it sometimes seems difficult to subsume them all under the same term. Shear (2006) invited ten experts of different meditation traditions to give an overview on their respective tradition. Qigong uses meditative movements, breathing techniques and concentration to circle energy through specific channels in the body (Liang & Wu,

2006). Yoga employs similar types of practices, and additionally recommends the use of mantra recitation or contemplation on the question “Who am I?” (Feuerstein, 2006). Zen Buddhists sit in silence, count their breaths, or contemplate on a contradictory phrase (*koan*) to reach a state of tranquility and awareness (Harada Roshi, 2006). Theravada Buddhists can select one or more of forty different meditation objects, such as a bowl of water, the visualization of a corpse, the four elements, unbounded space, or loving-kindness (Schwartz & Clark, 2006). Sufi meditators invoke a the feeling of love in their hearts and try to surrender the mind in the heart or to God (Vaughn-Lee, 2006), similar to Christian meditators (Pennington, 2006).

In 2007, Ospina et al. conducted a very broad study on meditation and its effects on health. Through a comprehensive literature search, they identified 32 interventions considered meditation practices or involving a meditative component. However, of the 32 practices only ten had been assessed in previous experimental trials. The authors chose to classify these ten meditation practices into five broad categories, namely, Mantra meditation, Mindfulness meditation, Yoga, Tai Chi, and Qigong. They acknowledged the lack of specificity in these broad categories. Particularly the last three categories encompass a variety of multifaceted practices, such as sitting meditation, body postures, meditative movement, and breathing techniques. To date, it remains unclear how each of these practices works—both, alone or in specific combinations. There are some hints that interventions combining several meditative practices are more beneficial than simpler interventions (Eberth & Sedlmeier, 2012; Hagins et al., 2013). Nonetheless, research into this topic is still in its infancy as there are far too many influential variables that need to be investigated in detail.

Influential Factors on Meditation’s Effects

Several authors have pointed out certain factors that might impact the efficacy of meditation interventions. I will summarize them in the following. There have been numerous calls to broaden the scope of current contemplative research by incorporating the multiplicity of existing meditative practices (Awasthi, 2013; Davidson & Dahl, 2018). Recent classification systems included a greater heterogeneity of practices from diverse traditional backgrounds (Dahl et al., 2015; Nash & Newberg, 2013). Moreover, a growing number of comparative studies has shown that diverse meditation techniques have distinct effects (e.g., Colzato et al., 2012; Fredrickson et al., 2017), and also differ in their perceived difficulty (Kropp & Sedlmeier, 2019; Lumma et al., 2015) and phenomenology (Kok & Singer, 2017). Still, no collection of meditation techniques has been truly comprehensive to date.

Meditative practices are typically situated within a broader context of traditional or, nowadays, secular frameworks (Dorjee, 2016; Ospina et al., 2007). These frameworks are supposed to provide guidance concerning both, the way of practice and the interpretation or framing of experiences during practice (Pilla et al., 2020). Research has shown that frameworks can influence the effects of meditation significantly (Amihai & Kozhevnikov, 2014; Wachholtz & Pargament,

2005). Most traditions recommend practicing sets of various techniques or following an elaborate path (see above). Traditional yoga, for example, entails four main elements—ethics, postures, breath regulation, and meditation (Gard et al., 2014). Similarly, secular meditation programs, such as Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 2013), comprise several components. Each of these components can elicit different effects (Hunt et al., 2018; Sauer-Zavala et al., 2013). Correspondingly, adding one component, in these cases ethical instruction, to a mindfulness or a yoga intervention enhanced their efficacy (Chen & Jordan, 2020; J. A. Smith et al., 2011).

Additionally, factors within a person and factors relating to the setting of meditation practice need to be considered (Allbritton & Heeter, 2018; Schmidt, 2014). Different people show different preferences for meditative practices (Burke, 2012; R. Tang & Braver, 2020), and pursue meditative practices for different reasons and aims (Park et al., 2016; Sedlmeier & Theumer, 2020). Furthermore, intervention studies have indicated considerable interindividual differences in response to meditation treatments (Krick & Felfe, 2020; May et al., 2014). It also made a difference whether participants learned meditative practices in a group or independently (Mantzios & Giannou, 2014), online or offline (Cillessen et al., 2018), and indoors or outdoors (Lymeus et al., 2019). Moreover, the amount of teacher training was related to well-being outcomes in healthy participants (Ruijgrok-Lupton et al., 2018). Yet, teachers' rated competence was not associated with depression outcomes in a patient population (Huijbers et al., 2017).

In summary, many factors (technique, context, personality, setting, etc.) influence the outcomes of meditation interventions and more research is needed to understand the basic working mechanisms of meditation. For this purpose, influential factors should be isolated and investigated in detail. Therefore, it is necessary to compile an overview on basic meditative practices and components of complex meditation systems. Then, each of these practices and components should be examined, both individually and in different combinations, using methodologically rigorous designs. Traditional frameworks and interindividual differences need to be taken into account. It might be that this huge variety of practices evolved around the world because people are so different. Thus, evaluating individual responses would be a worthwhile endeavor specifically with regard to the multiplicity of meditation practices and the complexity of intervention components.

Overview of Chapters

I attempted to address some of the abovementioned issues throughout my work on this thesis. This thesis consists of two main parts. Chapters 2 and 3 uncover the inherent variety of meditative practices that can be found across a wide range of meditation traditions. While these two chapters strip the basic meditation techniques off all additional influences, the second two chapters expand the focus of attention. In Chapters 4 and 5, I concentrate on one multifaceted system of meditative practice, namely, the eightfold yoga path. I elaborate on the variety of practice components this path has to offer and reveal some of their differential and incremental effects.

In the last chapter (Chapter 6), I summarize my main findings and place them in the context of current research and theorizing.

The four main chapters of this thesis are self-contained individual papers. One has already been published and the other three will be submitted to peer-reviewed journals. Note that I have made a few small adjustments to increase readability. I have replaced references between the papers by the according chapter numbers. Furthermore, this dissertation contains a single reference section and a single appendix section for all four papers. Apart from this, all papers are presented here in their original form. Thus, some textual redundancy between the chapters of this dissertation was inevitable.

In the second chapter, I try to answer the question “What do meditators do when they meditate?” from multiple perspectives. To answer this question, I chose a bottom-up approach and conducted two studies. My aim was to compile a comprehensive overview of meditation techniques spanning all major traditions. In the first, qualitative study, I gathered 309 meditation techniques through a literature search and interviews with 20 expert meditators. Then, I reduced this collection to 50 basic meditation techniques. In the second, quantitative study, 635 experienced meditators from a wide range of meditative backgrounds indicated how much experience they had with each of these 50 meditation techniques. Meditators' responses indicated that my choice of techniques had been adequate and two techniques had to be added. The additional statistical and cluster analyses illustrated preferences for specific techniques across and within diverse traditions as well as sets of techniques commonly practiced together. Body-centered techniques stood out in being of exceptional importance to all meditators. These results show an amazing variety of meditation techniques, which should be examined in future scientific investigations.

In the third chapter, I expand on the previous chapter and propose a novel classification system for meditation techniques. First, I review earlier proposals on defining and classifying meditation. Then, I describe another survey study that I conducted. Based on the findings from Chapter 2, I deduced the 20 most popular meditation techniques. In this study, I asked 100 experienced meditators to rate the similarity of these techniques. Using multidimensional scaling, I found two orthogonal dimensions along which meditation techniques could be classified: *activation* and *amount of body orientation*. These dimensions emphasize the role of embodied cognition in meditation. Within these two dimensions, seven main clusters emerged: mindful observation, body-centered meditation, visual concentration, contemplation, affect-centered meditation, mantra meditation, and meditation with movement. I conclude there is no “meditation” as such, but there are rather different groups of techniques that might exert diverse effects. These groups call into question the common division into “focused attention” and “open-monitoring” practices.

In the fourth chapter, I review the available evidence on the effects of diverse yoga components, such as physical postures, breathing techniques, meditation practices, and ethical teachings.

Numerous studies and meta-analyses have demonstrated yoga's efficacy in promoting mental and physical health. Conversely, little is known about how the various components of yoga contribute to its overall effect. In order to shed light on this issue, I evaluated 18 comparative studies and 16 meta-analyses that conducted relevant subgroup analyses. These studies and meta-analyses examined a multitude of variables and varied greatly with regard to population, study design, and yoga components under investigation. Some meta-analyses included other mind-body interventions, such as Mindfulness-Based Stress Reduction (MBSR). Nonetheless, combined interventions incorporating multiple components consistently outperformed simpler interventions. Adding breathing and/or meditation practices to yoga interventions proved particularly beneficial in this regard. However, specific components or combinations were more effective in enhancing certain variables or clinical conditions suggesting a necessity for custom-tailored programs. Similarly complex mind-body interventions, such as yoga and MBSR were often equally efficient. Still, most findings remain preliminary and more research is needed. The ethical component of yoga is particularly under-researched.

The fifth chapter describes an intervention study that attempted to disentangle the effects of different combinations of yoga components. Using an experimental single-case multiple-baseline design, I examined the incremental effects of ethical education and physical yoga on mantra meditation. Forty-two healthy participants were randomly assigned to four conditions—meditation alone, meditation plus physical yoga, meditation plus ethical education, and meditation plus yoga and ethics. All interventions lasted for eight weeks. During baseline and treatment phases, participants received daily questionnaires. Almost all participants showed an increase in well-being, except participants in the meditation only condition. This increase was most prominent in participants who received ethical education. There was a tendency for all treatments to decrease stress. However, there was a marked reduction in stress for participants in the yoga plus meditation condition. These results emphasize the incremental and differential effects of practicing meditation in combination with other practices from the eightfold yoga path. In addition, I observed a lot of interindividual variability in response to the treatments, which I discuss and try to explain in this chapter.

Chapter Two

What Do Meditators Do When They Meditate? Proposing a Novel Basis for Future Meditation Research

This chapter is under review as:

Matko, K., Ott, U., & Sedlmeier, P. (2021). What do meditators do when they meditate? Proposing a novel basis for future meditation research. *Mindfulness*.

2. WHAT DO MEDITATORS DO WHEN THEY MEDITATE?

Meditation has become one of the most popular and widely researched mental training techniques, and meditation and mindfulness are often treated as panaceas for almost anything (Van Dam et al., 2018). However, with its increasing popularity it has become clear that, in fact, “meditation” is not one specific technique but an umbrella term that encompasses a great variety of different techniques (Awasthi, 2013; Dorjee, 2016). These techniques range from the well-known observance of the breath to the far less common humming meditation or contemplation on death and mortality. This variety makes it difficult to define meditation and do justice to the vast range of practices associated with it (Bond et al., 2009; Schmidt, 2014). Thus, researchers and practitioners alike would benefit from a comprehensive overview of meditation techniques that would give them insight into what meditators actually do when they are meditating. This was the aim of the present studies. We employed a bottom-up methodological approach and drew on the expertise of experienced meditators from diverse traditions. As a result, we are able to present the first comprehensive compilation of basic meditation techniques, depicting the complexity and variety of meditation practices found in various meditative traditions and schools. Furthermore, our analysis should provide valuable insight into which meditation techniques are the most popular across and within different traditions and which are commonly practiced together.

Herbert Benson was one of the first researchers to describe the effects of meditation (1975). He investigated the effects of Transcendental Meditation (whose main technique is a form of mantra meditation) and concluded the main effect of meditation was the “relaxation response” it elicited. As the field of meditation research grew, it became clear that this view was shortsighted, as there were other meditation techniques that did not elicit relaxation in practitioners (Amihai & Kozhevnikov, 2014; Lumma et al., 2015; Peng et al., 2004). An initial and now widespread differentiation distinguished “focused attention” and “open monitoring” as two styles of meditation (Lutz et al., 2008). This differentiation was opened up and extended to include more styles, such as loving-kindness and compassion meditation, which were considered mixtures of focused attention and open monitoring (Lippelt et al., 2014). As research grew, it became clear that reducing meditation to these few styles represented an oversimplification of its inherent variety. Consequently, new collections and classification systems encompassing a greater variety of meditation techniques have been proposed (Brandmeyer et al., 2019; Dahl et al., 2015; Fox et al., 2016; Lutz et al., 2015; Nash & Newberg, 2013). Nonetheless, these collections and classification systems have still been derived mostly from the top down and they omit several important meditation techniques, especially from the Hindu context (see Chapter 3).

A growing body of research has acknowledged the need to differentiate between different styles of meditation. Meta-analyses have found differential effects for several types of meditation in clinical (Goyal et al., 2014) as well as healthy (Fox et al., 2016; Rose et al., 2020; Sedlmeier et al., 2012, 2018) populations. Comparative studies have begun to distinguish and compare the effects of mantra meditation, breathing meditation, body scan, open monitoring, or observing-thoughts meditation, loving-kindness meditation, and compassion meditation. Obviously, these studies did not compare all but rather selections of the abovementioned techniques. In doing so, they found differences in, for example, attention (Lee et al., 2012), affect (May et al., 2014), concentration and emotion regulation (Kropp & Sedlmeier, 2019), creativity (Colzato et al., 2012), decentering (Feldman et al., 2010), mindfulness (Cebolla, Campos, et al., 2017), heart-rate variability and perceived effort (Lumma et al., 2015), personal preference (Burke, 2012; R. Tang & Braver, 2020), phenomenological experience (Przyrembel & Singer, 2018), and brain activation and deactivation patterns (Fox et al., 2016).

Yet, despite these attempts to acknowledge and do justice to the variety of meditation techniques, the selection of meditation techniques to be included in a collection has still been limited to the few abovementioned, well-known styles of meditation. Additionally, the selection of techniques has often been arbitrary rather than guided by a sound theory or classification system. To date, only a few studies have investigated the effects of meditation techniques that are less well known but still very important and prevalent in their specific traditions. These techniques include visualization (Amihai & Kozhevnikov, 2014; Lou et al., 1999), nondual awareness (Josipovic, 2010), supine/relaxation meditation (Gul & Jahangir, 2019; Kjaer et al., 2002), chanting (Harne et al., 2019; Wolf & Abell, 2003), analytical meditation (van Vugt et al., 2020), contemplation (Bach & Guse, 2015), energy meditation (Venkatesh et al., 1997), dynamic meditation (Bansal et al., 2016), Qigong (Pölönen et al., 2019), or whirling meditation (Cakmak et al., 2017).

As can easily be seen from this rather arbitrary collection, these techniques partly originate from cultural, spiritual, or religious contexts other than the nowadays most prevalent forms of mindfulness meditation. Visualizations are commonly used in the context of Hindu or (Tibetan) Buddhist meditation. Chanting as a form of meditation can be found in Hindu, Buddhist, and Sufi traditions. Energy meditation is commonly practiced by Hindu, Tantric, and Qigong meditators. To date, these various techniques have received a lot less attention in research than the omnipresent mindfulness meditation or the formerly quite popular Transcendental Meditation.

However, one problem that arises with growing variety in the field is finding a definition that reconciles all these different forms of meditation. Definitions of meditation that have been brought up so far are almost as diverse as the techniques described above. Some authors have emphasized the relevance of particular aspects such as mental training, self-regulation, and attention (Lutz et al., 2008; Y.-Y. Tang et al., 2015; Walsh & Shapiro, 2006; West, 2016), while others have differentiated between meditative states and techniques (Bond et al., 2009;

Deshmukh, 2006; Nash & Newberg, 2013). The purpose of meditation also differs across definitions. According to some definitions, meditation can be practiced for either general well-being, alteration of consciousness, or spiritual insight. These diverse definitions have been discussed in detail elsewhere (Bond et al., 2009; Schmidt, 2014). I will discuss this issue in more detail in the next chapter. They represent the lack of consensus among experts on when or when not to label a practice meditation. Some authors have argued that finding an overarching definition of meditation might be close to impossible (Ospina et al., 2007; Schmidt, 2014). Others, in turn, have suggested that there might be commonalities across all techniques such as a common goal of reaching a “natural meditative state” (Reddy & Roy, 2019), or that all meditation techniques share a somatic, embodied component (see Chapter 3).

To better identify and comprehend the defining features and working mechanisms of meditation, it is imperative to open up meditation research and investigate meditation in its many forms (Dahl et al., 2015; Ospina et al., 2007; Travis & Shear, 2010). This might also be helpful in developing one or several overarching theories of meditation (Dorjee, 2016; Sedlmeier et al., 2016). To achieve this, first we need to obtain a good overview of the meditation techniques, which exist throughout different spiritual and cultural contexts and traditions. Although some researchers have pointed out and described a great variety of meditation techniques (Dahl et al., 2015; Ospina et al., 2007; Travis & Shear, 2010), as of this writing we know of no compilation that is truly comprehensive.

Additionally, in the past, many techniques were labeled with a couple of words, for instance, breathing meditation, without being given concise descriptions of what meditators were actually doing while meditating. However, “breathing meditation” can imply completely different techniques depending on the context. Some meditators count their breaths, some observe their abdomen while breathing, and still others combine breathing with visualizations of light and smoke. It is, thus, essential to describe the specific techniques that meditators are using during meditation in detail. In response to this issue, some researchers have developed taxonomies and frameworks to help researchers and practitioners describe what they are doing during meditation (Allbritton & Heeter, 2018; Lutz et al., 2015; Nash & Newberg, 2013; Schmidt, 2014).

Another issue repeatedly raised in the literature is the need to investigate basic meditation techniques that do not include confounding factors, such as supportive exercises or a religious context, to draw accurate causal inferences (Chiesa & Malinowski, 2011; Isbel & Summers, 2017). Research has shown that practicing meditation in the specific framework of a belief system can tremendously influence the outcomes of meditation (Amihai & Kozhevnikov, 2014; Bayot et al., 2020; Hunt et al., 2018). Yet, little is known about the differential effects of basic meditation techniques, let alone their interaction with context factors or the effects of combined techniques.

We decided to approach the abovementioned issues from a different perspective, using qualitative and quantitative methods. Instead of deducing meditation techniques from the top

down from a researcher's perspective, we chose a bottom-up process of generating basic meditation techniques by involving meditation experts. A similar methodology has already been successfully employed in a study deducing a working definition of meditation (Bond et al., 2009). We approached meditation experts from various traditions with a simple but germane question: "When you meditate, what exactly do you do?" This was the central question guiding our research. Moreover, we decided to break down meditation techniques into their components, or, in other words, the basic techniques. This would make them easily accessible and understandable to many practitioners of diverse backgrounds and, thus, to researchers interested in the basic working mechanisms of meditation.

In our first study, we deduced a set of basic meditation techniques that was as complete as possible, and then in a second study, we evaluated this set in a large sample of experienced meditators. Drawing on these data, we explored the question "What do meditators do when they meditate?" from three different perspectives. First, we approached the question in the most general way by identifying the most popular meditation techniques practiced by a large variety of meditators. Second, we looked at different meditative traditions to see which of these basic techniques are most commonly practiced in each tradition. And third, we focused on the question of which meditation techniques were commonly practiced together by meditators, irrespective of their tradition.

Study 1

One aim of this qualitative study was to capture as many meditation techniques as possible through a bottom-up empirical investigation. By asking expert meditators in the field and with a thorough investigation of the meditation literature, we looked for a practice-based, straightforward answer to our main question: "What do meditators do when they meditate?" We expected to find a large number of different answers in our primary collection of techniques. Therefore, a second aim of this study was to reduce this primary collection to a manageable number of basic meditation techniques.

Method

To obtain an exhaustive list of meditation techniques, we chose a combination of two approaches. On the one hand, we interviewed an extensive sample of expert meditators representing a wide range of different meditative traditions and schools in Germany. On the other hand, we conducted an extensive literature search. The literature search included meditation manuals from different traditions (Adyashanti, 2006; Anālayo, 2003; Austin, 1998; Bäumer, 2008; Bodian, 2016; Chinmoy, 2013; Kornfield, 2009; Mahasi, 1970; Main, 2013; Nandamalabhivamsa, 2013; Osho, 1983; Ott, 2010; Rinpoche Dagsay Tulku, 2002; Saradananda, 2011; Schimmel, 1992; Shear, 2006; Sivananda, 1975) as well as research papers that included

detailed descriptions of meditation practices (Amihai & Kozhevnikov, 2014; Cebolla, Campos, et al., 2017; Dahl et al., 2015; Fox et al., 2016; Ospina et al., 2007; Peng et al., 2004; Shannahoff-Khalsa, 2004).

The interviews took place in meditation and yoga centers in Dresden and Bad-Meinberg, Germany, or via telephone. The first author interviewed altogether 20 expert meditators from the following traditions: Different schools of Tibetan Buddhism (Kadampa, Kagyu, and Nyingma), Theravada Buddhism, Zen Buddhism, Yoga, Hinduism, Tantra, Sri Chinmoy, Kundalini Yoga, Osho meditation, Christian meditation, Sufi meditation, Brahma Kumaris, and Qigong.

The semistructured interviews focused on one central question: “When you meditate, what exactly do you do?” This question was asked in an open manner to elicit a free response. The interviewer guided interviewees with repeated inquiries and questions to obtain the most detailed description of the meditation technique they employed during their meditation sessions. This was repeated for all practices mentioned. Then, the interviewer asked whether there were any more techniques that the interviewees used less often and, in the case of the interviewee being a meditation teacher, whether there were any more techniques that they taught to their students.

Results

This exhaustive search resulted in a list of overall 309 meditation practices (see Appendix A). Since many techniques were combinations of diverse techniques, we segmented our list into primary and secondary techniques. The primary technique represented the main practice, whereas the secondary technique(s) represented optional auxiliary or combinable practices, or variations of the main practice. Approximately two thirds of these techniques were reported during the interviews, and one third originated from literature and manuals.

This extensive list was reduced in several steps. First, we removed all duplicates of identical techniques, for example, identical forms of observing the breath. Second, all techniques were sorted into 14 intuitive categories by the first author to get a general overview. These categories were (1) breath, (2) observing thoughts, contemplation, insight, (3) prayer, opening up, grace, mysticism, (4) visualizations, (5) repeating a mantra or an affirmation, (6) observing the body, (7) sensing/feeling of energy, emotions, or affect-centered objects, (8) open monitoring or doing nothing in particular, (9) experiencing nonduality or emptiness, (10) chanting, singing, humming, music, (11) concentrating on an object, (12) moving the body, (13) cultivating virtues, positive attributes, or good wishes, and (14) informal practice. After all remaining techniques had been sorted into these categories, more duplicates were removed in dialogue with all authors, resulting in 171 meditation practices (list available on request).

Because we considered 171 techniques to be still too many to be used in the second study, the third step focused on the deduction of a manageable number of representative basic meditation techniques. All practices were reread carefully and their basic techniques were extracted following these rules: (1) Technical terms were replaced by more commonly used words, for example, “chakra” was replaced by “energy center.” (2) The level of abstraction was increased for practices that were too specific, for example, “visualizing a rose blossom in the heart” and “visualizing an expanding light in the heart” were subsumed under “visualizations associated with the opening of the heart.” (3) Very similar practices were subsumed to superordinate techniques, for example, “sitting upright and allowing the body to circle around one’s own axis,” and “standing upright with the eyes closed and allowing the body to move smoothly without intervening” were subsumed under “sitting or standing upright with the eyes closed and allowing the body to move smoothly without intervening.” (4) Techniques that involved direct manipulation of breath, for example, rapid breathing or decelerating the breath, were subsumed under one category, as in some traditions they are considered preparatory rather than meditation practices.

After extensive discussions among the authors, it was decided to remove techniques that were too vague in their description to be understood by people not familiar with this specific practice, for example, “letting go of all suppressed emotions (‘catharsis’)” or “resting on primordial awareness/consciousness, in state of profound stillness and silence.” Furthermore, it was agreed to exclude meditation or mindfulness as a practice of daily life (“informal practice”), as it was not considered a “formal” meditation technique comparable to the other basic techniques. This reduction led to a list of 50 basic meditation techniques, which is depicted in Table 1.

Table 1

The 50 Basic Meditation Techniques and Their Abbreviations Utilized in the Present Paper

Basic meditation technique	Abbreviation
(1) Accumulating energy in specific centers (e.g., abdomen) and channeling it through certain pathways (e.g., spine)	Channel_Energy
(2) Being mindful of the respiratory flow in the entire body	Resp_Flow
(3) Being mindful of the rise and fall of the abdomen while breathing	Abdomen_Breath
(4) Being mindful of the sensations arising in the nose during inhalation and exhalation	Nose_Breath
(5) Carrying out predetermined, meditative sequences of movements while allowing the breath to flow naturally	Meditative_Movement
(6) Combining inhalation and exhalation with visualization of energy, qualities, light, smoke, etc.	Breath_Visualization
(7) Concentrating on a location in the body (e.g., abdomen or an "energy center" like chakra, Dan Tien) or on a series of locations in the body/"energy centers"	Concentrate_Energy

Basic meditation technique	Abbreviation
(8) Concentrating the mind on something contradictory without thinking about the contradiction	Contradiction
(9) Contemplating a spiritually important question (e.g., "Who am I?")	Contemplate_Question
(10) Contemplating death and one's own mortality	Contemplate_Death
(11) Contemplating the conditional emergence of experiences (cause & effect)	Contemplate_Condition
(12) Counting breaths	Count_Breath
(13) Creating a visual representation of a deity and then merging with this visualization	Deity_Merging
(14) Cultivating compassion, sympathetic joy, equanimity, loving kindness (for oneself, friends, neutral people, enemies, the whole world)	Compassion
(15) Droning or humming continuously with optional corresponding hand movements	Humming
(16) Fixating on an object without blinking/"staring" (candle flame, picture, hand)	Fixate_Object
(17) Focusing on internal sounds and vibrations	Internal_Sounds
(18) Focusing on one point of the body and letting the breath flow through this point of concentration	Point_Breath
(19) Focusing on the pauses between inhalation and exhalation, carefully observing what happens	Pause_Breath
(20) Fostering and focusing on a spiritual connection created by singing together	Singing_Together
(21) Labeling mental experiences with words that describe these experiences	Labeling
(22) Listening to the sound of singing bowls or a gong and feeling the corresponding vibrations inside the body	Listen_Sounds
(23) Looking at/focusing on a sacred object (image of the master, sacred geometric pattern, etc.)	Focus_Object
(24) Lying down and going into a state of deep relaxation while being fully conscious	Lying_Relaxing
(25) Mentally repeating syllables or words while connecting them to the rhythm of breathing	Repeat_Words_Breath
(26) Observing emotions without adhering to them	Observe_Emotions
(27) Observing how bodily sensations arise without adhering to them	Observe_Body
(28) Observing how thoughts arise in the mind without adhering to them	Observe_Thoughts
(29) Opening oneself up to blessings and inspiration	Opening_Up
(30) Perceiving, then releasing emotions and tensions (e.g., with the help of the breath), while scanning the body	Release_Tensions
(31) Reading certain paragraphs of a text over and over again and taking them in	Read_Text
(32) Reciting a mantra loudly, in a whisper, and silently	Recite_Mantra

Basic meditation technique	Abbreviation
(33) Repeating a mantra using a mnemonic (e.g., prayer beads)	Mantra_Mnemonic
(34) Repeating a mantra while focusing on corresponding points in the body	Mantra_Bodypoints
(35) Repeating an affirmation (e.g., "I am patient")	Repeat_Affirmation
(36) Scanning the entire body	Scan_Body
(37) Singing sutras/mantras	Singing_Sutras_Mantras
(38) Sitting and gazing at the wall, observing oneself doing nothing	Sitting_Do_Nothing
(39) Sitting or standing upright with the eyes closed and allowing the body to move smoothly without intervening	Move_Smoothly
(40) Spinning around one's own axis with the arms spread out	Spinning
(41) Trying to feel one's heartbeat	Feel_Heartbeat
(42) Visualizations associated with light or fire at different body parts	Visualize_Light_Fire
(43) Visualizations associated with the opening of the heart (e.g., rose blossom)	Visualize_Heart_Opening
(44) Visualizing how the dead human body slowly decays and decomposes	Visualize_Decay
(45) Visualizing that thoughts are inherently restless and focusing on the silence and the vastness that lies beyond them	Visualize_Thoughts_Silence
(46) Visualizing the body expanding in all directions	Visualize_Expanding
(47) Voluntary manipulation of breath, e.g., reducing the strength of breathing or "pranayama" with holding one's breath	Manipulate_Breath
(48) Walking and being mindful of sensory perceptions (movement of the feet, legs, clothing, air, hair etc.), coordinating it with the breath if necessary	Walking_Senses
(49) Walking, dividing the walking process into parts, and internally labeling each partial movement	Walking_Labeling
(50) With a specific intention (e.g., open one's heart, raise one's mood) selecting and repeating a mantra, combining it with associated hand postures or arm movements	Intention_Mantra

Note. Techniques are arranged in alphabetical order.

Discussion

In this qualitative study, we gathered all accessible meditation practices from 15 diverse traditions and reduced them to 50 basic meditation techniques. Although we have taken pains to arrive at a comprehensive collection of meditation techniques, we do not claim to have gathered all existing techniques as, for example, some techniques are kept secret to people belonging to a specific tradition (e.g., Tantric Buddhism), and some minor schools might have been overlooked by our research team. To our knowledge, this list of 50 basic meditation techniques surpasses all former attempts to depict the variety of meditation techniques in a

clear-cut way. It also includes far less prominent techniques that have rarely been researched, so far.

At the same time, we aimed at simplifying the complex nature of meditation by extracting basic meditation techniques underlying the many combined practices we found in our analysis. In many traditions, meditation is practiced in sets of different techniques that can sometimes be as simple as counting the breath but can also involve complex and progressing stages of visualization or breath work (Amihai & Kozhevnikov, 2014; Austin, 1998; Osho, 1983; Peng et al., 2004). We tried to disentangle these complex practices as far as possible, on the one hand to make them more accessible and on the other to ease scientific investigation into the “active ingredients” of meditation. Yet, it remains largely unclear to what extent the effects of meditation interventions can be attributed to specific techniques, teachers, settings, traditions, personality traits, or specific combinations or sequences of techniques. Our list of 50 basic meditation techniques could provide a means to scientifically addressing some of these issues.

Nonetheless, the question of whether our selection of meditation techniques would generalize to a broader audience of experienced meditators remained unanswered. For this reason, we decided to conduct an extensive online survey, reaching out to a broad range of experienced meditators with all kinds of meditative backgrounds. This would allow us to validate our qualitative results using quantitative methodology.

Study 2

This study addressed the question “What do meditators do when they meditate?” in a broader sense. We wanted to see whether experienced meditators from all kinds of different contemplative traditions would be able to identify their personal practice in our selection of meditation techniques and/or whether they would add techniques that we might have overlooked. In other words, we were interested in whether our selection of techniques had been adequate. At the same time, by obtaining their traditional background and the amount of experience they had with each technique, we were able to draw conclusions from their ratings on the popularity and prevalence of each technique, generally and tradition-wise. With this, we were able to answer the above question from three different perspectives: What do meditators do when they meditate in general? What do they do in their specific tradition? What do they do with respect to combining several techniques?

Method

Participants

To answer these questions, we devised a four-part online survey using the SoSci Survey platform (Leiner, 2019). The survey addressed “experts in meditation” from any spiritual or meditative tradition or background with any level of meditation experience. Altogether 878 experienced

meditators responded to the survey, and 661 completed the survey. We excluded all participants who did not provide any data on their lifetime experience with meditation and/or on the tradition in which they were practicing. Two participants had to be excluded because they rated having the same amount of experience with all meditation techniques, which we deemed very unlikely. The final sample was composed of 635 participants, 60.9% women. The mean age was 52.32 years ($SD = 10.71$; range 21–92 years). At the time of the survey, 92.3% of the participants were living in Germany.

Participants had practiced meditation for 6 months up to 57 years ($M = 15.01$ years, $SD = 11.11$). On average, they reported practicing meditation 6.03 times a week ($SD = 3.61$) for 31.35 min per session ($SD = 22.89$). The majority of participants reported having taught meditation occasionally (40.8%) or regularly (23.0%) and described their meditation practice as very (30.4%) or fairly (42.4%) regular. Participants reported affiliations with a great variety of meditative traditions and schools, which we subsumed under 19 categories of major meditative traditions (see below).

Of all participants, 48.7% reported holding a university degree, 19.5% had graduated from high school, 6.8% had completed their doctorate, and 12.8% had acquired a professional qualification. Regarding employment, 32.9% of participants were working as employees, 37.0% were self-employed, and 8.5% were retired.

Procedure

In the survey, meditators were first asked to answer questions regarding their meditation experience and their current or past meditation practice/routine. Second, they were asked to name all traditions the meditation techniques they practiced were derived from, in reverse chronological order, that is, the most recent first. Third, they were given the list of 50 basic meditation techniques and asked to rate how much experience they had with each of the 50 techniques on a 6-point Likert scale (from 1 = *no experience at all* to 6 = *a lot of experience*). If an important technique they were practicing was missing, they had the opportunity to add up to two techniques to the list and rate their experience with these. Last, they answered a few sociodemographic questions.

We used snowball sampling to reach as many experienced meditators from as many traditions as possible. The internet was searched extensively for schools, centers, societies, and associations of meditation, yoga, or contemplation in Germany, Austria, and Switzerland. We identified around 100 contacts in this way. Then, we sent the online survey to these contacts with the request to spread the survey and forward it to as many meditators as possible. Most meditation centers and societies agreed to do so.

Results

We performed multiple analyses to provide a multifaceted response to each question. One set of analyses was based on all 50 meditation techniques to obtain a complete picture of the adequateness of our selection and the distribution and clustering of the techniques. A second set of analyses focused on the top 10 preferred techniques of all participants or of subsets of participants. This was done in an attempt to simplify and reduce the vast number of techniques under investigation. The two types of analyses complement each other in supplying an in-depth examination of what meditators do when they are meditating.

Data were analyzed quantitatively by employing descriptive, correlational, and cluster analyses. All statistical analyses were performed using R 4.0.2 (R Core Team, 2020). Bar charts were generated with the statistical package ggplot2 (Wickham, 2016), and dendrograms with the package ggdendro (de Vries & Ripley, 2020). Results on all three research questions will be reported consecutively in the following.

What Do Meditators Do When They Meditate: The Commonalities

Do experienced meditators agree with our selection of basic meditation techniques? Which meditation techniques are especially popular among meditators of all traditions? We relied on the two analytic approaches described above to answer these two questions. The first question was analyzed encompassing all 50 techniques, whereas the second question aimed at simplifying our selection by extracting the top 10 preferred techniques of all meditators.

We descriptively evaluated the ratings of all participants on all meditation techniques. If our list of techniques included insignificant ones, we would anticipate that none of the experienced meditators would have a lot of experience with this specific technique. If we had omitted important techniques, we would expect them to consistently appear in the further added techniques. At the same time, these added techniques should not be variations of our already present 50 basic techniques. To deduce the most popular techniques, we calculated mean experience scores across all participants for each meditation technique and built a ranking sequence based on these scores.

Adequateness of 50 Meditation Techniques

In general, all 50 meditation techniques were commonly used. Every technique received all possible rating scores, ranging from the minimum of 1 (*no experience at all*) to the maximum of 6 (*a lot of experience*). On average, each technique had around 129 experienced meditators (20.4% of the sample; $SD = 10.5\%$) who reported having a lot of experience with that particular technique. The most popular technique in this regard, that is, the one with the highest rating score (scanning the body), had 277 meditators, while the least popular technique (visualizing decay) still had 13 meditators reporting having a lot of experience with it. At the same time, each technique had an average of 147 participants (23.2% of the sample; $SD = 14.5\%$) who had no experience practicing it. The techniques with the highest (419) and lowest (23) number of participants with no practice experience were the same as above—visualizing decay and scanning the body, respectively.

This means that for every meditation technique, there were at least 23 experienced meditators who never used it and at least 13 who used it a lot, which speaks to our selection of practices. A more detailed exposition on how rating scores were distributed across all meditation techniques can be found in the Appendix (Table B1).

Next, we looked at the average number of meditation techniques our participants were acquainted with. On average, experienced meditators from our sample reported having no experience at all with 11.6 ($SD = 9.7$) techniques, a little experience with 7.7 ($SD = 5.2$), some experience with 6.4 ($SD = 4.3$), more experience with 6.9 ($SD = 4.2$), quite a lot of experience with 7.3 ($SD = 5.8$), and a lot of experience with 10.2 ($SD = 9.4$) meditation techniques. Consequently, participants reported already having practiced 38 of the 50 meditation techniques, at least to some extent. This further validates our list of techniques as they, indeed, seem to be widely practiced.

Of all meditators, 6.6% reported having employed *all* techniques at least once in their life. The absolute minority of respondents, 0.8%, reported having used only 10 or fewer meditation techniques over the course of their practice. Thus, it seems that most experienced meditators did have accumulated experience with quite a few different meditation techniques over their lifetime of meditation practice. However, most meditators seemed to have a set of around 10 preferred techniques they most engaged with in their practice. Personal preferences ranged from very popular meditation techniques, such as observing the breath, to less common techniques, such as visualizing how the human body slowly decays and decomposes.

Furthermore, participants had the opportunity to add any meditation technique they felt was missing from the list. Altogether 240 techniques were added (list available on request). Again, we analyzed these techniques descriptively by extracting and grouping similar techniques. The analysis revealed four main groups of techniques: (1) Osho (or similar) techniques, for example, “catharsis” ($n = 18$), which we had considered in our first list of 309 techniques but excluded because they fell under the criterion of being too vague in their description to be understood

by people not familiar with this specific practice. (2) Sitting in silence ($n = 35$), which we had considered in our first list but excluded as a “vague” practice. (3) Koan, Mahavakya, or similar techniques ($n = 9$), which we had included in our list but for which we probably had not chosen the right wording. (4) Other techniques ($n = 178$) that (a) either fell under one of the exclusion criteria mentioned above, that is, they were either too general (e.g., “Zen”, “Yoga”), too specific (e.g., “heart chakra meditation,” “tree meditation”), or an informal practice (e.g., “mindfulness as a practice of daily life”); or (b) or were already included in the list (e.g., “mantra meditation,” “observing thoughts and emotions”).

Subsequently, we made three slight adjustments to our original list (depicted in Table 1). We decided to reword one technique and to extend our list by including two more basic techniques. Specifically, we included “sitting in silence” and “expressive practices,” such as catharsis or shaking, which are often employed in the context of Osho meditation. To aid understanding, we reworded Technique 8 (“concentrating the mind on something contradictory without thinking about the contradiction”) to “concentrating the mind on something contradictory, a paradox, or a sentence of wisdom without thinking discursively about it (e.g., Koan, Mahavakya).” Thus, our final set included 52 basic meditation techniques. Yet, all of the following analyses are based on the 50 techniques we explicitly had requested participants to rate in this study.

The 10 Most Popular Meditation Techniques

We calculated the mean score of rated experience with each meditation technique across all participants to build a ranking sequence of preferred techniques. Our underlying assumption was that the meditation techniques that meditators rated as having “a lot of experience” with were being practiced more often in the present or had been practiced quite a lot in the past. Thus, it can be assumed that these techniques were more popular and important in meditators’ regular meditation practice than other techniques. Table 2 shows the top 10 meditation techniques that received the highest mean scores across all meditators from all traditions.

Table 2

Mean Rating Scores and Standard Deviations of the 10 Most Popular Meditation Techniques Across All Participants (n = 635)

Meditation technique	<i>M</i>	<i>SD</i>
Scanning the entire body	4.71	1.48
Being mindful of the rise and fall of the abdomen while breathing	4.68	1.50
Observing how thoughts arise in the mind without adhering to them	4.66	1.44
Being mindful of the respiratory flow in the entire body	4.54	1.53
Perceiving, then releasing emotions and tensions (e.g., with the help of the breath), while scanning the body	4.41	1.56
Cultivating compassion, sympathetic joy, equanimity, loving kindness (for oneself, friends, neutral people, enemies, the whole world)	4.34	1.54
Observing how bodily sensations arise without adhering to them	4.28	1.59
Singing sutras/mantras	4.21	1.76
Lying down and going into a state of deep relaxation while being fully conscious	4.19	1.76
Being mindful of the sensations arising in the nose during inhalation and exhalation	4.13	1.68

As can be observed from Table 2, the three most popular meditation techniques across all participants were scanning the body, observing the abdomen while breathing, and observing thoughts. Consistently, these are possibly the three most widely known meditation practices.

In this list of 10 techniques, five others stand out as having a clear body-oriented focus, that is, observing the breath in the nose and in the body, observing bodily sensations, releasing tensions in the body, and supine meditation (lying down and being relaxed but conscious). Therefore, body-centered techniques seem to be of particular importance for meditation. Only observing thoughts, singing sutras/mantras, and cultivating compassion or similar virtues refer to techniques not exclusively linked to the body, though they certainly involve some somatic component.

We also had a look at the least popular meditation techniques, that is, techniques that only a few meditators reported having much experience with. The three least popular meditation techniques across all participants were visualizing how the body slowly decays ($M = 1.69$), spinning around one's own axis ($M = 1.80$), and concentrating the mind on something contradictory ($M = 2.02$). Perhaps this is not surprising, as these techniques are considered very advanced and/or specific to certain traditions that might have been underrepresented by our sample of meditators. Whereas the first of these three techniques is commonly practiced by Theravada Buddhist monks and nuns, the second is considered a typical Sufi technique. The third was the technique we chose to reword because some meditators might have misinterpreted its description (see above). Thus, to provide a more differentiated picture of the

variety of practices, we decided to run a few tradition-specific analyses. This led us directly to the second research question.

What Do Meditators Do When They Meditate: The Differences

After gaining some general insight into the preferred techniques across a diverse sample of meditators, we were interested in how these findings would generalize across preferences in specific meditative traditions. For this reason, we first evaluated which traditions were represented in our sample. Second, we compared preferred techniques in our two largest groups of meditators, that is, Buddhist and Hindu meditators. And third, to obtain an even more accurate picture, we subdivided our sample into 12 major groups of meditative traditions and compared their preferred meditation techniques with one another.

The majority of these analyses were based on an evaluation of the top 10 preferred techniques in each tradition. However, we also estimated the similarity and differences between the 12 traditions more accurately by subjecting their full ranking sequences (including all 50 techniques) to a cluster analysis.

Meditative Traditions in the Sample

Participants were provided with a free input field to list all meditative traditions they were affiliated with and to provide the name of any prominent teacher in their school. Then, we closely examined and processed all enumerated traditions in three consecutive steps. First, we extracted and categorized all unique names of traditions and spiritual teachers until the list was complete and no new names could be added. Second, we aggregated these names into larger groups of related traditions and teachers. And third, we generated a final categorization of superordinate traditions by carefully grouping them into as many categories as necessary and as few as possible. This process was guided by three different considerations: (1) Clustering similar traditions (e.g., Soto and Rinzai Zen into “Zen Buddhism”); (2) Representing the highest possible diversity in philosophical, cultural, or geographical origin (e.g., Indian, Abrahamic, Chinese); (3) Retaining distinctive traditions, which were strongly represented in our sample (e.g., Sivananda vs. Kundalini Yoga).

We identified 18 superordinate traditions in this way. In a final step, we allocated participants to these superordinate traditions based on the descriptions they had given in the questionnaire. They could be assigned to several groups of traditions if they had been practicing in different meditative traditions. Table 3 gives the superordinate traditions and the number of participants having practiced in these.

Table 3

List of Superordinate Traditions Present in the Sample and Number of Experienced Meditators (n) Practicing or Having Practiced in These Traditions

Superordinate tradition	Number of meditators (n)
Zen	219
Sivananda Yoga	156
Theravada, Vipassana	144
Other Hindu traditions: Vaishnavism, Sri Chinmoy, Sri Aurobindo, Mother Meera, Ramana Maharshi, Deepak Chopra, Transcendental Meditation, and others	116
Tibetan Buddhism	99
Yoga (other)	84
Kundalini Yoga	47
Osho meditation	46
Mindfulness-based stress reduction	32
Sufism	29
Christianity	26
Qigong/Tai Chi	17
No tradition/free meditation	11
Tantra	11
Shamanism	5
Anthroposophy	3
Merkabah/Jewish	3
Other, e.g., Acem, hypnosis	24

Several participants reported having practiced in different meditative traditions. Therefore, the total number of allocated traditions ($n = 1,107$) surpasses the total number of participants. On average, participants reported practicing in 1.74 ($SD = 1.04$, range 1–6) of these traditions. The majority of participants had practiced in either Buddhist ($n = 462$) or Hindu ($n = 449$) meditative traditions. However, we were also able to reach less prominent groups of meditators, such as Christian ($n = 26$), Sufi ($n = 29$), and Qigong/Tai Chi ($n = 17$) meditators.

To derive tradition-specific preferences for meditation techniques, we ran three analyses. First, we divided the sample into purely Buddhist and purely Hindu meditators and calculated their top 10 preferred meditation techniques. Second, we assigned each participant to one of 12 major meditative traditions, based on their most recent tradition. Then, we built ranking sequences for each tradition and compared them with each other by (1) using their top 10 preferred

techniques and (2) subjecting their full ranking sequences to a cluster analysis. We present our results in the following.

Hindu Versus Buddhist Meditators

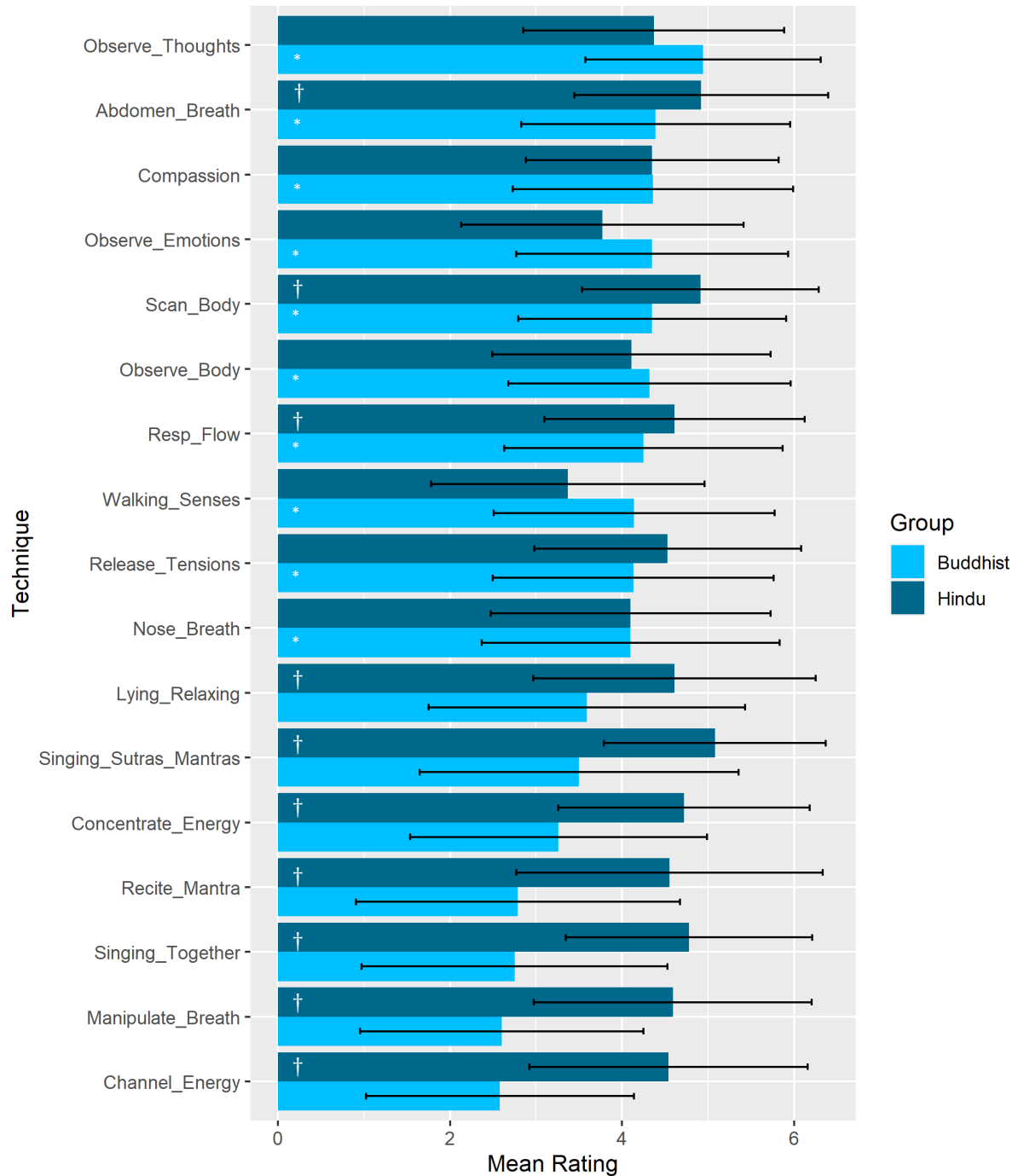
Participants who reported practicing in one or more Buddhist traditions (i.e., Zen, Theravada, Vipassana, or Tibetan schools) but in no tradition from another spiritual background were allocated to the group of Buddhist meditators ($n = 216$). Participants practicing in one or more Hindu traditions (i.e., Sivananda Yoga, Kundalini Yoga, other Yoga, or in affiliation with Hindu masters such as Osho, Ramana Maharshi, Sri Aurobindo, Mother Meera, or Sri Chinmoy) but in no other spiritual tradition formed the group of Hindu meditators ($n = 204$). Participants of any other spiritual or mixed spiritual backgrounds were not included in the following analyses.

Table B2 in the Appendix gives the number and percentage of subgroups of traditions in both groups. Practitioners of Zen Buddhism and Sivananda Yoga were slightly overrepresented in our sample. However, we know of no representative survey giving reliable base rates of meditators practicing in the respective traditions. Still, both abovementioned traditions are very popular in Germany.

As for the previous analysis, we calculated the mean score of each meditation technique for both groups, that is, Hindu and Buddhist meditators, and built ranking sequences. Higher scores indicate more overall experience in practicing the respective technique. To ease comparison between the two groups of meditators, we visually present their top 10 preferred techniques in a comparative bar chart (Figure 1). This figure depicts 17 techniques that appeared in any of the two top-10 lists with their corresponding mean ratings in both groups. It is ordered according to the top-10 list of Buddhist meditators to enhance comparability. Stars and daggers indicate the top 10 preferred techniques for Buddhist and Hindu meditators, respectively. Tables showing the top 10 preferred techniques separately for Buddhist and Hindu meditators can be found in the Appendix (Tables B3 and B4).

Figure 1

Comparative Bar Chart Depicting the Top 10 Preferred Meditation Techniques of Buddhist (n = 216) and Hindu (n = 204) Meditators and Corresponding Mean Ratings in Both Groups



Note. * = Top 10 preferred techniques of Buddhist meditators; † = top 10 preferred techniques of Hindu meditators. Whiskers represent standard deviations. See Table 1 for descriptions of technique codes.

Looking at the stars and daggers in Figure 1, very clear distinctions in preferred techniques appear between Buddhist and Hindu meditators. Both top-10 lists have only three meditation techniques in common: observing the respiratory flow, observing the abdomen while breathing, and scanning the body. All other techniques differ and reflect tradition-specific preferences for techniques. Buddhist meditators prefer techniques such as observing thoughts or emotions, walking meditation, and cultivating compassion or loving-kindness. Hindu meditators, on the other hand, practice singing or reciting mantras, concentrating on locations in the body or “energy centers,” and manipulating the breath. These preferences correspond to both statements of experienced meditators from Study 1 as well as meditation manuals from the respective traditions (Bodian, 2016; Chinmoy, 2013; Kornfield, 2009; Mahasi, 1970; Nandamalabhivamsa, 2013; Saradananda, 2011; Sivananda, 1975). Moreover, it seems that Hindu meditators also practice techniques preferred by Buddhist meditators quite a lot, but not vice versa.

Comparing these results to the overall top 10, the latter seem like a mixture of preferred meditation techniques from Buddhist and Hindu traditions. All three techniques that overlap in both traditions reappear in the top 10, as well as four more techniques from Buddhist traditions (observing bodily sensations or thoughts, cultivating compassion etc., releasing tensions in the body) and three more techniques from Hindu traditions (singing sutras/mantras, supine meditation, concentrating on a location in the body).

As both groups of meditators, Buddhist and Hindu, represent a substantial proportion of meditators in our sample, 34.0% and 32.1%, respectively, it might well be that the abovementioned general top-10 list is slightly skewed. Nonetheless, it might also be possible that these techniques represent techniques actually preferred by many meditators independent of their tradition. To check this assumption we prepared ranking sequences for 12 major spiritual traditions. Then, we calculated the proportion of overlap between them and clustered them according to the distances between their ratings.

Preferred Meditation Techniques in 12 Major Traditions

To make our results more discernible, we decided to allocate each participant to one single tradition. If meditators reported practicing in more than one tradition, we allocated them to the tradition they described as their current one. If two traditions were mentioned as equally important, a randomized trial (throwing a coin) determined the allocation. Thereafter, we excluded all traditions with fewer than five meditators allocated to them, for example, shaman, anthroposophical, or Jewish meditators. As the “other” category was far too heterogeneous to be interpreted meaningfully, we refrained from including it in our analyses. We also excluded meditators with “no tradition.”

As a result, we obtained 12 categories of major meditative traditions. Respective sample sizes, gender ratios, mean ages, and mean meditation experiences of participants in each of the 12 traditions can be found in Table B6 in the Appendix. We are well aware that subgroups with smaller sample sizes (such as the five designated Qigong/Tai Chi meditators in our subsample) provide less reliable estimates than subgroups with larger sample sizes. Therefore, the results should be interpreted with care.

Following the procedure described above, we calculated the mean experience with each meditation technique within each subgroup of meditators and, again, built ranking sequences for each tradition. Then, we performed three analyses to generate a precise picture of differences and commonalities between traditions. First, we extracted the 10 most popular meditation techniques within each tradition and calculated the percentage of overlap in preferred techniques across all traditions. Second, including all 50 techniques, we used hierarchical clustering to determine the proximity/distance between the mean ratings in diverse traditions. And third, we identified distinctive meditation techniques that were uniquely preferred by one specific tradition, relying on their top 10 techniques.

To calculate the percentage of overlap, we divided the number of techniques shared in two traditions by 10. Resulting percentages are given in Table 4. As only the top 10 ranked meditation techniques were compared to each other, a score of 0.3, for instance, indicates that three of 10 techniques overlapped in two traditions. The mean percentage of overlap between all traditions was 44.4% ($SD = 17\%$). Full ranking sequences for all traditions can be found in Appendix C.

Table 4

Percentage of Overlap Between Ranking Sequences of the Top 10 Preferred Techniques in 12 Major Meditative Traditions

Technique	Zen	Theravada	Tibetan	Sivananda	Kundalini	Yoga	Hindu	Osho	MBSR	Christian	Sufi	Qigong/Tai Chi
Zen	1											
Theravada	0.7	1										
Tibetan	0.5	0.6	1									
Sivananda Y.	0.3	0.3	0.3	1								
Kundalini Y.	0.1	0.1	0.2	0.6	1							
Yoga other	0.6	0.6	0.4	0.7	0.4	1						
Hindu	0.2	0.3	0.4	0.6	0.5	0.3	1					
Osho	0.7	0.7	0.6	0.6	0.4	0.7	0.4	1				
MBSR	0.7	<i>0.8</i>	0.5	0.4	0.2	0.7	0.3	0.7	1			
Christian	0.5	0.6	0.3	0.4	0.1	0.4	0.4	0.4	0.6	1		
Sufi	0.3	0.4	0.4	0.6	0.4	0.4	0.6	0.4	0.3	0.3	1	
Qigong/Tai Chi	0.6	0.5	0.4	0.3	0.2	0.5	0.3	0.5	0.5	0.3	0.3	1

Note. Bold type indicates overlap of less than 20%. Bold italic indicates overlap of more than 80% of techniques. MBSR = Mindfulness-Based Stress Reduction; Y = Yoga.

Interestingly, Table 4 indicates that each meditative tradition has at least one prominent overlapping technique with each other tradition. Again, the two most popular techniques in almost all traditions were observing the breath in the abdomen and scanning the body (both found in 11 of the 12 traditions), followed by observing the respiratory flow (8 of 12 traditions). This finding corresponds to prior results presented in this paper, both the general top 10 as well as the top 10 of Buddhist and Hindu meditators. Thus, it seems these techniques are indeed practiced by many meditators irrespective of their current meditative tradition. Furthermore, this highlights the strong importance of body-centered meditation techniques found and taught in many traditions (Ott, 2010; Sedlmeier, 2016).

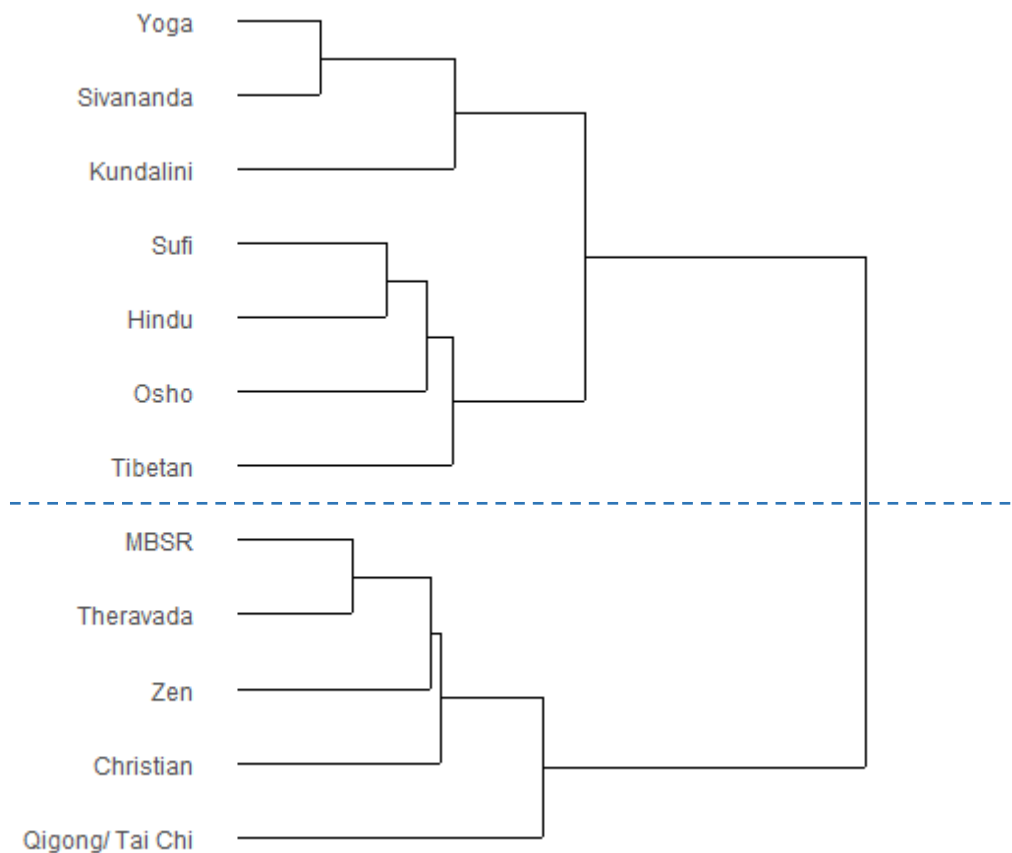
Remarkably, we found the least overlap between Kundalini Yoga and other traditions. Although some overlap exists with other Yoga or Hindu traditions, the overlap to other traditions' preferred meditation techniques is minimal. A similarly small overlap was observed for techniques of Hindu and Zen meditators. The traditions with the highest overlap are Theravada Buddhism and mindfulness-based stress reduction (MBSR), which might reflect the strong influence of Kabat-Zinn's Theravada practice on the development of MBSR (Kabat-Zinn, 2013).

Next, we used cluster analysis to identify similarity in groups of traditions based on their ratings of all 50 meditation techniques. Cluster analysis maximizes homogeneity within as well as heterogeneity between clusters of objects and is performed with a proximity matrix (Kaufman & Rousseeuw, 2009). This proximity matrix can resemble either similarities (correlations) or dissimilarities (distances) between objects. We considered the distances between ratings to be more relevant for our research question than their covariation. Therefore, we calculated Euclidean distances between the mean ratings across all 50 techniques of all traditions and submitted them to a Ward's hierarchical agglomerative cluster analysis. The resulting dendrogram is presented in Figure 2.

Dendrograms are analyzed visually by inspecting the relative lengths of their bars. Shorter bars indicate a smaller distance between objects whereas longer bars represent a greater distance. Thus, similar traditions appear closer to each other in the dendrogram in Figure 2. After careful inspection, we identified two clusters of traditions that emerged from the data: (1) Hindu meditative traditions, also including Sufi and Tibetan meditators; and (2) Buddhist meditative traditions, also including Christian and Qigong/Tai Chi meditators. However, Qigong/Tai Chi meditators are relatively far from the remaining traditions in the Buddhist cluster. Within the Hindu cluster, one could differentiate a yoga cluster and a broader Hindu cluster, yet the distances between these two clusters are rather short.

Figure 2

Dendrogram of Relative Distances Between Ratings of 12 Major Meditative Traditions



Note. The blue dashed line represents the partitioning of two clusters. MBSR = Mindfulness-Based Stress Reduction.

These results support the general commonalities identified in the analyses above while at the same time substantiating the distinctions found between Hindu and Buddhist meditators. Interestingly, Tibetan Buddhism appeared within the Hindu cluster. This might be indicative of shared preferences in these two groups reflecting their shared past. Tibetan Buddhism incorporates many Hindu contemplative practices that other Buddhist traditions such as Zen and Theravada do not (J. Powers, 2007; Rinpoche Dagsay Tulku, 2002).

Last, we had a closer look at distinctive meditation techniques that appeared solely in the top-10 list of one specific tradition but in no other ranking sequence. We identified 12 distinctive techniques in six diverse traditions (see Table B5 in the Appendix). In most cases, these techniques corresponded to the recollections of our interview participants in Study 1 who practiced in these specific traditions, except for Qigong/Tai Chi meditators. However, this might also be due to the relatively small subgroup of Qigong/Tai Chi meditators ($n = 5$) in our sample.

In conclusion, traditions do differ in their preferences for specific meditation techniques, and this diversity should be taken into account more. Although there are many overlapping preferences, there is a multiplicity of techniques that are tradition specific and, often, under-researched in contemplative sciences.

Once we identified what meditators did when they meditated in various meditative traditions, we were interested in how these techniques might be clustered together. Therefore, we conducted a series of cluster analyses to find groups of related techniques that were commonly practiced together.

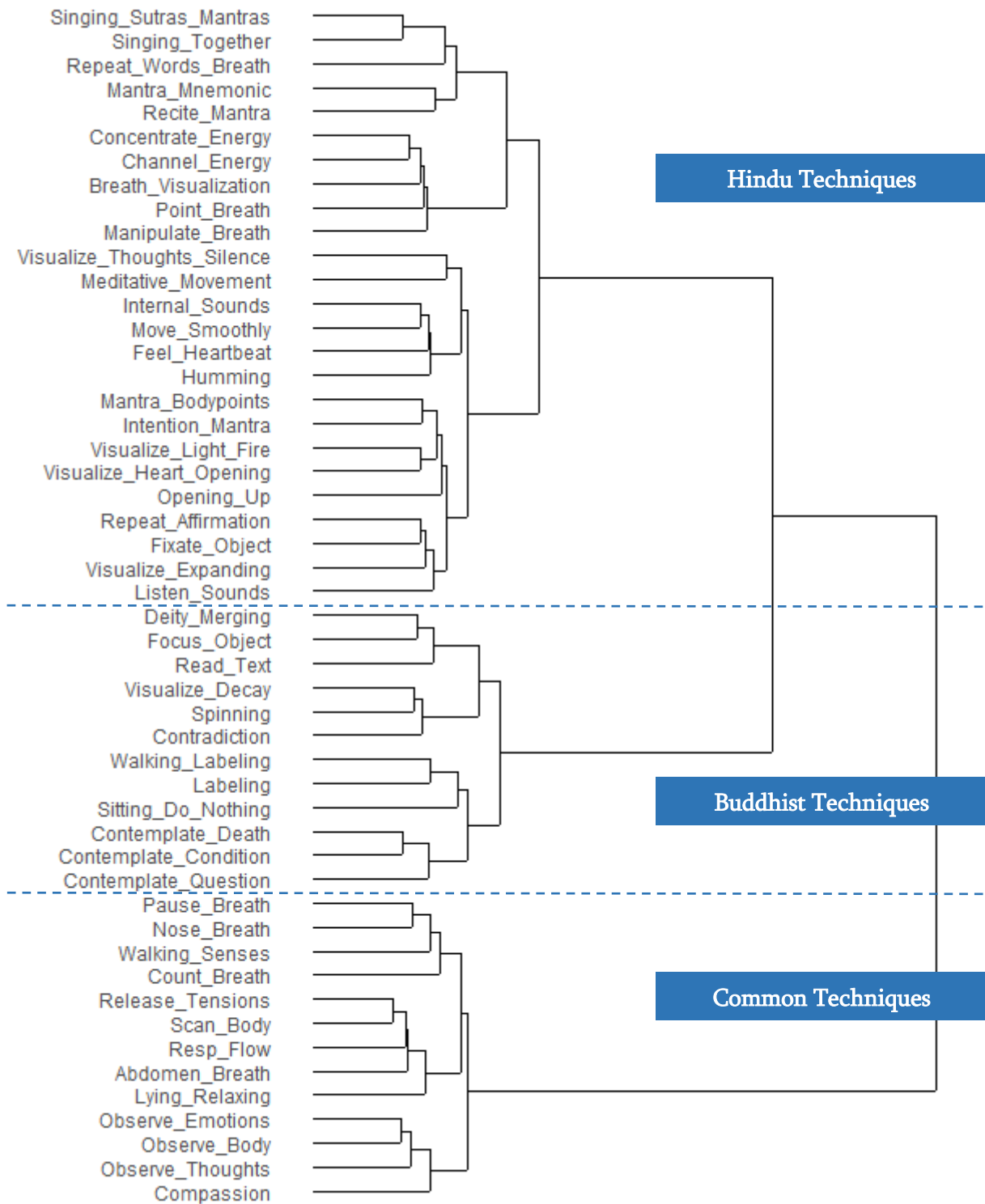
What Do Meditators Do When They Meditate: The Combinations

Meditators often use several meditation techniques when they practice. They might have a main practice and alternate it from time-to-time with other practices. Alternatively, they might have a certain set of techniques that are practiced in a predefined sequence, or depending on the time of day or a specific intention they have. Consequently, we were interested to find groups of techniques that are commonly practiced together. To identify groups of related meditation techniques, we performed three hierarchical cluster analyses. These analyses relied on all 50 meditation techniques and complement the top-10 analyses described above. Hence, we first clustered the ratings of all 635 participants. Second, we performed two separate cluster analyses for the two largest subgroups of participants, namely, Buddhist and Hindu meditators. In accordance with our previous descriptive analyses, we would expect marked differences between clusters of Buddhist and Hindu meditators.

Prior to each cluster analysis, we calculated Euclidean distances between the ratings of each meditation technique across all participants or across participants within each of the two subgroups in question. Then, we submitted the distance measures to a Ward's hierarchical agglomerative cluster analysis and visually inspected the resulting dendrograms. Figure 3 depicts the dendrogram of the overall cluster solution. Meditation techniques with similar experience ratings have shorter bars and appear closer to each other in the dendrogram. Accordingly, these meditation techniques are commonly practiced together by meditators in our sample. Longer bars, on the other hand, represent greater distances between practiced meditation techniques and point to differences in the combination of certain techniques.

Figure 3

Dendrogram of Relative Distances Between Experience Ratings of 50 Basic Meditation Techniques Across All Meditators (n = 635)



Note. Blue dashed lines represent the partitioning of three clusters. See Table 1 for descriptions of technique codes.

Looking at Figure 3, three main clusters of techniques emerged from the data. We named them according to the context in which they are commonly practiced together—from top to bottom: (1) Hindu meditation techniques, (2) Buddhist meditation techniques, and (3) common meditation techniques.

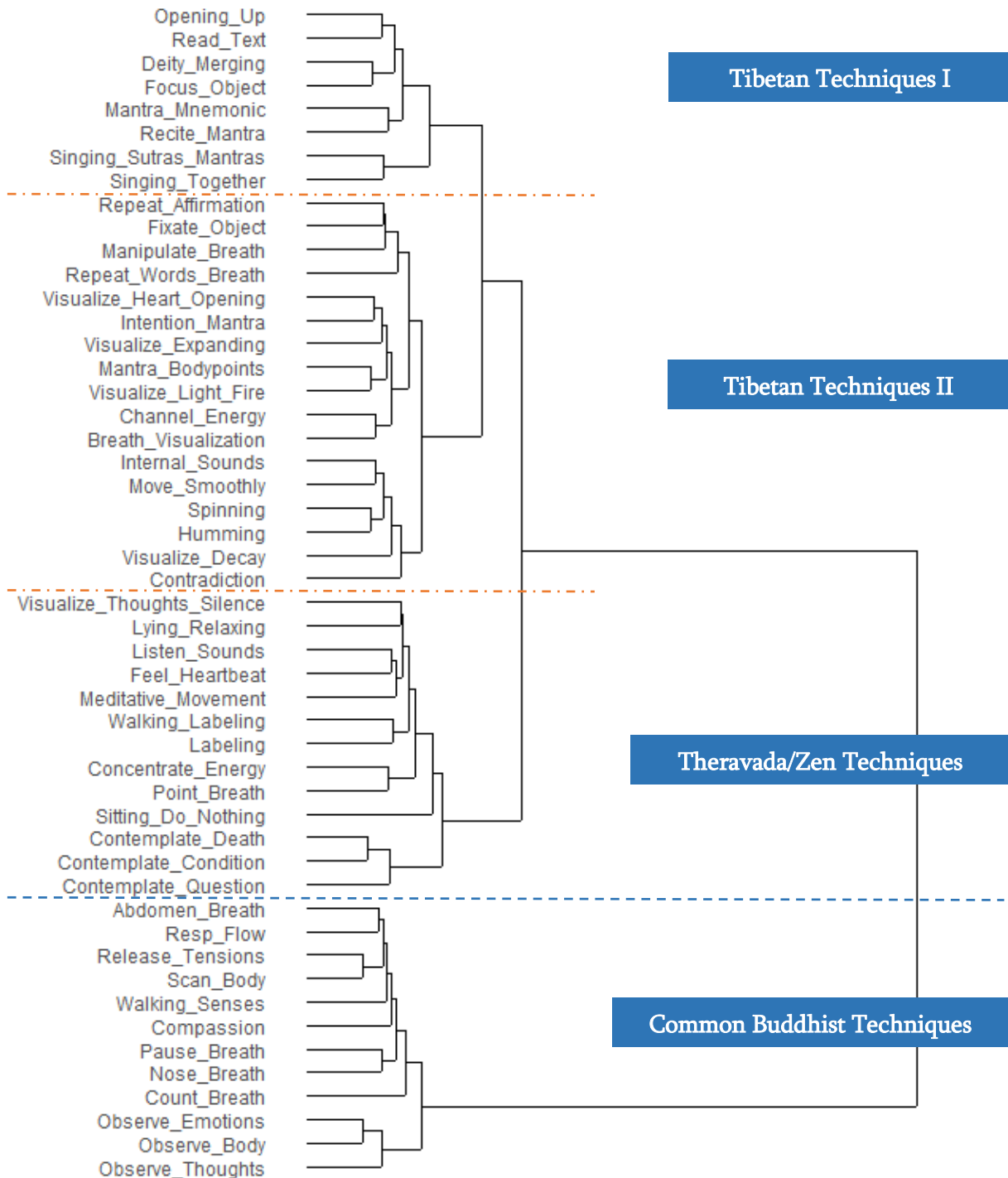
We found meditation techniques summarized in the Hindu cluster both in the recollections from expert meditators in Study 1 as well as in the top positions in the ranking sequences of many Hindu traditions. The same is true for most of the techniques found in the Buddhist cluster. The last cluster, though, is different. It comprises many of the very common, more general techniques we located in many different traditions. A majority of these have a strong and prominent focus on the body. Although they correspond closely to the abovementioned top-10 list of Buddhist meditators, we nevertheless decided to call them “common” meditation techniques. This was done because all of these techniques are widely known and utilized in many different contexts, including traditional schools as well as secular meditation programs such as (Kabat-Zinn, 2013).

All clusters could be divided into smaller subclusters. However, the distances between these subclusters are markedly shorter than the distances between the larger clusters. One could section the Hindu cluster into three subclusters: (a) mantra meditation, (b) energy meditation, and (c) visualization and movement meditation. The Buddhist cluster is not as easy to subdivide. One subcluster could be named “contemplation,” but it is difficult to find suitable names for other possible clusters. The common cluster could be segmented into (a) body-centered meditation and (b) mindful observation and compassion/virtue meditation. Yet, the lengths of the lines in the dendrogram would suggest a three-subcluster solution that we could not make sense of.

Subsequently, we conducted two cluster analyses for Buddhist and Hindu meditators to check for possible differences in clustering. This seemed plausible according to our abovementioned top-10 analyses. Figures 4 and 5 give the respective dendrograms.

Figure 4

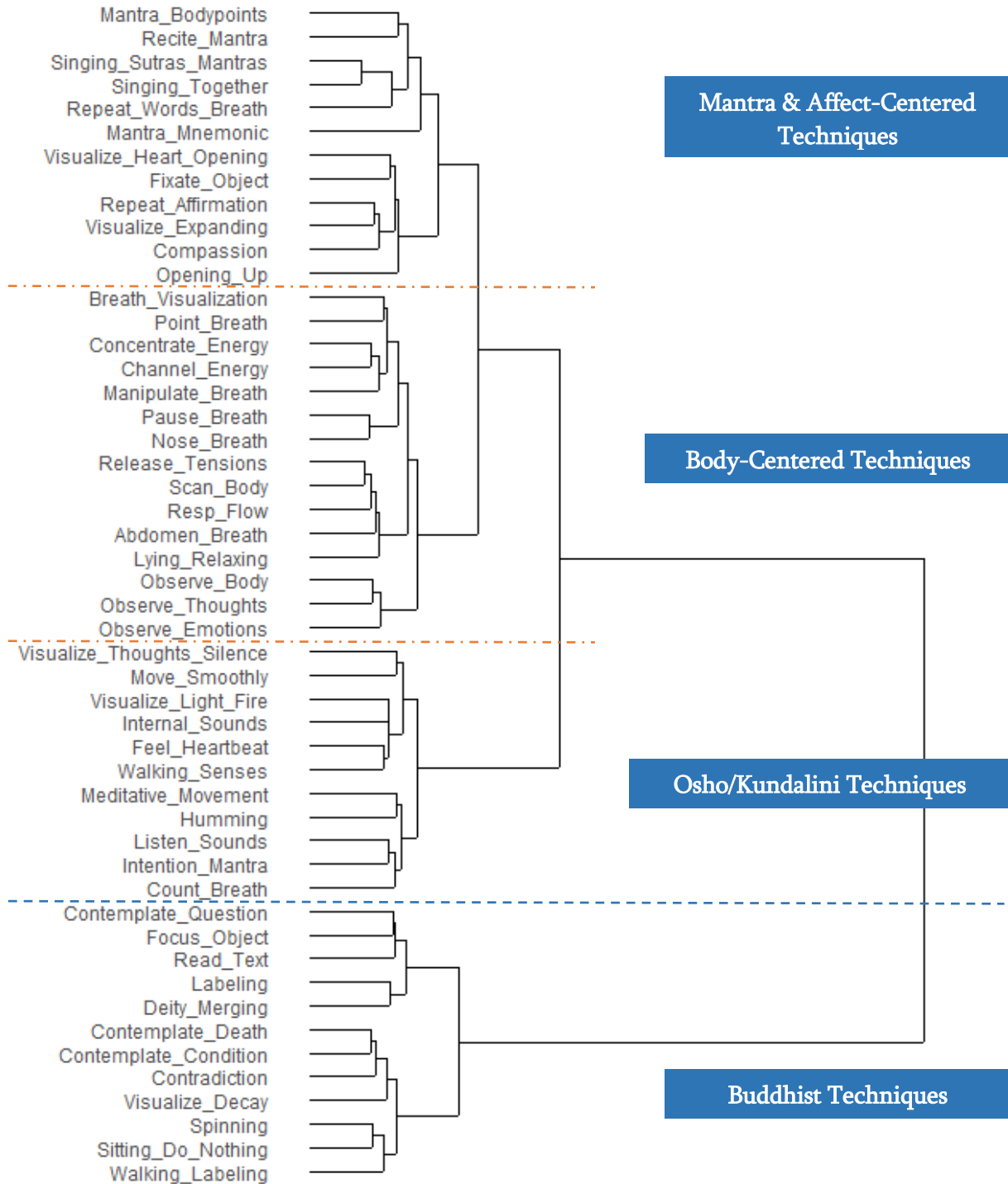
Dendrogram of Relative Distances Between Experience Ratings of 50 Basic Meditation Techniques Across Buddhist Meditators (n = 216)



Note. Blue dashed lines represent the partitioning of two main clusters. Orange dot-dashed lines represent the partitioning of three subclusters within the larger cluster. See Table 1 for definitions of technique codes.

Figure 5

Dendrogram of Relative Distances Between Experience Ratings of 50 Basic Meditation Techniques Across Hindu Meditators (n = 204)



Note. Blue dashed lines represent the partitioning of two main clusters. Orange dot-dashed lines represent the partitioning of three subclusters within the larger cluster. See Table 1 for definitions of technique codes.

The first thing that catches the eye in both figures is the presence of two distinct clusters, one smaller and one larger, with the larger cluster being subdivided into three subclusters. Interestingly, the smaller cluster in the dendrogram of Buddhist meditators very closely resembles the cluster of "common" meditation techniques in the overall solution, whereas the smaller cluster in the Hindu dendrogram is identical to the Buddhist cluster. We look into these findings more closely in the following.

The large cluster within the dendrogram of Buddhist meditators can be subdivided into three smaller subclusters. The first two of these subclusters represent a more Tibetan style of practice including a lot of mantra, visualization, and energy meditation techniques. The third subcluster, though, resembles a more Theravada or Zen style of practice, including labeling, contemplation, and sitting in silence. Hence, the larger cluster indicates specific differences between various schools of Buddhism, whereas the smaller cluster at the bottom represents techniques practiced by all Buddhist meditators, irrespective of their particular school.

Conversely, the clustering within the dendrogram of Hindu meditators looks markedly different. The larger cluster can be segmented into three subclusters. The first subcluster contains diverse forms of mantra and affect-centered meditation. The second cluster resembles the secular cluster in the overall solution but includes more breath and body-centered meditation techniques. The third subcluster includes meditation techniques with movement or sound and other techniques than are commonly practiced in Osho or Kundalini Yoga traditions. Accordingly, the first two subclusters represent meditation techniques commonly practiced in many Hindu traditions, whereas the third subcluster is indicative of two specific traditions. Conversely, the smaller cluster at the bottom represents distinguished Buddhist meditation techniques that are very uncommon in Hindu meditation practice.

Overall, these two tradition-specific cluster solutions provide unique insight into which techniques are commonly practiced together within two broad groups of Hindu and Buddhist meditators. They reveal clusters of techniques that can be easily attributed to particular schools within these traditions, as well as clusters of techniques commonly practiced by all Buddhist or Hindu meditators. Some clusters closely resemble clusters found in the overall solution, while others distinctly differ. Thus, these findings support the presence of both generally practiced meditation techniques and tradition-specific preferences for specific techniques and combinations of techniques. Consequently, they fit in neatly with the results described earlier in this paper. In summary, our findings depict a remarkable variety of meditation techniques that should more often be taken into account.

Discussion

This study thoroughly evaluated the selection of 50 basic techniques that we had identified in Study 1. Altogether 635 experienced meditators responded to our online survey and provided data on how much experience they had with each of the 50 techniques. Moreover, they were invited to add any technique they considered missing on the list.

From the responses of our remarkably large and diverse sample of experienced meditators, we conclude that our selection of meditation techniques is comprehensive and representative for this sample. All 50 basic meditation techniques were commonly practiced and each technique had a notable number of participants who had a lot of experience with it. This was also true for less well known techniques that many people do not habitually associate with meditation. A small adjustment to the original list led to a final set of 52 basic meditation techniques.

An assessment of the 10 most popular meditation techniques across all meditators reveals a certain preponderance of Buddhist and Hindu meditation techniques. This is unsurprising as these two groups formed the majority of our sample. However, comparing the preferred techniques of Buddhist versus Hindu meditators, clear-cut distinctions between these two traditions become obvious. Of the 10 most popular techniques, they had only three in common, all focusing on the body or the breath. All other techniques differed.

This result recurred in the comparison of the preferences for 12 major meditative traditions. All 12 traditions had at least one preferred technique in common with each other tradition, the mean overlap being substantially higher particularly between related traditions. A subsequent cluster analysis revealed two clusters of traditions—Hindu traditions including Tibetan and Sufi meditators, and Buddhist traditions including Christian and Qigong/Tai Chi meditators. This indicates some shared preferences between otherwise less related traditions. Moreover, it provides more evidence for the existence of discernible differences between Buddhist and Hindu meditators.

A closer look revealed three very popular techniques that reappeared in the top ratings of almost all 12 traditions. All three techniques were body centered, pointing to an extraordinary relevance of body-centered techniques throughout all meditative traditions. Additionally, we uncovered a great variety of meditation techniques that are commonly used in diverse traditions but are, unfortunately, consistently underrepresented in contemplative research.

Often, meditators use several techniques in their meditation practice, consecutively or alternately. Commonly, these techniques reflect the teachings of a certain tradition. However, frequently, they also indicate the practice history of the meditator and the resulting preferences they developed over the course of time. Employing hierarchical cluster analysis, we found three large clusters of meditation techniques that are commonly practiced together. Again, there was an obvious divergence between clearly Buddhist and clearly Hindu meditation clusters. Conversely, the third cluster represented the aforementioned overarching meditation

techniques spanning many meditative traditions. It included body-centered techniques as well as mindful observing and compassion/loving-kindness techniques. Two tradition-wise cluster analyses across purely Buddhist and purely Hindu meditators substantiated the presence of this general cluster in both traditions. Furthermore, both cluster analyses uncovered clusters of techniques relevant for specific subgroups of Buddhist or Hindu traditions. These clusters corresponded to our previous analyses, suggesting a greater differentiation between diverse meditative practices and traditions. Consequently, the consistent findings across a multitude of analyses increase the convergent validity of our results.

The Central Role of Body-Centered Meditation Techniques

Some studies comparing the effects of different meditation techniques found that breathing meditation or the body scan were experienced as less effortful and easier to learn than other techniques (Kropp & Sedlmeier, 2019; Lumma et al., 2015). Conventionally, many meditative traditions emphasize the central role of the body in meditation and recommend learning to observe the breath or the body to beginners of meditation (Ott, 2010; Sedlmeier, 2016; Shear, 2006). Accordingly, meditators in the present study, with all sorts of meditative backgrounds, preferred to place their attention on their body or basic bodily processes such as the breath. This is true even though they had experience with many other meditation techniques, too. Moreover, clusters of body-centered meditation techniques recurred in all analyses presented in this paper. Consequently, it seems that body-centered meditation techniques are of profound importance for general meditation practice.

Some studies found significant increases in body awareness or interoception (the processing of internal bodily signals) when participants practiced body-centered techniques compared to an active control activity (Fischer et al., 2017) or other meditation techniques (Kok & Singer, 2017). Developing a greater sense of body awareness and interoception has been proposed as one of the central mechanisms of meditation and mindfulness (Cebolla et al., 2016; Farb et al., 2015; Gibson, 2019; Hölzel et al., 2011). Furthermore, the insular cortex has been reliably associated with interoceptive processes (Craig, 2003). Fittingly, neuroscientific studies have shown consistent structural alterations and functional activations in the insular cortex across many different kinds of meditation (Fox et al., 2014, 2016). Thus, it seems that the focus on the body inherent in many diverse meditation techniques, but specifically in body-centered techniques, is one of the key aspects of meditation practice. This is in line with current literature emphasizing the embodied nature of meditation (Cebolla et al., 2016; Kerr et al., 2013; Khoury et al., 2017; Michalak et al., 2012; Varela et al., 2016).

A recent empirical classification system (described in Chapter 3) identified two embodied dimensions along which meditation techniques could be classified. In this chapter, I posit that all meditation techniques share a somatic component and are inherently embodied. This might also apply to our selection of 52 meditation techniques. Many, if not all, meditation practices emphasize directing attention to interoceptive signals. Whether meditators visualize their heart opening like a rose blossom, focus on internal sounds and vibrations, or gaze at the wall and

observe themselves doing nothing, the body remains a constant companion in all their endeavors. This may be less evident for techniques consisting of contemplating a spiritually important question or reading certain paragraphs of a text repeatedly. Nevertheless, even contemplation and reading are done with the intention to observe one's internal reactions to the content of the text or the contemplative question. Thus, it might well be that all meditation techniques are embodied.

Measuring Up to the Variety of Meditation Practice

In the classification system in Chapter 3, I delineate seven clusters of similar meditation techniques, namely, mindful observation, body-centered meditation, visual concentration, contemplation, affect-centered meditation, mantra meditation, and meditation with movement. All of these clusters were also present in the current study, albeit in different combinations. It seems that meditators in this study combined techniques from several clusters of similar techniques, presumably to maximize the diversity of effects associated with these varying techniques. This appears perfectly reasonable, as meditators might practice certain sets of meditation techniques, often jointly taught by certain traditions, but for a whole range of different purposes.

Many traditions formulate guidelines about when to use which technique. Some traditions differentiate between practices for beginner and those for advanced meditators (Anālayo, 2003; Mahasi, 1970). Some even provide specific meditation techniques connected to achieving certain goals or treating certain psychological or somatic conditions (Shannahoff-Khalsa, 2004). Some advise meditators on which techniques to use based on a prior assessment of their personality (Kornfield, 2009). However, actual scientific evidence for many of these claims is still scarce, and future investigations should address these issues. Additionally, more research is needed to effectively disentangle similarities, effects, and purposes of diverse meditation techniques.

The most popular techniques identified in this study quite clearly depict the most well known and most researched groups of meditative practices, that is, the body scan (Dambrun et al., 2019), observing the breath (Doll et al., 2016), observing thoughts (Lumma et al., 2015), cultivating compassion or loving-kindness (May et al., 2014), and mantra meditation (Lynch et al., 2018). Nonetheless, the repeatedly observed evident differences between Buddhist and Hindu meditation practices call for closer inspection. Currently, the focus of contemplative research lies predominantly on mindfulness meditation (Rose et al., 2020), with other meditation techniques, especially from Hindu traditions, receiving a lot less attention. However, as Hindu meditation techniques differ so strikingly from Buddhist techniques, they should be investigated in more detail.

In light of the remarkable variety of meditation techniques found in the present study, definitions of meditation should be reconsidered. All definitions brought up so far indicate a great variance in possible approaches to defining meditation and a lack of consensus among

experts (Bond et al., 2009; Lutz et al., 2008; Nash & Newberg, 2013; Y.-Y. Tang et al., 2015; Walsh & Shapiro, 2006; West, 2016). It would be advisable to include the embodied aspect of meditation in future definitions of meditation. It also might even be conceivable to establish different terms and definitions for various forms of meditation. With this, researchers could contribute to a more differentiated use of the umbrella term “meditation.”

Limitations and Future Directions

We are well aware that our choice of meditation techniques might have been limited to the regional availability of meditation teachers and traditions in Study 1. Still, the adequateness and probably also the comprehensiveness of our selection was confirmed by a broad sample of experienced meditators with a diversity of meditative backgrounds almost unique in contemplative research. Although most meditators belonged to some Buddhist or Hindu tradition, we also reached smaller groups of meditative traditions, such as Christian, Sufi, or Qigong meditators. We know of only one study that addressed a similarly large and diverse sample of experienced meditators (Vieten et al., 2018). Clearly, our sample cannot be regarded as being representative of Western European, let alone all, experienced meditators practicing the abovementioned meditation techniques. We encourage researchers to evaluate our selection of 52 meditation techniques in other countries and contexts to examine its general validity.

The sample sizes of some traditions were relatively small, especially for Osho, Christian, MBSR, and Qigong meditators. Furthermore, many meditators drew their meditation practices from several backgrounds or had a whole history of practicing in different traditions. It was, thus, difficult for us to determine the major tradition of some participants. Consequently, future studies should ask meditators to distinguish their major meditative tradition from possible adjunct practices explicitly. They should also approach meditators from the abovementioned, underrepresented meditative traditions.

One could argue that the 52 techniques that we evaluated in this study were artificially constructed and taken out of context. Traditionally, meditation techniques are practiced in a specific sequence, in the framework of a specific tradition, or in combination with other practices. Observing the breath, for example, is often combined with visualizations or with the repetition of a mantra. Conversely, little is known about the effects of combined meditation techniques compared to simple techniques. Therefore, it seems promising to investigate and compare simple and combined techniques, to see if there are, indeed, any additive effects.

Furthermore, a specific traditional background or framework can tremendously influence the effects of meditation (Amihai & Kozhevnikov, 2014; Bayot et al., 2020; Wachholtz & Pargament, 2005). However, these effects may be very complex, specifically regarding the manifold meditation traditions. In an attempt to simplify this issue, we chose to deduce basic meditation techniques practiced in many meditative traditions. This might help clarify and disentangle genuine effects of simple meditation techniques from the effects of their traditional

context. Future studies could compare the effects of bare meditation techniques to a combined intervention of meditation practice and ethical or philosophical teachings.

Although we now have a better idea of what meditators do when they are meditating, or rather, which meditation techniques they employ, we have little access to the experiences they have during meditation. Several authors have pointed out the difference between meditative technique and meditative state or phenomenological experience (Bond et al., 2009; Nash & Newberg, 2013). Phenomenological experiences are difficult to capture and depend strongly on individual factors, such as personality or learning history (Hölzel et al., 2011; Lippelt et al., 2014; May et al., 2014; Schmidt, 2014; R. Tang & Braver, 2020). It seems, for example, that people who score high on the trait absorption tend to experience deep meditative states and intense feelings of self-transcendence more easily (Hölzel & Ott, 2006; Lifshitz et al., 2019). Furthermore, phenomenological experience also differs across diverse meditation techniques (Przyrembel & Singer, 2018). Recently, Lutz et al. (2015) proposed a phenomenological matrix to help describe different states and processes related to mindfulness practices. Future studies could investigate phenomenological experiences associated with the practice of a larger sample of meditation techniques and focus on possible interactions with personality factors, too. Single-case research designs (Barlow et al., 2009) seem to be a promising approach in this respect (May et al., 2014).

In the long run, all of these efforts could contribute to establishing one or more theories of meditation. This endeavor is not only imperative for the future of scientific research into meditation (Sedlmeier et al., 2016) but also highly promising in efforts to understand the phenomenon of meditation (or the phenomena of different kinds of meditations) more thoroughly.

Conclusion

The aim of this paper was to shed light on the manifold practices meditators use when they meditate. To do so, we employed a bottom-up methodological approach by first gathering, then reducing, and finally evaluating a large sample of diverse meditation techniques. Throughout this process, we relied on the statements and ratings of expert meditators and used qualitative and quantitative methods to arrive at a reliable and valid consensus.

While Study 1 generated a selection of 50 basic meditation techniques, Study 2 provided valuable insight into the prevalence and popularity of these techniques in manifold meditative traditions. The two studies presented in this paper provide converging evidence for the immense variety of techniques that can be subsumed under the umbrella term “meditation.” Thereby, they add to a growing body of research on diversifying meditation. Future definitions of meditation should take the multiplicity of meditation techniques and their embodied aspect into consideration. We hope that our diverse collection of basic meditation techniques will be useful for future comparative and differential studies and the development of profound theories of meditation.

Chapter Three

What is Meditation?

Proposing an Empirically-Derived Classification System

This chapter is published as:

Matko, K., & Sedlmeier, P. (2019). What is meditation? Proposing an empirically derived classification system. *Frontiers in Psychology, 10*, Article 2276.

3. HOW CAN MEDITATION TECHNIQUES BE CLASSIFIED?

Meditation and mindfulness belong to two of the currently most popular and hyped research topics in psychology, psychiatry, medicine, and neuroscience (Van Dam et al., 2018). One issue that remains unsolved thus far, though, is providing a comprehensive theory of meditation (Sedlmeier et al., 2016). This is intensified by the fact that “meditation” is an umbrella term subsuming an extensive amount of diverse practices (Awasthi, 2013; Fox et al., 2016). Moreover, meditation is often used to describe both, the mental training technique employed by meditators as well as the resulting altered state of consciousness (Bond et al., 2009; Nash & Newberg, 2013). In this paper, we will mainly focus on the multiplicity of meditation *techniques*. To date, we have found no thorough overview of meditation techniques doing justice to the complexity and diversity of meditation practices found in various meditative traditions and schools. Additionally, there is no consensus on defining and demarcating meditation, left alone providing a truly encompassing classification system of meditation techniques. Our research aimed at filling this gap. By providing an copious list of commonly practiced meditation techniques (Chapter 2) and presenting the first empirically-derived classification system of meditation in the present paper, we hope to contribute to an ongoing discussion and to an empirically grounded foundation for studying the effects of meditation, and, thus, working towards a future all-embracing theory of meditation.

Recently, researchers have begun to compare selected meditation techniques (Amihai & Kozhevnikov, 2014; Fredrickson et al., 2017; Kropp & Sedlmeier, 2019; Lumma et al., 2015; May et al., 2014; Trautwein et al., 2020) or proposed extended theoretical models and classification systems (Dahl et al., 2015; Hölzel et al., 2011; Lutz et al., 2015; Nash & Newberg, 2013; Schmidt, 2014; Vago & Silbersweig, 2012). Other researchers have elaborated on ancient theories of meditation tied to specific Hindu or Buddhist systems of thought (Grabovac et al., 2011; Lutz et al., 2007; Sedlmeier & Srinivas, 2016, 2019). Whereas the latter approaches refer to specific combinations of meditation techniques, which are embedded in ethical and spiritual contexts, the former ones analyze and explain actually practiced meditation techniques, sometimes acknowledging but mostly bypassing ethical or spiritual context. Consequently, it seems hard to see through this variety of models and approaches, which reveal a lacking consensus among researchers.

Therefore, in an attempt to clarify and simplify these issues, we chose to develop a new classification system in a bottom-up way, relying on the judgements of experienced meditators. A similar approach has already been successfully employed in a study deducing a working definition of meditation by repeatedly asking a panel of seven experts in meditation research (Bond et al., 2009). In the present study, we requested a large sample of experienced meditators

to compare a set of diverse, but commonly practiced meditation techniques according to the similarity of their expected general effects on practitioners. This approach was based on recent findings demonstrating how different meditation techniques yield different effects – phenomenologically, neuroscientifically and psychologically. Hence, we concluded that this variety of effects could provide a valuable means in detecting underlying dimensions that could help to structure the immense variety of meditation techniques. In the following, we will give an overview on the current state of the art.

Neuroscientific research has repeatedly shown differing brain activation and deactivation patterns during diverse meditative states following diverse meditative practices (Fox et al., 2016; Tomasino et al., 2014). Also, a growing body of research has found differential effects of specific types of meditation (Goyal et al., 2014; Ospina et al., 2007; Sedlmeier et al., 2012, 2018; Singer et al., 2016). So far, most research on the effects of meditation has been conducted without much theoretical foundation and has mainly been limited to four types of meditation: focused attention (mainly on the breath or the body), open monitoring, loving-kindness or compassion meditation, and mantra meditation (mostly Transcendental Meditation).

This limitation is probably due to the historical development of meditation research. While the 70's saw considerable research efforts in examining the effects of Transcendental Meditation, the 90's brought a huge interest into mindfulness meditation which keeps growing to the present (Schmidt, 2014). Meditation, though, is very diverse in itself, although it has been and is still largely being treated as a unitary construct. This is also reflected in the wide-spread use of “mindfulness meditation” as a synonym for meditation. A first attempt to differentiate meditation into “focused attention” (FA) and “open-monitoring” (OM) practices was brought forward by Lutz and colleagues (2008). Yet, as contemplative research kept expanding, more and more practices entered the field of interest. Whereas many models focus on describing the working mechanisms of mindfulness meditation (Grabovac et al., 2011; Grossenbacher & Quaglia, 2017; Hölzel et al., 2011; Y.-Y. Tang et al., 2015), Vago and Silbersweig (2012) were one of the first to propose diverse working mechanisms for three different styles of mindfulness meditation. These three styles of meditation are concentrative (FA), receptive (OM), and ethical enhancement (EE, e.g., loving-kindness or compassion) practices. Accordingly, now, “loving-kindness” and “compassion meditation” have been recognized as representatives of a new category as these practices entail elements of both, focused attention and open-monitoring styles of practice (Lippelt et al., 2014). More recent accounts have broadened the focus even further, as we will see in a moment.

Still, comparative studies have mainly focused on the above-mentioned four types of meditation, i.e., focused attention, open monitoring, loving kindness or compassion meditation, and mantra meditation. Studies empirically comparing some of these meditation techniques found differences in, e.g., dispositional mindfulness (Cebolla, Campos, et al., 2017), creativity (Colzato et al., 2012), attention (Lee et al., 2012), affect (May et al., 2014), phenomenological experience (Przyrembel & Singer, 2018), or heartrate variability and perceived effort (Lumma et al., 2015).

These differential effects highlight the possibility of categorizing meditation techniques into clusters of similar techniques according to their effects. Interestingly, another study (Amihai & Kozhevnikov, 2014) has shown that effects on the nervous system and cognitive performance depend more heavily on the tradition in which meditation is practiced than on the type of attentional system involved. Moreover, the framework in which certain meditation techniques are practiced seems to be of profound importance (Hunt et al., 2018; Trives, 2018; Wachholtz & Pargament, 2005). This rising complexity requires more complex models in explaining and classifying meditation.

Diverse meditation techniques have distinct effects. This finding has led to a few new proposals in classifying meditation including a greater variety of meditation techniques from different backgrounds. Nash and Newberg (2013) chose to classify meditation practices into three domains of conjunct methods and states, i.e., cognitive, affective and null domains. Another proposal (Dahl et al., 2015) categorizes meditation into three families, i.e., attentional, constructive, and deconstructive. Both proposals share certain commonalities. The cognitive domain and the attentional family both entail focused attention and open-monitoring practices. The affective domain and the constructive family both comprise techniques that aim at altering emotional responses, such as loving-kindness and compassion meditation. Dahl and colleagues, however, expand the focus of this category and include Christian prayer and taking vows into their constructive family. The interpretation of the last category varies to some extent. While both approaches describe techniques and states aiming at dissolving the sense of self, closely related to “nondual awareness” (Josipovic, 2010), Dahl and colleagues (2015) also include other “insight-oriented” practices, like the Buddhist Foundations of Mindfulness, Vipassana, Dzogchen, Koan, Mahamudra, and Muraqaba (a Sufi technique).

Yet, as reasonable as these considerations may be, these proposals have largely been derived top-down and, thus, might be limited by researchers’ personal expertise and experience. Consistent with this assumption, they omit several important and commonly practiced meditation techniques, especially from the Hindu context. Additionally, experienced meditators from the respective traditions might not agree with these classifications as the proposed clusters might be misguided attempts at throwing together “apples and oranges”.

Other approaches acknowledged these problems and devised phenomenological features or taxonomic keys to help researchers and practitioners describe what they are doing during meditation (Lutz et al., 2015; Nash & Newberg, 2013; Schmidt, 2014). Most taxonomies include questions on the object of meditation, the mental faculty or attentional mode employed, and the practical context of the practice (including questions on posture, guidance, setting, and breathing). They also touch on the effort, stability, and attitude or motivation behind the practice, or include questions on the axiological or traditional framework in which a practice is conducted. Furthermore, Lutz et al. (2015) emphasize cognitive and attentional factors, like degree of dereification (i.e., interpreting mental contents as mental processes rather than accurate depictions of reality), meta-awareness, and clarity. These taxonomies provide researchers and practitioners

alike with valuable means of accurately describing their practice and allow to group or map meditation practices according to their phenomenology and contextuality. Still, the sheer number of taxonomies makes it difficult to detect commonalities amongst practices. Additionally, the variety of meditation techniques exacerbates finding an all-embracing definition of meditation and to properly differentiate meditation from other mind-body practices.

When people talk about meditation they often refer to someone sitting silently in a cross-legged position with closed eyes and searching for some inner silence or truth. This may be due to the historical development of meditation and meditation research in the West (see above) but cannot account for the immense variety of meditation practices found across different spiritual traditions. Interestingly, especially those approaches coming from our own western Christian context, or from related Abrahamic traditions like Sufi mysticism and the Jewish Merkabah, have gotten less attention. Only now, there is an increasing interest into a more broad scientific exploration of meditation in its many forms, including rather atypical practices like Osho's dynamic meditation (Bansal et al., 2016) or Kundalini Yoga (Peng et al., 2004). Yet, this broadening of the scope makes it even more difficult to find an overarching definition of what is actually meant by meditation. Some voices even discard the notion of finding a definition that "suits all" types of meditation (Schmidt, 2014). In the following, we will give some examples of the astonishing variety of definitions that have been brought up so far.

- (1) "The term *meditation* refers to a family of self-regulation practices that focus on training attention and awareness to bring mental processes under greater voluntary control and thereby foster general mental well-being and development and/or specific capacities such as calm, clarity, and concentration" (Walsh & Shapiro, 2006, p. 228).
- (2) "Meditation is an art of being serene and alert in the present moment, instead of constantly struggling to change or to become" (Deshmukh, 2006, p. 2239).
- (3) "Three main criteria have been defined as essential to any meditation practice: the use of a defined technique, logic relaxation [i.e., not intending to analyze, judge or expect], and a self-induced state/mode. Other criteria deemed important [by meditation experts] involve a state of psycho-physical relaxation, the use of a self-focus skill or anchor, the presence of a state of suspension of logical thought processes, a religious/spiritual/philosophical context, or a state of mental silence" (Bond et al., 2009, p. 135).
- (4) "A complex neural practice that induces changes in neurophysiology and neurochemistry of brain resulting in altered neurocognition and behavior in the practitioner" (Jaseja, 2009).
- (5) "An exercise in which the individual turns attention or awareness to dwell upon a single object, concept, sound, image, or experience, with the intention of gaining greater spiritual or experiential and existential insight, or of achieving improved psychological well-being" (West, 2016, p. 4).

- (6) “A contemplative practice [e.g., meditation] is multi-generational, embedded in a community, has certain features which include an alteration of body and/or mind, a certain kind of purpose or goal. There is a recipe (i.e., instructions) to achieve this goal, plus criteria for progress towards this goal which can be evaluated by evaluators from the community” (Dunne, 2018).

These six definitions are representative of opposing inclusion and exclusion criteria deemed important for labeling a practice meditation, or not. Some definitions are very specific (1, 3, 5), whereas others are rather broad (2, 4, 6). Specific definitions may be appropriate for investigating clear-cut research questions, they might, however, not account for the diversity of practices labeled “meditation”. Let’s consider the Sufi whirling technique (i.e., spinning around one’s own axis with arms spread out). This practice is generally considered a meditation technique aimed at “gaining greater spiritual or experiential insight” (5), it is thought to train awareness (1), and is a self-induced state of suspension of logical thought processes taking place within the context of a spiritual tradition (3). However, it does not necessarily involve a psychophysiological relaxation (3), and does not necessarily focus on bringing mental processes under greater voluntary control (1), and might not be considered as dwelling upon a single object or experience (5).

On the other hand, very broad definitions could be very inclusive of diverse meditation techniques, but might broaden the scope too far by including practices generally not considered to be meditation techniques. This proves to be a tricky question, though. Can dancing, prayer, CrossFit or mindfully doing the dishes be considered meditation techniques or not? Where do we draw the line? According to definitions (2), (4), and (6) almost all the practices mentioned above would count as meditation. However, inducing “changes in neurophysiology and neurochemistry of brain resulting in altered neurocognition and behavior in the practitioner” (4) would also be true for experiences involving taking hallucinatory drugs or doing any kind of sports. As Ospina and colleagues (2007) point out, it might be “impossible to select components that might be considered universal or supplemental across practices” (p. 3). It might well be, that the only thing all meditation practices have in common, is the fact they are being called “meditation”.

This was the starting point for our research. We decided to approach the above-mentioned difficulties from a completely different perspective involving experienced meditators from diverse traditions in the process of gathering, selecting and grouping meditation techniques. We wanted to include as many different contexts, schools and traditions as possible. This bottom-up methodological approach differs fundamentally from any previous study, and stands in line with several researchers demanding a more rigorous investigation into the variety of meditation techniques (Ospina et al., 2007; Travis & Shear, 2010). Our aim was to develop an empirical classification system of meditation techniques and to expand the scope of meditation practices under investigation. Thereby, we hope to inspire work towards developing one or more comprehensive theories of meditation.

As mentioned above, meditation techniques are often taught in a specific context, tradition or belief system. This context can influence the effects of meditation immensely (Amihai & Kozhevnikov, 2014; Hunt et al., 2018). Yet, little is known about the differential effects of specific meditation techniques, not to mention their interaction with context factors. For this reason, we chose to extrapolate basic meditation techniques common to many different contexts and traditions. This makes them easily accessible and understandable to many practitioners of diverse backgrounds and, thus, to researchers interested in the basic working mechanisms of meditation. Employing a bottom-up approach, we conducted two preparatory studies to extract diverse and recurring meditation techniques found in various spiritual traditions (see Chapter 2). With this, we hope to provide a framework which is independent of tradition-specific knowledge and easily applicable in any meditation (research) context.

Two preparatory studies were carried out to evaluate and deduce basic meditation techniques to be classified in the current study. In the first study (Chapter 2—Study 1), we collected all meditation techniques we could find through literature search and by conducting guided interviews with 20 experienced meditators from diverse traditions such as Tibetan Buddhism, Theravada Buddhism, Zen Buddhism, Yoga, Hinduism, Tantra, Sri Chinmoy, Kundalini Yoga, Osho-Meditation, Christianity, Sufism, Brahma Kumaris and Qi Gong. Interviews focused on the central question “When you meditate, what exactly do you do?”. The literature search included meditation manuals from different schools as well as research papers that included detailed descriptions of meditation practices (e.g., Dahl et al., 2015). This exhaustive search resulted in a list of 309 meditation practices that were reduced in several steps. Duplicates were removed, similar techniques were subsumed into one category, the level of abstraction was increased for techniques that were too specific, and techniques were excluded that were either too vague in their description (e.g., “catharsis”), or that were considered meditation practices of daily life rather than “formal practice” (e.g., mindfully doing the dishes). Technical terms (e.g., “chakra”) were replaced by more commonly used words (e.g., “energy center”) to make practices more easily comprehensible. This reduction led to a list of 50 basic meditation techniques.

The second preparatory study (Chapter 2—Study 2) focused on exploring the prevalence, popularity, and comprehensiveness of our selection of 50 meditation techniques, and examined their underlying factor analytic structure. In a broad online survey, 637 experienced meditators from diverse meditation backgrounds provided data on how much experience they had with each of these 50 techniques. We found that all techniques were commonly used and could be grouped into seven factors. These factors represent groups of techniques that are commonly practiced together and correlate with the respective traditions they were derived from, but also span different traditions. In addition, we identified the 20 most popular meditation techniques widely practiced across many traditions (see Materials, Table 1).

This final selection of 20 techniques formed the basis of the current study, which focused on examining the structure underlying these diverse techniques. These structural investigations should be based on similarity ratings of general effects that might be expected when meditators

engage in practicing these meditation techniques. We decided to focus on general effects, because previous findings suggest that diverse meditation practices yield differential effects (Fox et al., 2016; Sedlmeier et al., 2018). Furthermore, we were interested in the most general intuitions associated with these techniques and, thus, did not further discriminate phenomenological, psychological or behavioral effects in our investigation.

We chose to pursue a purely statistical approach in this venture rather than referring to pre-existing concepts based on traditions or theoretical approaches. On the one hand, we were interested in identifying dimensions along which these 20 techniques could be classified and differentiated. On the other hand, we took an interest in potential clusters of similar meditation techniques that could be identified within these dimensions. These dimensions and clusters should form the basis of a new, empirically-derived classification system for meditation techniques.

Method

Procedure

The current study used multidimensional scaling (MDS) as a tool for uncovering latent dimensions of diverse meditation techniques (Borg et al., 2018). Moreover, MDS techniques enable a researcher to produce a typology or, in our case, clusters of similar techniques using the judgments of a diverse set of individuals who are blind to the purpose of the study. Hence, MDS-based typologies are less prone to researchers' biases than typologies developed through other methods (Robinson & Bennett, 1995). Accordingly, we employed MDS in our study for both means, detecting implicit dimensions and deriving clusters of similar techniques. The great advantage of the present method is that we can use the intuitive knowledge of the experienced meditators without additional rationalizations that might occur if we asked them directly about underlying dimensions for classifying meditation techniques. The procedures followed in this study and the results are discussed below. The data were collected in accordance with ethical guidelines pertaining to the use of human subjects.

We devised an online survey to compare the 20 most popular meditation techniques identified in the two above-mentioned preliminary studies (see Materials, Table 1) according to their similarity as perceived by experienced meditators. Participants saw the upper half of a matrix listing all 20 meditation techniques horizontally and vertically. They were asked to rate the similarity of each technique on a scale from 0 (no similarity at all) to 10 (very high similarity). The instruction read "Please indicate for each of the following meditation techniques how similar it is to each other technique regarding its general effects." The instruction was phrased deliberately in a very general way and left open to participants' interpretation because we were interested in detecting general structures and intuitive typologies associated with these 20 meditation

techniques. If participants did not know a specific technique enough to rate it, they could enter -1 as a missing value. To control for potential sequencing effects, the order of presentation for the 20 meditation techniques was determined randomly for a first questionnaire. A second questionnaire was constructed with the order reversed. Each participant was randomly assigned one of the two questionnaires.

Participants

The survey was sent to all participants of the second preparatory study mentioned above (Chapter 2—Study 2) who had provided their e-mail addresses and consented to participate in further studies. A total of 102 experienced meditators completed the survey. Two participants were excluded because one did not provide sufficient data on his/her meditation routine, and one filled all answer fields with the same number. The final sample comprised 100 experienced meditators. The mean age was 52.90 years ($SD = 10.78$), the youngest participant being 26 years and the oldest 74 years old. 58.8% of the participants were female, and 93.0% were currently living in Germany.

Of all participants, 55.0% reported holding a university degree, 18.0% have completed higher education, 8.0% have completed their doctorate, and 11.0% are holding a professional degree. 37.6% are currently working as an employee, 28.7% are self-employed, and 16.8% are retired.

Meditation Experience and Background

Participants had practiced meditation from two years up to 46 years, the mean meditation experience being 15.10 years ($SD = 10.34$). On average, they stated practicing meditation 6.97 times a week ($SD = 5.48$) for a mean of 31.90 minutes per session ($SD = 22.60$). 92.9% of all participants stated meditating regularly in the present, whereas 7.1% stated having meditated regularly in the past, but not in the present.

Participants were asked to select the tradition(s), the meditation techniques they practiced, were affiliated with. They reported practicing in the following traditions:

- Zen ($n = 35$)
- Theravada, Vipassana ($n = 31$)
- Tibetan Buddhism ($n = 29$)
- Yoga, Kundalini Yoga ($n = 55$)
- Osho meditation ($n = 10$)
- Other Hindu traditions, such as Vaishnavism, Sri Chinmoy, Sri Aurobindo, Mother Meera, Ramana Maharshi, Deepak Chopra, and Transcendental Meditation ($n = 15$)
- Mindfulness, MBSR ($n = 31$)
- Christianity ($n = 10$)
- Sufism ($n = 6$)
- Qigong, Tai Chi ($n = 3$)

- Judaism, Merkabah ($n = 1$)
- No Tradition, Free Meditation ($n = 13$)
- Other ($n = 3$)

Several participants had been practicing in different contemplative traditions, therefore, the total number of allocated traditions ($N=242$) surpasses the total number of participants ($N=100$). 33.7% of all participants practiced in only one tradition, 48.5% practiced in two or three traditions, and the remaining 17.8 % practiced in more than three traditions. These traditions could belong to a similar background, e.g., diverse Buddhist traditions, or could differ in their backgrounds.

Materials

Participants were asked to rate the similarity of the 20 basic meditation techniques listed below. Table 1 displays the full description of each technique (as it was used in the survey) as well as the abbreviations utilized in the following text.

Table 1

List of 20 Basic Meditation Techniques Used in the Present Study, in Their Abbreviated and Full Descriptions

Abbreviated Description	Full Description
Repeating syllables	Repeating syllables, words or phrases either mentally or loudly
Manipulating the breath	Voluntary manipulation of breath, e.g., reducing the strength of breathing or "pranayama" with holding one's breath
Contemplating on question	Contemplating on a spiritually important question (e.g., "Who am I?")
Walking and observing senses	Walking and being mindful of sensory perceptions (movement of the feet, legs, clothing, air, hair etc.), coordinating it with the breath if necessary
Lying meditation	Lying down and going into a state of deep relaxation while being fully conscious
Concentrating on energy centers or channeling	Concentrating on one or subsequent locations in the body/ "energy centers" (e.g., abdomen or Chakra, Dan Tien), including "channeling energy" through certain pathways (e.g., spine)
Observing the body	Observing how bodily sensations arise without adhering to them
Singing Sutras or Mantras	Singing Sutras/Mantras/invocations, alone or together with others
Contradiction or paradox	Concentrating the mind on something contradictory or complex without thinking discursively about the contradiction (e.g., Koan, Mahavakyas)
Body scan	Scanning the entire body (e.g., body scan), including perceiving and releasing occurring emotions and tensions

Concentrating on an object	Sustained concentration on an object or a visualized object (e.g., Kasina, geometrical pattern, picture of the master)
Meditation with movement	Carrying out predetermined, meditative sequences of movements
Sitting in silence	Sitting in silence (e.g., Shikantaza)
Observing thoughts or emotions	Observing how thoughts or emotions arise without adhering to them
Breath abdomen	Being mindful of the rise and fall of the abdomen while breathing
Opening up for blessings	Opening oneself up to blessings and inspiration
Meditation with sound	Meditation with sound (e.g., humming, or singing bowls)
Cultivating compassion	Cultivating compassion, sympathetic joy, equanimity, loving kindness ¹ (for oneself, friends, neutral people, enemies, the whole world), including Tonglen
Breath nose	Being mindful of the sensations arising in the nose during inhalation and exhalation
Visualization	Visualization practices (e.g., heart as an opening rose blossom, body expanding in all directions, combining inhalation and exhalation with imagination of energy, light, smoke etc.)

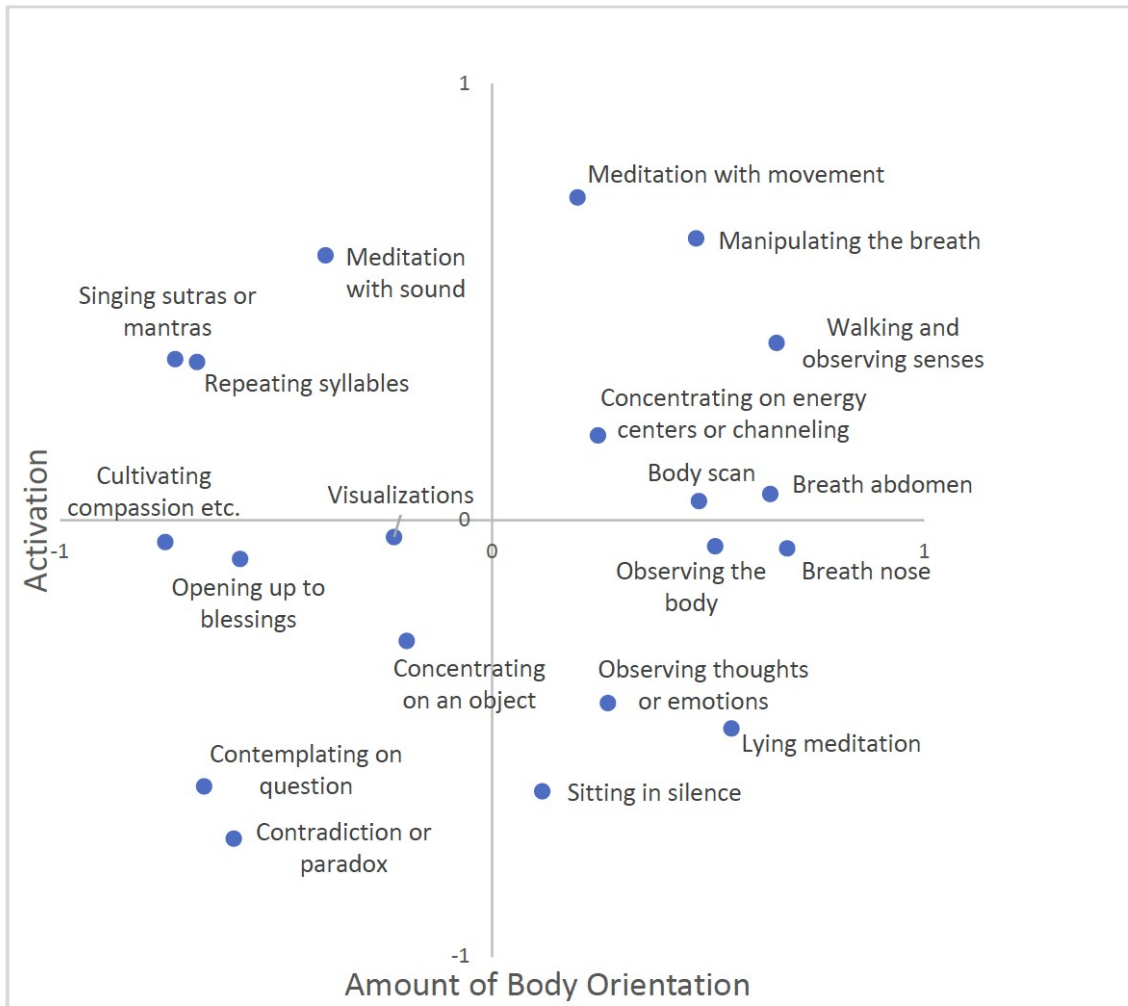
Results

Multidimensional scaling can be applied to any similarity matrix. Thus, each participant's ratings could serve as the basis for analysis. However, as an individual's ratings can be very subjective or limited to his or her personal experience, we calculated the means of the similarity judgments across all participants. On the basis of the resulting similarity matrix, we performed a multidimensional scaling analysis using SPSS's program PROXSCAL. Following recommendations by Borg et al. (2018, p. 78), we applied a multiple random starts configuration ($n=1000$) and a stress convergence of .00001. Model fit was measured using the stress value, a measure depicting the aggregated representation errors of each data-distance pair (Borg et al., 2018, p. 29). Kruskal's stress values for the one-, two-, and three-dimensional models were .207, .043, and .020, respectively. Adding the second and third dimensions reduced stress (by .164 and .023, respectively), suggesting an increasingly better fit with the data. The improvement from the two- to the three-dimensional model was negligible, though. Therefore, we opted for the two-dimensional model (Figure 1).

¹ These four features are derived from Buddhist teachings which are called "brahmaviharas". They refer to four "divine abidings" or "sublime states" which can be cultivated through meditation (Buswell Jr. & Lopez Jr., 2014, p. 385). Cultivating these virtues, namely, loving kindness, compassion, empathetic joy, and equanimity, can help to counter "unwholesome states" like greed, ignorance and hatred, and may lead to living a more balanced life.

Figure 1

Overall Multi-Dimensional Scaling (MDS) Solution, Based on Average Similarity Judgments of n = 100 Experienced Meditators



The statistical method of multidimensional scaling returns a dimensional output with potentially meaningful clusters, which are open to interpretation by the researcher. Thus, we thoroughly inspected Figure 1 and arrived at the following interpretation described below.

Dimension 1 has cultivating compassion and other brahmaviharas (see footnote 1), contemplating on a spiritual question, concentrating on a contradiction or paradox, and singing Sutras or Mantras on one extreme. At the other end are scanning the body, observing the abdomen or the nostrils while breathing, lying meditation, and manipulating the breath. Meditation techniques with a more abstract or conceptual focus received lower scores, while those with a higher amount of body-orientation received higher scores. Therefore, we decided to label this dimension “amount of body orientation”.

Dimension 2 has sitting in silence, concentrating on a contradiction or paradox, lying meditation, and observing thoughts or emotions at one end of the spectrum, while meditation with movement, walking and observing senses, and manipulating the breath are at the other end. Lower scores reflect a more passive, still and contemplative kind of meditation practice, while higher scores reflect more (bodily) active kinds of meditation practices. This dimension was labeled “activation”.

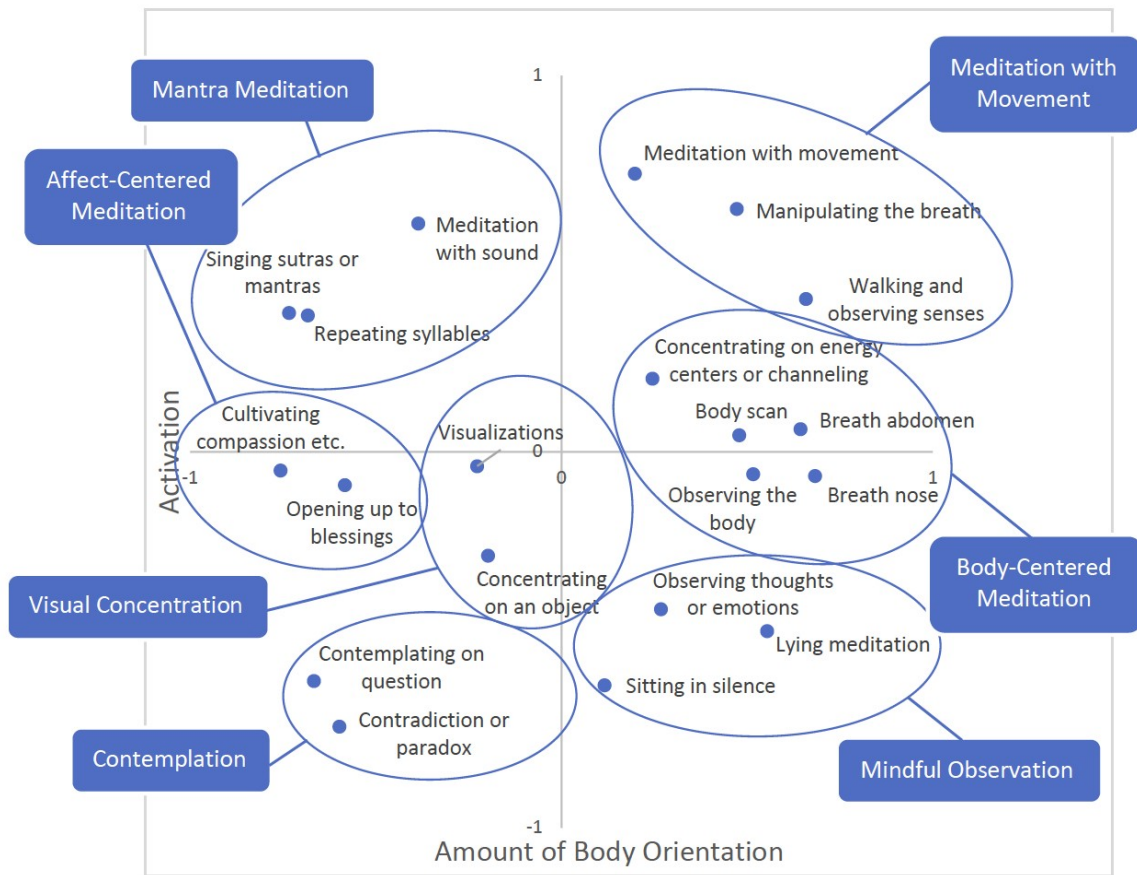
We identified seven clusters of meditation techniques by visual inspection (Figure 2). The biggest cluster includes five techniques that have a strong focus on observing the body, the breath or sensory perceptions, and was labeled “body-centered techniques” (middle right). It also includes concentrating on locations in the body or “energy centers”. Another cluster comprises practices that focus on mindfully observing oneself in stillness and was, thus, labeled “mindful observation”. It includes lying meditation, sitting in silence, and observing thoughts and emotions. These meditation techniques are relatively close to so-called “open-monitoring” techniques (see respective descriptions in Table 1). Manipulating the breath, walking and observing senses, and meditation with movement could be grouped into a broader cluster of “meditation with movement”.

Four smaller clusters were identified on the other side of the diagram, towards the more conceptual or object-oriented end. One cluster comprises concentrating on a contradiction or paradox and contemplating on a spiritual question and was labeled “contemplation”. The second cluster includes visualizations, and concentrating on an object or a visualized object, and was labeled “visual concentration”. The third cluster comprises opening oneself up to blessings, and cultivating compassion, loving-kindness, sympathetic joy, and equanimity, and can be seen as a cluster of “affect-centered techniques”. The fourth of the smaller clusters includes repeating syllables, words or phrases, singing Sutras or Mantras, and meditation with sound, and was labeled “mantra meditation”.

These two dimensions, plus the seven clusters of meditation techniques, constitute our proposed new classification system of meditation techniques.

Figure 2

Overall Multi-Dimensional Scaling (MDS) Solution with Indicated Clusters and Labels



Differences Between Traditions

Results from one of the preliminary studies (Chapter 2—Study 2) identified differences in usage and popularity of certain meditation techniques between meditators of two major traditions, i.e., Buddhist and Hindu meditators. Therefore, we decided to conduct another two multidimensional scaling analyses for these two subgroups. We wanted to see whether meditators from these two traditions have different conceptions about clusters and dimensions of basic meditation techniques.

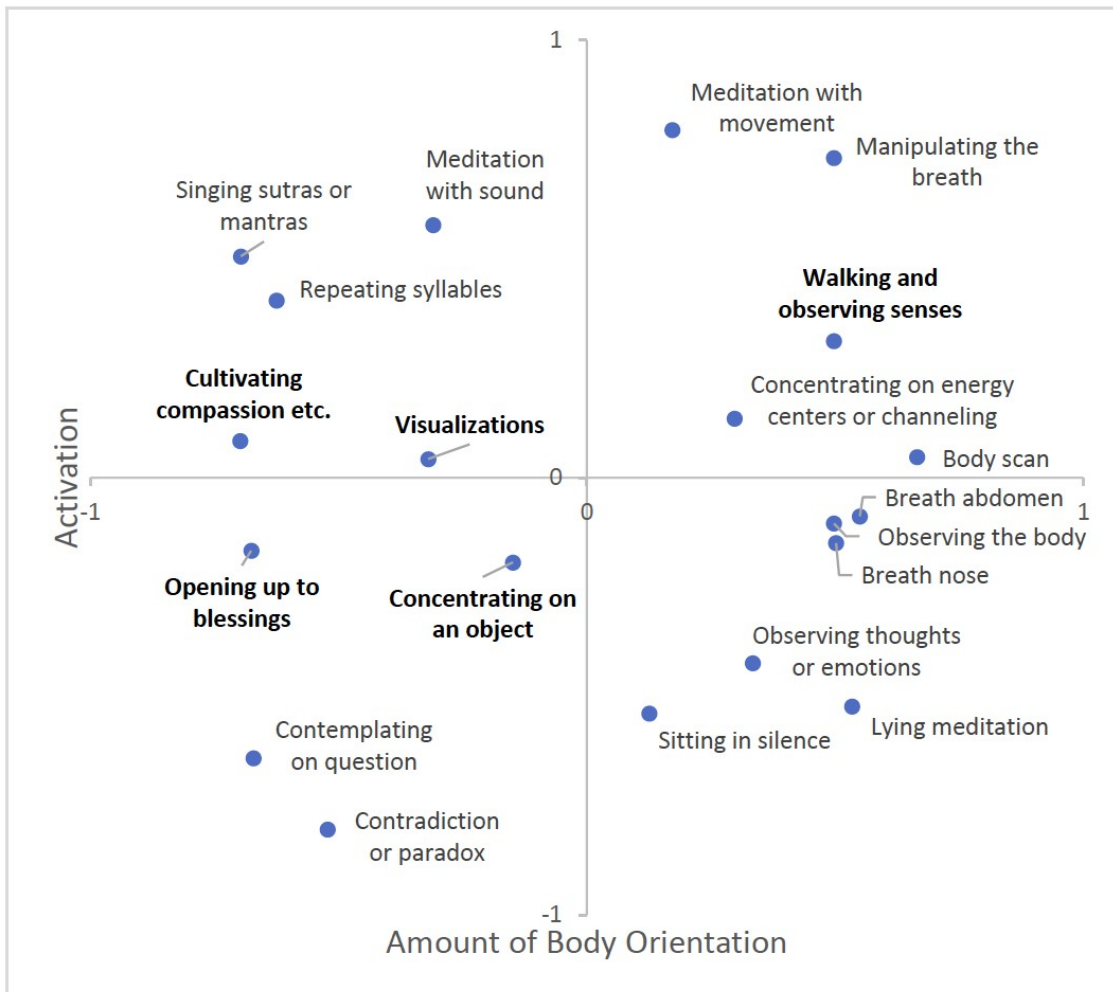
Participants who stated practicing in one or more Buddhist traditions (i.e., Zen, Theravada, Vipassana, Mindfulness, or MBSR), but in no other tradition from another spiritual background, were allocated to the group of Buddhist meditators (N=27). Participants practicing in one or more Hindu traditions (i.e., Yoga, Kundalini Yoga, Hindu traditions, or Osho), but in no other spiritual tradition, formed the group of Hindu meditators (N=20). Participants of any other spiritual or mixed spiritual backgrounds were excluded from the following analyses.

In accordance with the results mentioned above, we selected two-dimensional models with Kruskal's stress values of .054 (Buddhist), and .048 (Hindu), respectively. These values indicate an adequately good, but not perfect fit between model and data. Figure 3 shows the solution for Buddhist meditators, and Figure 4 for Hindu meditators (the original solution was mirrored along the X-axis to increase comparability between solutions), respectively.

First, both figures indicate a high congruence between ratings. Both solutions, Buddhist and Hindu, bear similarity not only to each other, but also to the overall solution described above. Moreover, both solutions exhibit similar dimensions, namely "amount of body orientation" as Dimension 1, and "activation" as Dimension 2, and similar clusters of techniques. However, and importantly, some of the techniques have slightly shifted their position and/or affinity to the afore-mentioned clusters (printed in bold type).

Figure 3

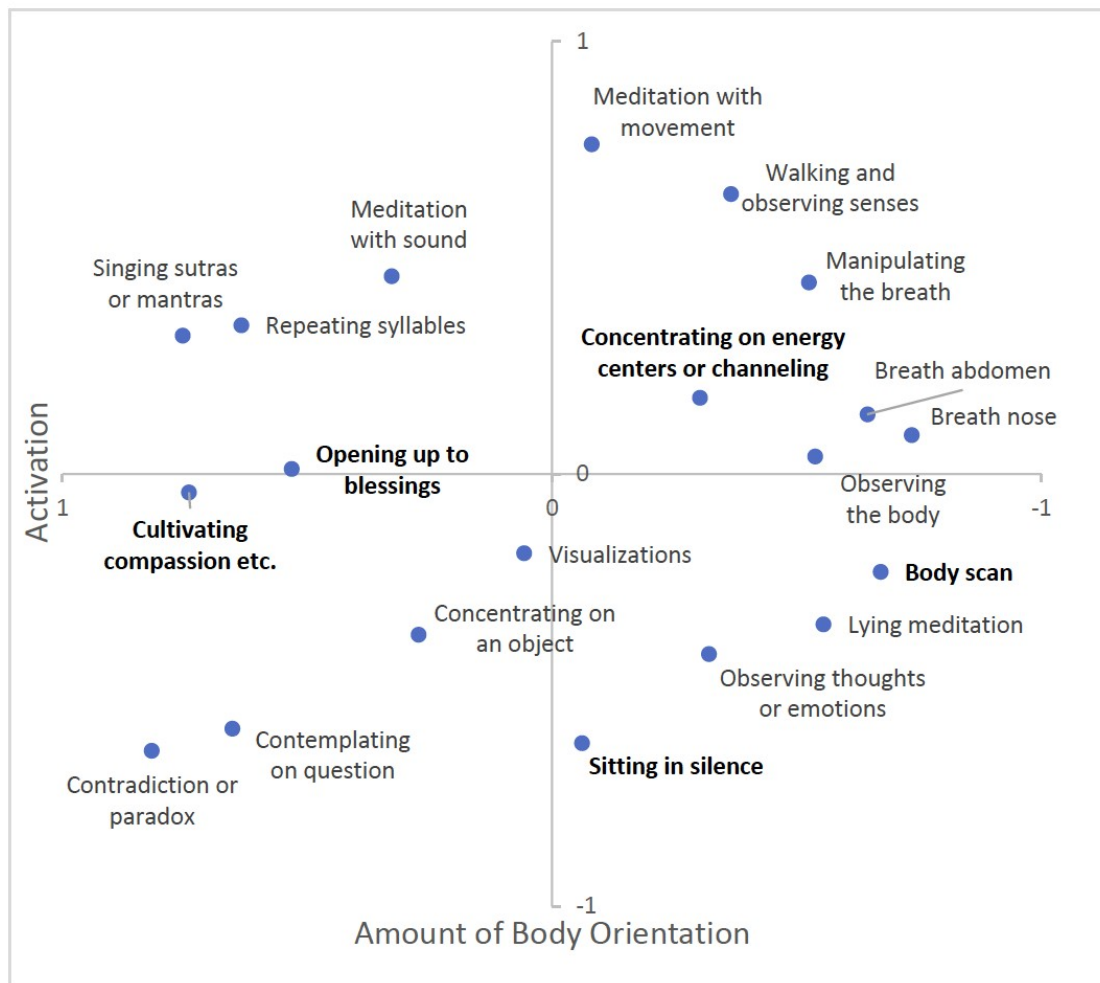
Multi-Dimensional Scaling (MDS) Solution for Buddhist Meditators (n = 27)



The solution for Buddhist meditators shows basically the same cluster structure as the overall solution, with two small peculiarities. First, the technique walking and observing senses shifted from the “meditation with movement” to the “body-centered meditation” cluster. This appears reasonable when looking at Buddhist traditional practices where walking meditation is commonly practiced alternating with breathing meditation (Kornfield, 2009; Sedlmeier, 2016). Second, the distances increased between opening up to blessings and cultivating compassion, and visualizations and concentrating on an object, respectively. This may be indicative of an assumedly greater differentiation of these techniques in Buddhist meditators.

Figure 4

Multi-Dimensional Scaling (MDS) Solution for Hindu Meditators (n = 20)



Looking at the solution of Hindu meditators, both dimensions can be replicated, again. Looking closer, certain shifts in location lead to changes in some clusters. Contrary to the Buddhist solution, opening oneself up to blessings and cultivating compassion remain in the same cluster. However, both techniques moved further away from the “visual concentration” cluster, and now appear to be closer to the cluster of “mantra meditation”. Second, the body scan has left the cluster of “body-centered techniques” and joined lying meditation and observing thoughts and emotions. This appears reasonable with regard to Hindu practice traditions, especially in the Yoga context where the body scan is commonly practiced in a supine position (Ott, 2013). Third, two techniques appear to form categories of their own as they are distant to and cannot be grouped with any of the other clusters. These two techniques are “sitting in silence” and “concentrating on energy centers or channeling”.

All in all, there is remarkable conformance between the original solution and both solutions from Buddhist and Hindu meditators, respectively. At the same time, both solutions reveal tradition-specific particularities that can easily be attributed to traditional frameworks and modes of practice. This gives further evidence to the general validity of the proposed classification system.

Discussion

This study arrives at a novel classification system for meditation techniques: the first to have been devised in an empirical and systematic bottom-up way. Drawing upon results from extensive preparatory studies (Chapter 2) we employed multidimensional scaling (MDS) to the similarity ratings of 100 experienced meditators for 20 well-known and diverse meditation techniques. Thus, our approach is unique not only in its methodology, but also in the variety of meditation techniques that were included in the analyses.

During the past years, the scope of scientific research has expanded continually to include a wider range of meditation practices (Dahl et al., 2015; Nash & Newberg, 2013). However, this expansion has made it even more difficult to find an overarching definition or top-down classification that could account for the variety found in meditation practices (Schmidt, 2014). Therefore, we chose to rely on the judgements of experienced meditators, a method that has already been successfully employed by other researchers in the field trying to find demarcation criteria for meditation (Bond et al., 2009). This approach has the advantage of getting close-up practice-based insights from practitioners from a variety of spiritual backgrounds.

Based on our results, we propose a two-dimensional system of classifying meditation according to (1) the amount of body orientation in the technique, and (2) the level of activation in the technique. Furthermore, we propose seven main clusters of meditation techniques, namely: (1) Body-centered meditation, (2) mindful observation, (3) contemplation, (4) mantra meditation, (5) visual concentration, (6) affect-centered meditation, and (7) meditation with movement.

Taking a closer look at the dimensions and clusters, implicit assumptions of experienced meditators differ fundamentally from afore-mentioned theoretical proposals. Former proposals have focused on cognitive variables to describe and differentiate meditation techniques with the popular “focused attention” (FA) and “open monitoring” (OM) distinction (Lutz et al., 2008) leading the way. But also newer models (Dahl et al., 2015; Nash & Newberg, 2013) have attributed differences in techniques largely on diverse cognitive mechanisms or attentional modes at work. Thereby, the involvement of different cognitive mechanisms should result in differential effects. For instance, meditation practices from the attentional family (Dahl et al., 2015) should increase attention and decrease mind-wandering, whereas meditation practices from the constructive family might affect the regulation of emotion.

Meditation Is Inherently Embodied

Quite on the contrary, our MDS solution does not depict cognitive, but rather embodied dimensions. Both dimensions, amount of body orientation and level of activation, are closely related to bodily processes. They have been taken into account in previous descriptive or taxonomic systems (Nash & Newberg, 2013; Schmidt, 2014), but have not been considered as central dimensions, yet.

It seems that, according to experienced meditators, meditation is inherently somatic. This is in line with research on “embodied cognition” (Damasio, 2006; Varela et al., 2016). Antonio Damasio (2006; 2012) convincingly argues that past and present states of the body heavily influence the contents and processes in the brain and that body-based emotions and feelings shape our mind. Nowadays, there is growing consensus among researchers that cognition is shaped by both, top-down (descending pathways from the cerebral cortex) and bottom-up (ascending pathways from the periphery) processes (Barsalou, 2010; Clark, 1999; Thompson & Varela, 2001; Wilson, 2002; Winkielman et al., 2015). This view has also been recently discussed in the context of contemplative science and mindfulness research (Cebolla et al., 2016; Kerr et al., 2013; Khoury et al., 2017; Michalak et al., 2012).

Meditation places the focus of attention onto those ascending and descending inner processes, making them more salient in consciousness. Many, if not all, meditation practices emphasize directing attention to interoceptive and/or exteroceptive signals. Whether meditators observe all incoming (sensory or mental) stimuli, develop compassionate feelings for others, silently repeat a mantra, or explicitly focus on bodily mechanisms such as the breath: the body remains a constant companion in all their endeavors. Likewise, Buddhist teachings emphasize that body and mind are equally valid objects of meditation, and encourage practitioners to use awareness of the whole body as a somatic anchor for mindfulness, or, in other words, cultivate an embodied form of mindfulness (Anālayo, 2016). Thus, it appears shortsighted to define meditation based on purely cognitive or attentional dimensions. We suggest that all meditation techniques have a somatic component and meditation is inherently embodied. We ground these assumptions in the results of our empirical analyses.

It is surprising, though, that meditators implicitly classify meditation techniques on embodied dimensions, although we had requested them to judge the similarity of general effects of these techniques. We do not know whether participants judged techniques according to similar phenomenological experiences likely to occur during the practice of the specific technique or according to similar psychological outcomes following the prolonged practice of the technique. It might well be that they considered the one or the other, or both, or something completely different. But, we can probably assume that these diverse interpretations of the question were leveled out by agglomerating the judgements of 100 participants. Overall, it seems that similarity or dissimilarity of meditation techniques seems to be implicitly attributed to differences in

the two above-mentioned embodied dimensions, i.e., level of activation and amount of body orientation.

Yet, one issue that remains unsolved so far is whether similarity on these two dimensions corresponds to differences in actual effects, too. Future studies should evaluate whether meditation techniques judged high in one dimension, e.g., level of activation, lead to similar phenomenological experiences, neuroscientific signatures, and/or psychological and behavioral outcomes. They could also compare techniques judged high versus techniques judged low in one dimension and investigate whether there is a linear increase or decrease of specific effects along this dimension. A close-up examination of diverse techniques could reveal similar or dissimilar mechanisms and processes underlying the practice of these techniques and take into account individual variation between participants.

Expanding Focused Attention and Open Monitoring

The commonly made distinction between FA and OM practices could not be replicated in the present study, confirming previously voiced considerations (Amihai & Kozhevnikov, 2014). Also, looking at Buddhist practices, the same meditation objects can serve for concentrative (shamata) as well as insight (vipassana) meditation techniques (e.g., Pa Auk, 2003). Moreover, some commonly used techniques, such as the body scan might be arguably seen as a mixture of (sequentially moving) focused attention and open awareness. So, it might not come as such a surprise that both, OM and FA practices are displayed in our model in a far more differentiated way.

Still, it is easier to connect the cluster of “mindful observation” techniques with OM practices than to make connections to the FA concept. The mindful observation cluster includes three main practices in which the present-moment experience is approached with an open and receptive attitude (Bishop et al., 2004). These are sitting in silence, observing thoughts and emotions, and lying meditation. In contrast, FA practices are possibly the most difficult to locate in our model. Many studies used breathing meditation as a form of FA or “concentrative meditation” (Ainsworth et al., 2013; Manna et al., 2010; May et al., 2014; Valentine & Sweet, 1999). Mantra meditation has also often been considered a specific form of FA (Fox et al., 2016, p. 211). On the contrary, some researchers have emphasized a different mode (“automatic self-transcending”) being supposedly active in mantra meditation as it is practiced, e.g., in Transcendental Meditation (Travis & Shear, 2010). In this form of practice, the repetition of the mantra becomes successively more subliminal until it fades away into silence. Looking at our MDS solution, breathing meditation and mantra meditation are very distant from each other, underlining differences in presumed effects and mechanisms at work in these two techniques. Therefore, it does not seem plausible to subsume them into the same category of FA meditation.

Furthermore, observing the breath might be considered concentrative for novice meditators, but might progress into a more passive and observational mode with growing experience, or even change back and forth from concentrative to receptive during the same meditation session.

This would also be true for other practices clustered together in our solution as “body-centered meditation”, i.e., scanning or observing the body, and concentrating on a location in the body or on “energy centers”. The only identifiable cluster of techniques with a strong concentrative focus is the group of “visual concentration” techniques. Conversely, these have a very specific visual focus (concentrating on an object such as a picture or disc, or visualization techniques). Thus, they can be considered to be a very specific form of FA.

In conclusion, we would suggest that it might eventually be helpful to discard the rather un-specific category of FA meditation and replace it by the more specific categories presented in our empirically-derived MDS solution. This notion needs further empirical investigation, though. Future experimental intervention studies should evaluate whether the alleged differences between clusters can be replicated in empirical findings. According to our model, meditation techniques that are closer to each other in the MDS solution should yield more similar effects than techniques which are further apart from each other.

We encourage researchers to evaluate this new classification system through comparative empirical studies. These studies could investigate short-term and long-term effects of each technique or cluster of techniques taking into account phenomenological, psychological, behavioral and neuroscientific aspects. They could also try to capture individual experiences with and reactions to these techniques. Single-case research designs (Barlow et al., 2009) seem to be a promising approach in capturing differential effects of diverse meditation techniques. They enable custom-tailored measurement and high-resolution recording of specific changes over time, also regarding individual differences in response to meditation (Sedlmeier et al., 2016). Several authors have pointed out that individual differences might tremendously influence the effects of meditation (Hölzel et al., 2011; Lippelt et al., 2014; May et al., 2014). Also, the phenomenological experiences encountered during meditation depend heavily on individual factors, such as personality or learning history (Schmidt, 2014). This individual variation might be of particular interest in the context of investigating diverse meditation techniques, especially regarding person-technique-fit. Consequently, future studies should include measures of personality traits and carefully capture individual responses to different forms of meditation.

Limitations and Future Directions

We are well aware that our choice of practices might have been limited to the regional availability of meditation teachers and traditions. Still, the comprehensiveness of our selection was confirmed by a broad sample of experienced meditators in one of the preparatory studies (Chapter 2—Study 2). This allowed us to deliberately choose the 20 most popular and commonly known techniques for the current study. Additionally, the MDS solutions of ratings of primarily Buddhist or Hindu meditators were astonishingly congruent with the overall solution, while, at the same time, revealing tradition-specific particularities. This shows how different traditional background knowledge can frame responses, even though the question we asked our participants was very general in nature. We might have received different answers if our question

had been more specific, e.g., specifying phenomenological, psychological or behavioral effects. Yet, this was not the aim of the present study, which rather focused on detecting general structures and intuitive typologies. Future studies could evaluate more specific typologies of meditation.

One could argue that the 20 techniques, which were investigated in this study, were artificially constructed and taken out of context. Traditionally, meditation techniques are practiced in a specific order, in the framework of a specific tradition, or in combination with other practices. Observing the breath, e.g., is often combined with visualizations or with the repetition of a mantra. Conversely, little is known about the effects of combined meditation techniques compared to simple techniques. Therefore, it seems promising to investigate and compare both, simple and combined techniques, and see if there are, indeed, any additive effects.

The same is true for the sequence of practices and the specific framework or traditional context of practice. To date, there is a scarcity of studies into sequence or framework effects (Hölzel et al., 2011; Lippelt et al., 2014). Nevertheless, some studies have shown a greater perceived effort for participants who began their practice with loving-kindness meditation compared to beginning practice with breathing meditation or body scan (Kropp & Sedlmeier, 2019; Lumma et al., 2015). Additionally, a specific traditional background or framework can tremendously influence the effects of meditation (Amihai & Kozhevnikov, 2014; Wachholtz & Pargament, 2005). However, these effects may be very complex, specifically regarding the manifold meditation traditions. For this reason, and as a first step of investigation, we chose to take out meditation techniques of their traditional context and evaluate their basic effects. This might help to effectively disentangle genuine effects of simple meditation techniques from the effects of their traditional context. Future studies could compare the effects of bare meditation techniques to a combined intervention of meditation practice and ethical or philosophical teachings.

Another argument could be that some of the 20 meditation techniques employed in this study are not simple techniques but rather very broad categories in themselves. For example, voluntarily manipulation of breath, visualizations, or meditation with movement are all conglomerates subsuming a lot of diverse techniques. This was our conscious choice in the interest of brevity. During our preparatory studies we came across a great variety of techniques ($N = 309$, see Appendix A) which had to be considerably shortened for the current study, for pragmatic reasons. In this way, we ensured that participants' load during the similarity ratings remained manageable. At the same time, it allowed for comparisons to be fine-grained enough for our analysis, incorporating a great variety of meditation techniques. The remaining variety surpasses by far the range of meditation techniques examined in earlier studies.

Nonetheless, these broad categories of techniques should be eventually investigated in greater detail. For instance, manipulating the breath, also often referred to as “pranayama”, can take many forms. These can range from reducing the strength of breathing, to alternate nostril breathing with holding one's breath, or even very rapid breathing (Ott, 2013; Ott & Epe, 2018). Investigations into different forms of “pranayama” or breathing techniques have already shown

significant and differentiated effects on cardiovascular variables and stress (Bhavanani et al., 2014; Conrad et al., 2007; Peng et al., 2004; Sengupta, 2012). Still, some traditions regard breathing techniques as preparatory exercises rather than meditation techniques. For this reason, it would be interesting to further compare the effects of diverse breathing techniques, and, successively, compare them to other basic meditation techniques.

The other two broad categories mentioned above can be very diverse, too. Visualizations can focus on imagining light or fire at different body parts, imagining the body expanding in all directions, or merging with a visual representation of a deity (a typical Tibetan Buddhist practice, see, e.g., Amihai & Kozhevnikov, 2014). Meditation with movement includes techniques of Yoga, Qigong, Tai Chi, Osho meditation and other movement-based meditation traditions. Apparently, these traditions are incredibly rich in the variety of techniques they offer (Ospina et al., 2007). Similar to sitting meditation techniques, the variety of meditation with movement seems limitless. A comprehensive overview of meditation techniques using movement is still missing in literature. Thus, it seems very worthwhile to take a closer look at these techniques and disentangle their specificities and working mechanisms. Subsequently, researchers could compare movement-based meditation techniques to other basic techniques.

In the long run, all of these efforts could contribute to establishing one or more theories of meditation. This endeavor is not only imperative for the future of scientific research into meditation (Sedlmeier et al., 2016), but also highly promising in understanding the phenomenon of meditation (or the phenomena of different kinds of meditations) more thoroughly. With the proposed classification system, we hope to have taken an important step toward achieving this goal and encourage future scientific investigation into this matter.

Conclusion

A broad range of diverse meditation techniques was effectively depicted in the novel classification system presented in this paper. This classification system is the first to be derived empirically by requesting experts' evaluations. The dimensions depicted in our classification system shed new light on previous categorizations and shift the focus from cognitive to embodied variables of interest. We hope that our classification system will be useful for future studies and the development of profound theories of meditation.

Chapter Four

The Effects of Different Components of Yoga A Review on Comparative Studies and Meta-Analyses

This chapter is submitted as:

Matko, K., Bringmann H. C., & Sedlmeier, P. (2021). The effects of different components of yoga. A review on comparative studies and meta-analyses.

4. WHAT EFFECTS DO DIFFERENT COMPONENTS OF YOGA HAVE?

Yoga is one of the most widely practiced mind-body interventions in the West—with more and more people joining the trend (Clarke et al., 2015; Eardley et al., 2012). Commonly, it is used for preventive purposes such as relaxation or stress relief (Park et al., 2016, 2019). Indeed, a growing amount of research acknowledges the positive effects of yoga on alleviating stress (Breedvelt et al., 2019; Pascoe et al., 2017), and promoting mental and physical health (Büssing, Michalsen, et al., 2012; Hendriks et al., 2017; Ross & Thomas, 2010). However, yoga encompasses a variety of practices, and it is unclear how these practices relate to the overall effect of yoga. The ancient discipline of yoga originates from India and includes diverse practices such as physical postures (*asana*), breathing techniques (*pranayama*), meditation techniques (*pratyahara*, *dharana*, *dhyana*, *samadhi*), and ethical teachings (*yamas* and *niyamas*) (Feuerstein, 2012; Telles & Singh, 2013). Research has shown that these practices can yield quite different effects (Peng et al., 2004; Sauer-Zavala et al., 2013). Conversely, comparative and in-depth studies into the differential and incremental effects of yoga components are still scarce. Furthermore, past research has often suffered from poor methodological quality and the high heterogeneity among yoga interventions. Thus, there have been repeated calls to evaluate and disentangle the effects of different components of yoga (Gard et al., 2014; McCall, 2013; Riley & Park, 2015; Schmalzl et al., 2015).

Recent theoretical proposals have delineated possible working mechanisms of various yoga components. Gard et al. (2014) proposed an integrative framework and neurophysiological network model of yoga focusing on the enhancement of top-down and bottom-up self-regulatory mechanisms. The authors posit that yoga can be broken down into a skillset of four main tools, namely, ethics, postures, breath regulation, and meditation. All four tools contribute to an optimization of self-regulation and the development of an adaptive stress response. In their model, ethical beliefs promote the top-down initiation, monitoring and maintenance of behavioral change. Postures, breath regulation and meditation, on the other hand, elicit both top-down as well as bottom-up processes. The sustained practice of meditation and “meditation in motion” during posture and breath practice facilitates top-down attention control, which, in turn, supports behavioral change. Additionally, the embodied aspect of these practices enhances bottom-up processes of sensory awareness, viscerosomatic integration and parasympathetic control. With continued practice, these regulatory pathways are thought to become more automatized, leading to increased cognitive, emotional and behavioral regulation, and psychological and physical well-being.

Two other proposals have described yoga as either a modern psychophysiological therapeutic practice consisting of movement-, breath- and attention-based techniques (Schmalzl et al.,

2015), or as an ethically grounded, transformational process of exploring values, causes of suffering and eudemonic well-being (Sullivan et al., 2017). Schmalzl et al. (2015) outline the bottom-up neurophysiological and top-down neurocognitive processes that are affected by yoga movement, breath and attention practices, independent of traditional or ethical background. In contrast, Sullivan et al. (2017) delineate how the ethical first-person inquiry through *yamas* and *niyamas* can lead to an intentional reorientation of identity, meaning, and purpose in life. Postures, breath regulation, and meditation can support this process of shifting from the experience of suffering to the experience of eudemonic well-being.

All of these proposals strongly encourage the empirical investigation and systematic testing of the hypothesized links and mechanisms. Specifically, they suggest conducting longitudinal, comparative, or dismantling studies. However, the heterogeneity of yoga styles and the multitude of possible “active ingredients” in yoga makes the investigation of its components challenging. Modern styles of yoga vary considerably in the emphasis they place on various components of yoga. While some styles focus primarily on postures and breathing practices (e.g., Iyengar, Hatha), others comprise mainly breathing practices (e.g., Surdahan Kriya) or meditation (Sahaja). Some styles include mantras and chanting (e.g., Kundalini), and still others try to integrate and synthesize as many aspects and components as possible (e.g., Kripalu). Almost all styles end their yoga practice with a period of deep relaxation in supine position (*shavasana*). For an overview on different yoga styles see McCrary (2013). Scientific yoga interventions mirror this diversity of styles making it hard to draw reliable conclusions about the relative effects or importance of each yoga component.

The aim of this review is to summarize the current evidence on the differential and incremental effects of various yoga components. We will first look at intervention studies contrasting different yoga components. Then, we will review all available meta-analyses that have conducted subgroup analyses based on the inclusion or exclusion of specific yoga components. With this, we hope to shed light on the undeniable diversity in yoga research and ease future research efforts on evaluating yoga components.

Comparative Intervention Studies

The yoga studies reviewed here have examined and, in part, compared postures, breathing techniques, relaxation, chanting, meditation, and ethical education. The degree of specificity and disassembling of components and practices under investigation varied greatly among studies. While some compared, e.g., very specific breathing practices to each other, others compared rather complex yoga interventions to meditation or relaxation techniques. Studies also varied regarding outcome variables, duration of treatments, methodological quality, sample size, and population. Table 1 gives an overview of the reviewed comparative studies. We indicated all components of yoga interventions (postures, breathing, relaxation, meditation, education) that we were able to identify in the respective articles. The education component refers to any type of lecture on health, stress management or ethics participants received during their treatment.

Although the specific interventions and treatments varied greatly between studies in Table 1, combined interventions were generally more effective than simple interventions. Most comparative treatments in each study were equal in length. Nonetheless, outcomes were usually better for treatments combining several elements of yoga practice (Bowden et al., 2011; Melville et al., 2012; Park et al., 2017; Rohini et al., 2000; Shankarapillai et al., 2012; Shannahoff-Khalsa et al., 1999, 2019; J. A. Smith et al., 2011). Complex treatments helped to improve depression, anxiety, mood, sleep latency, interoceptive awareness, emotion and self-regulation, and physiological markers of stress.

Conversely, findings were not always consistent, particularly when two equally complex interventions were compared to each other. Some studies reported no difference between complex yoga interventions and progressive muscle relaxation (C. Smith et al., 2007), stress management (Granath et al., 2006; Wolever et al., 2012), or three forms of (mindfulness) meditation (Gorvine et al., 2019) on similar outcome variables. Additionally, a complex mindfulness intervention had a greater effect on working memory capacity than a complex yoga intervention (Quach et al., 2016). Interestingly, in the latter study, stress and anxiety scores improved for all conditions, even the waitlist control. Thus, this amelioration could not be attributed to the “active ingredients” of both treatments. Nonetheless, when simple meditation treatments were compared to complex yoga interventions, the latter were more effective in improving obsessive-compulsive pathology and mood (Shannahoff-Khalsa et al., 1999, 2019). This adds to the impression that combined interventions seem to have stronger impacts than simple ones. In another study, the combination of yoga and physical exercise outperformed both single treatments in enhancing well-being and reducing anxiety and stress (Bhat et al., 2012). However, in this study, this might have also been due to the higher dosage and exercise time in the combined treatment.

Table 1*Results in Previous Studies That Compared Different Components of Yoga*

Study	Sample	Format	Intervention Groups	Duration of Treatment	Results	Conclusion
Bhat et al. (2012)	Healthy adults (<i>n</i> = 400)	RCT	1) Yoga (P, B, R) 2) Physical training 3) Yoga + physical training 4) Control: No treatment	3 months (45 min for 5 days a week; in (3) 2 x 45 min)	Yoga (1) had greater positive effects on well-being, anxiety and stress compared to physical training (2) and control (4), but yoga + physical training (3) yielded the strongest effects	Combined intervention more effective
Bhavanani et al. (2017)	Healthy college students (<i>n</i> = 134)	RCT	1) Physical Yoga (P, R) 2) Yoga breathing (B) 3) Control: No treatment	1 week (5 sessions of 60 min each)	Both yoga postures (1) and breathing (2) resulted in significant increases in reaction time to simple visual and auditory stimuli compared to control; Breathing (2) was associated with more pronounced changes, specifically in visual reaction time	Breathing more effective than physical yoga
Bhogal et al. (2016)	Healthy college students (<i>n</i> = 45)	RCT	1) Supine meditation (M) 2) Shavasana relaxation (R) 3) Control: Unguided relaxation (R)	30 days (30 min for 6 days a week)	Supine meditation (1) and shavasana relaxation (2) both increased memory scores compared to control (3), with supine meditation (1) showing a higher magnitude of change	Meditation more effective than relaxation
Bowden et al. (2011)	Healthy adults (<i>n</i> = 33)	RCT	1) Brain Wave Vibration (BWV) training (P, B, M, specific rhythmic exercises) 2) Iyengar Yoga (P, B, R) 3) Mindfulness (M, E)	5 weeks (75 min twice weekly)	All interventions improved mood, well-being and stress, but the mindfulness intervention (3) enhanced absorption and the BWV training (1) improved depression and sleep latency	Combined intervention more effective
Gorvine et al. (2019)	Healthy college students (<i>n</i> = 92)	Quasi-experiment	1) Yoga (P, B, R) 2) Meditation (3 forms of M)	10 weeks (50 min twice weekly)	Both interventions equally increased mindfulness and self-compassion; A posi-	No difference between yoga and meditation

						<p>tive effect on stress reduction was only observed when both groups were taken together in calculation</p>	
Granath et al. (2006)	Stressed individuals (<i>n</i> = 33)	RCT	<ol style="list-style-type: none"> 1) Kundalini Yoga (P, B, R, E) 2) Stress management/Cognitive behavior therapy (CBT)—(E, R) 	<ol style="list-style-type: none"> 1) 10 weeks 2) 10 sessions over 4 months 	Both treatments yielded the same beneficial effects on stress-related psychological and physiological variables; Yoga (1) had a stronger effect on noradrenaline and CBT (2) on adrenaline levels	No difference between yoga and stress management	
Melville et al. (2012)	Healthy adults (<i>n</i> = 20)	Rand. within-subjects design	<ol style="list-style-type: none"> 1) Chair-based yoga (P, B, R) 2) Guided meditation (M) 3) Control: No treatment 	<ol style="list-style-type: none"> 3 days (15 min each day) 	Both treatments significantly reduced psychological and physiological markers of stress, including respiration rate; Yoga (1) resulted in a greater number of physiological benefits than meditation (2)	Combined intervention more effective	
Park et al. (2017)	Healthy female college students (<i>n</i> = 34)	RCT	<ol style="list-style-type: none"> 1) Kripalu Yoga (P, B, R, M, E) 2) Cognitive-behavioral stress management (CBSM)—(E, R) 3) Control: No treatment (waitlist) 	<ol style="list-style-type: none"> 8 weeks (60 min twice weekly) 	Yoga (1) significantly increased interoceptive awareness, emotion regulation and self-regulation compared to CBSM (2) and control (3), and was perceived as more helpful; Both treatments increased physical function and activity, with yoga (1) having a more timely effect; No effects were found on stress, depression, anxiety	Combined intervention more effective	
Peng et al. (2004)	Experienced meditators (<i>n</i> = 10)	Within-subjects design	<ol style="list-style-type: none"> 1) Baseline: Sit quietly 2) Mantra meditation (M) 3) Rapid breathing (<i>kapalabhati</i>, B) 4) Segmented breathing (B/M) 	<ol style="list-style-type: none"> 1 day (10 min per condition) 	Compared to baseline (1), mantra meditation (2) and segmented breathing (4) induced similarly low frequency heart rate oscillations and high coherence between heart rate and breathing; whereas rapid breathing (3) increased heart rate and decreased HRV and coherence	Breathing and meditation differ	

Quach et al. (2016)	Healthy adolescents (<i>n</i> = 198)	RCT	1) Yoga (P, B, R, E) 2) Mindfulness meditation (M, B, E) 3) Control: No treatment (waitlist)	4 weeks (45 min twice weekly)	Mindfulness meditation (2) significantly improved working memory capacity, in contrast to yoga (1) or control (3); Surprisingly, all groups reported decreased levels of stress and anxiety	Meditation more effective than yoga
Raghuraj et al. (1998)	Healthy male adults (<i>n</i> = 12)	Within-subjects design	1) Rapid breathing (<i>kapalabhati</i> , B) 2) Alternate nostril breathing (<i>nadi shodana</i> , B)	2 days 1) 1 min 2) 15 min	Alternate nostril breathing (2) did not affect HRV, whereas rapid breathing (1) increased sympathetic activity with reduced vagal activity	Breathing techniques differ
Rohini et al. (2000)	Adults with Major Depressive Disorder (<i>n</i> = 30)	RCT	1) Full Sudarshan Kriya Yoga (3 forms of B) 2) Partial Sudarshan Kriya Yoga (2 forms of B)	Daily for 4 weeks	Depression and anxiety scores decreased for both groups, but with a trend for superiority of the full program (1)	Combined intervention more effective
Shankarapillai et al. (2012)	Healthy dental students (<i>n</i> = 100)	RCT	1) Yoga (B, P, R) – home practice: breathing 2) Stress management (E) – home practice: listening to ocean wave sounds	1 week (one 60 min lecture, daily home practice)	Contrary to stress management, yoga significantly reduced anxiety directly before and after students' first periodontal surgical procedure	Yoga (breathing) more effective than stress management
Shannahoff-Khalsa et al. (1999)	Patients with Obsessive-Compulsive Disorder (<i>n</i> = 21)	RCT	1) Kundalini Yoga (B, M, P) 2) Mantra and observing-thoughts meditation (M)	3 months (60 min weekly)	Yoga (1) was more effective in improving obsessive-compulsive pathology and mood than a meditation (2)	Combined intervention more effective
Shannahoff-Khalsa et al. (2019)	Patients with Obsessive-Compulsive Disorder (<i>n</i> = 52)	RCT	1) Kundalini Yoga (B, M, P) 2) Mantra meditation (M)	4.5 months (60 min weekly)	Compared to mantra meditation (2), yoga (1) was more effective in improving obsessive-compulsive pathology, mood, depression and anxiety	Combined intervention more effective

C. Smith et al. (2007)	Stressed adults (<i>n</i> = 131)	RCT	1) Yoga (P, B, R) 2) Progressive Muscle Relaxation (R)	10 weeks (60 min weekly)	Both treatments significantly reduced stress and anxiety and improved health status; Yoga was more effective in improving mental health at the end of the intervention, but relaxation outperformed yoga during follow-up; No changes in blood pressure	No difference between yoga and relaxation
J. A. Smith et al. (2011)	Healthy college students (<i>n</i> = 69)	RCT	1) Ethical yoga (P, B, M, R, E) 2) Non-ethical yoga (P, B, R, M) 3) Control: No treatment	7 weeks (60 min twice weekly)	Both treatments decreased depression and stress, and increased hopefulness and flexibility; Only ethical yoga (1) decreased anxiety and salivary cortisol	Combined intervention more effective
Wolever et al. (2012)	Stressed adults (<i>n</i> = 239)	RCT	1) Viniyoga (P, B, M, R, E) 2) Mindfulness-based intervention (M, E) 3) Control: No treatment	12 weeks (60 min weekly)	Both treatments decreased perceived stress and sleep difficulties and improved heart rhythm coherence; Yoga (1) significantly decreased pain levels compared to control (3); No effects on mood, blood pressure, or work productivity	No difference between complex interventions

Note. P = postures, R = relaxation, B = breathing, M = meditation, E = education, HRV = heart rate variability

Frequently, the combined yoga treatments mentioned above included some form of yoga postures or breathing techniques. The latter seem to be particularly relevant. Bhavanani et al. (2017) found that yoga breathing practice was more effective than yoga postures in enhancing reaction to visual stimuli. Breathing practice also helped dental students to stay calm during their first surgical procedure more than a short stress-management lecture (Shankarapillai et al., 2012). Yoga incorporates a collection of diverse breathing techniques which can have quite different, sometimes even opposing effects on practitioners (Peng et al., 2004; Raghuraj et al., 1998). Brown and Gerbarg (2005) provide an overview on different breathing techniques and their psychological, physiological and neurological effects, and propose an integrative neuro-physiologic model.

Commonly, studies compared rather different treatments to each other, such as complex yoga programs and stress-reduction or mindfulness programs. Only some truly contrasted isolated components of yoga practice, such as yoga postures versus breathing practice (Bhavanani et al., 2017), or supine meditation versus supine relaxation (Bhogal et al., 2016). Two studies used an incremental design comparing the same intervention but removing or adding a specific component to it. In both cases the more complex treatment was superior to the reduced one (Rohini et al., 2000; J. A. Smith et al., 2011). The latter was also the only study explicitly examining the effects of adding an ethical education component to a yoga intervention (Smith et al., 2011). They reported a higher efficiency of the ethical yoga intervention on decreasing anxiety and salivary cortisol. According to traditional yoga experts, yoga should be practiced in its entirety, including its ethical aspects (Varambally & Gangadhar, 2016). Likewise, a panel of experienced yoga teachers deemed the cultivation of positive values, attitudes and behaviors as very important or essential for alleviating mental health conditions (de Manincor et al., 2015). Thus, future studies should evaluate yoga in its completeness, and disentangle the specific effects of yoga ethics, postures, breathing practices, and meditation.

Meta-Analyses Comparing Different Subgroups of Interventions

Next, we looked at meta-analyses comparing yoga interventions based on their inclusion of diverse practice components. Numerous meta-analyses and reviews have tried to synthesize the vast amount of yoga studies, but consistently criticized the heterogeneity of studies and the lack of methodological rigor. Only few explicitly conducted subgroup analyses for studies with varying yoga components. Table 2 gives an overview on these meta-analyses. Meta-analyses vary with regard to outcome variables, population, sample size, study design of included studies, control groups, and yoga components under investigation in subgroup analyses.

Some of these meta-analyses included studies on yoga as well as studies on mindfulness-based interventions, like Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1982) or its derivatives. We indicated these as such in Table 2. MBSR is one of the most-researched mind-body interventions to date. It combines mindfulness meditation and Buddhist philosophy with yoga postures and movement practices. Thus, it is equally complex as yoga. Lately, there have been several attempts to dismantle and evaluate single components of MBSR interventions. Two studies requested participants to log their respective daily practice times of each component. In one study (Carmody & Baer, 2008), yoga practice time was more strongly related to improvements in mindfulness, perceived stress, anxiety, and psychological well-being than formal sitting meditation. Gallegos et al. (2013) found that yoga practice and sitting meditation time were both associated with higher post-treatment insulin-like growth factor (IGF-1), but only yoga significantly increased positive affect. Other studies evaluated different components of MBSR by comparing active treatment groups and found differential effects for yoga postures and diverse meditation techniques (Colgan et al., 2016; Hunt et al., 2018; Kropp & Sedlmeier, 2019; Sauer-Zavala et al., 2013; Stein & Witkiewitz, 2020). In two of these studies, the yoga component was found to decrease stress or increase well-being more than meditative components (Hunt et al., 2018; Sauer-Zavala et al., 2013). Therefore, it seems promising to compare and evaluate the components of mind-body interventions that share similar practices, such as yoga and mindfulness-based interventions.

Table 2

Results on Previous Meta-Analyses That Compared Different Components of Yoga

Meta-Analysis	Condition	Sample	Overall Effects	Subgroup Analyses	Conclusion
Breedvelt et al. (2019)	Depression, anxiety, and stress in college students	23 RCTs (n = 1373)	<p><i>Yoga, meditation, mindfulness and MBSR interventions</i></p> <p><i>g</i> = 0.61 (overall) <i>g</i> = 0.42 (depression) <i>g</i> = 0.46 (anxiety) <i>g</i> = 0.42 (stress) <i>g</i> = 0.52 (waitlist control) <i>g</i> = 0.39 (no treatment) <i>g</i> = 0.13 (active control, n.s.)</p>	No differences between yoga, meditation, mindfulness or MBSR interventions	No differences between complex interventions
Chimiklis et al. (2018)	Youth with ADHD	11 studies (n = 251)	<p><i>Yoga, meditation, and mindfulness-based interventions</i></p> <p><u>ADHD symptoms:</u> <i>g</i> = 0.57 (parent report)/ <i>g</i> = 0.23 (teacher report)</p> <p><u>Inattention and attention problems:</u> <i>g</i> = 0.35/ <i>g</i> = 0.31</p> <p><u>Hyperactivity:</u> <i>g</i> = 0.39/ <i>g</i> = 0.22</p> <p><u>On-task behavior:</u> <i>g</i> = 1.22 (researcher report)</p> <p><u>Executive function (teacher report):</u> <i>g</i> = 0.31 (metacognitive; n.s.) <i>g</i> = 0.67 (behavioral)</p>	Mindfulness-based interventions (e.g. MBSR, MBCT) had a greater effect on hyperactivity than yoga interventions alone or combined yoga plus meditation interventions; other measures improved across all types of interventions	Combined intervention more effective

			<p><u>Child-parent relationship:</u> $g = 0.50$ (child report)</p> <p><u>Parent mindfulness:</u> $g = 0.31$ (n.s.)</p> <p><u>Parent stress:</u> $g = 0.44$</p>		
Cramer et al. (2019)	Chronic obstructive pulmonary disease (COPD)	11 RCTs ($n = 586$)	<p><u>Yoga compared to no treatment:</u> $SMD = 0.57$ (quality of life, n.s.) $SMD = -0.23$ (dyspnea, n.s.) $SMD = 0.54$ (exercise capacity) $SMD = 0.47$ (forced expiratory volume in one second, n.s.)</p> <p>Positive effects on quality of life, exercise capacity, and predicted forced expiratory volume in one second when analyses were limited to studies using the same COPD assessment test</p>	Breathing-based yoga interventions had positive effects on dyspnea, exercise capacity, and predicted forced expiratory volume in one second compared to no treatment; Complex yoga interventions had positive effects only on exercise capacity	Breathing more effective than other combinations
Cramer, Haller, et al. (2014)	Hypertension	7 RCTs ($n = 452$)	<p><u>Yoga compared to usual care:</u> $MD = -9.65$ (systolic BP) $MD = -7.22$ (diastolic BP)</p> <p><u>Yoga compared to exercise:</u> No difference</p>	One breathing-based yoga intervention that did not include postures (without P) was more effective than interventions that did (with P)	Breathing more effective than postures
Cramer et al. (2017)	Chronic neck pain	3 RCTs ($n = 188$)	<p><u>Yoga compared to usual care:</u> $SMD = -1.28$ (pain intensity) $SMD = -0.97$ (pain-related disability) $SMD = 0.57$ (quality of life) $SMD = -1.02$ (mood)</p>	No differences in effects between exercise-based (with P) versus meditation-based yoga interventions (without P)	No difference between yoga postures and meditation
Cramer et al. (2013)	Depression	12 RCTs ($n = 619$)	<p><u>Yoga compared to usual care:</u> $SMD = -0.69$ (depression) $SMD = -0.00$ (anxiety, n.s.)</p>	Yoga interventions based on meditation and/or breathing (without P) were more	Meditation or breathing more effective than postures

			<u>Yoga compared to relaxation:</u> <i>SMD</i> = -0.39 (depression) <i>SMD</i> = -0.79 (anxiety) <u>Yoga compared to aerobic exercise:</u> <i>SMD</i> = -0.59 (depression)	effective for reducing depressive symptoms than exercise-based or complex yoga interventions (with P)	
Cramer, Posadzki, et al. (2014)	Asthma	14 RCTs (<i>n</i> = 824)	<u>Yoga compared to usual care:</u> <i>Risk Ratio</i> = 10.64 (asthma control) <i>SMD</i> = -0.37 (asthma symptoms) <i>SMD</i> = 0.86 (quality of life) <i>SMD</i> = 0.49 (peak expiratory flow) <u>Yoga compared to psychological interventions:</u> <i>SMD</i> = 0.61 (quality of life) <i>SMD</i> = 2.87 (peak expiratory flow rate) <u>Yoga compared to stretching or breathing exercises:</u> No difference	Yoga interventions were only effective when they included breathing techniques	Combined interventions (esp. breathing) more effective
Ewais et al. (2019)	Inflammatory bowel disease	8 RCTs (<i>n</i> = 501)	<i>Mindfulness-based, mindfulness and yoga interventions</i> <u>Stress:</u> <i>SMD</i> = -0.48 (short term) / <i>SMD</i> = -0.55 (long term) <u>Depression:</u> <i>SMD</i> = -0.29 (n.s.) / <i>SMD</i> = -0.36 <u>Quality of life:</u> <i>SMD</i> = 0.22 (n.s.) / <i>SMD</i> = 0.38 <u>Anxiety:</u> <i>SMD</i> = -0.19 (n.s.) / <i>SMD</i> = -0.27 (n.s.) No effect on physical outcomes	Yoga and mindfulness interventions were both effective in reducing stress and improving quality of life, but one yoga study outperformed three mindfulness studies in decreasing depression and anxiety scores	Yoga more effective than MBSR

Gong et al. (2015)	Prenatal depression	6 RCTs (<i>n</i> = 375)	<u>Yoga compared to active control:</u> <i>SMD</i> = -0.59 (prenatal depression)	Complex yoga interventions (P + R/ B/ M) significantly reduced the level of prenatal depression, whereas exercise-based yoga (P) did not	Combined interventions more effective
Gothe & McAuley (2015)	Cognitive function	15 RCTs and 7 repeated measures studies (<i>n</i> = 1894)	<u>RCTs:</u> <i>g</i> = 0.33 (overall) <i>g</i> = 0.29 (attention, processing speed) <i>g</i> = 0.27 (executive function) <i>g</i> = 0.18 (memory, n.s.) <u>Repeated measures (acute effects):</u> <i>g</i> = 0.58 (overall) <i>g</i> = 0.49 (attention, processing speed) <i>g</i> = 0.39 (executive function) <i>g</i> = 0.78 (memory)	Breathing and meditative exercises, but not physical exercises, were consistently associated with improved cognitive performance	Meditation and breathing more effective than postures
Hagins et al. (2013)	Hypertension	17 controlled studies (<i>n</i> = 1013)	<u>Overall effect:</u> <i>MD</i> = -4.17 (systolic BP) <i>MD</i> = -3.62 (diastolic BP) <u>Yoga compared to usual care/ no treatment:</u> <i>MD</i> = -7.96 (systolic BP) <i>MD</i> = -5.52 (diastolic BP) <u>Yoga compared to physical exercise or active control:</u> No difference	Significant reductions in BP only in yoga interventions that incorporated three components of practice (P, B, M), but not in interventions with fewer components	Combined interventions more effective
Hendriks et al. (2017)	Positive mental health in healthy adults	17 RCTs (<i>n</i> = 1901)	<u>Yoga compared to no treatment:</u> <i>SMD</i> = 0.69 (well-being) No effects on life satisfaction, social relationships, or mindfulness <u>Yoga compared to physical exercise:</u> No difference	Positive effect of yoga on well-being was comparable to the effects of meditation or physical exercise; Mindfulness meditation had a greater effect on mindfulness than yoga	No difference between yoga and meditation

Kumar et al. (2016)	Type II diabetes mellitus	17 RCTs (<i>n</i> = 1358)	<u>Yoga compared to control:</u> <i>SMD</i> = -1.40 (fasting blood sugar) <i>SMD</i> = -0.91 (post prandial blood sugar) <i>SMD</i> = -0.64 (glycosylated hemoglobin)	No effect on any of the three measures for interventions that incorporated only breathing exercises (compared to standard care)	Combined interventions more effective
Pascoe et al. (2017)	Stress-related physiological measures in diverse populations	42 RCTs (<i>n</i> = 2944)	<u>Yoga and MBSR</u> <u>Compared to active controls:</u> <i>MD</i> = -1.51 (waking cortisol) <i>MD</i> = -0.60 (afternoon cortisol) <i>MD</i> = -0.88 (evening cortisol) <i>MD</i> = -3.66 (resting diastolic BP) <i>MD</i> = -6.82 (resting mean arterial pressure) <i>MD</i> = -3.20 (resting heart rate) Positive effects also on heart-rate variability, fasting blood sugar, cholesterol, low density lipoprotein No effects on other measures	Positive effects for MBSR over yoga on decreasing Interleukin-6 and systolic blood pressure; Both types of interventions reduced salivary cortisol, blood pressure and cytokine levels to a greater extent than active controls	MBSR more effective than yoga
Thind et al. (2017)	Type II diabetes mellitus	21 controlled studies (<i>n</i> = 2473)	<u>Yoga compared to control:</u> <i>d+</i> = 0.58 (fasting blood sugar) <i>d+</i> = 0.40 (post prandial blood sugar) <i>d+</i> = 0.36 (glycosylated hemoglobin) <i>d+</i> = 0.51 (total cholesterol) <i>d+</i> = 0.67 (triglyceride) <i>d+</i> = 0.22 (systolic BP, n.s.) <i>d+</i> = 0.73 (diastolic BP) <i>d+</i> = 0.64 (fasting cortisol) <i>d+</i> = 0.52 (body mass index) <i>d+</i> = 0.28 (weight) <i>d+</i> = 0.36 (waist-to-hip ratio, n.s.) Positive effects also on very-low, low, and high-density lipoproteins	Yoga interventions were more successful in reducing triglyceride levels and lowering body weight when they included meditation practice; Inclusion of relaxation techniques was associated with lower body mass index; No differences in other variables	Combined interventions more effective

Wu et al. (2019)	Hypertension prevention/ Blood pressure	49 controlled studies (<i>n</i> = 3517)	<u>Yoga compared to passive control:</u> <i>SMD</i> = -0.47 (for both systolic and diastolic BP)	Yoga interventions that include either breathing techniques (B) or meditation/mental relaxation (M/R) led to larger decreases in blood pressure than interventions that did not	Combined interventions more effective	82
------------------	--	---	---	---	---------------------------------------	----

Note. *g* = Hedges' *g*, *SMD* = standardized mean difference, *MD* = mean difference, *d+* = weighted mean effect size with positive values favoring the intervention relative to control; P = postures, R = relaxation, B = breathing, M = meditation, E = education; BP = blood pressure. Reported effects are significant unless otherwise stated.

The meta-analyses summarized in Table 2 are very diverse. Most of them investigated clinical populations with conditions such as depression, hypertension, chronic pain, asthma, chronic obstructive pulmonary disease (COPD), inflammatory bowel disease, type II diabetes, and ADHD. Three meta-analyses used mixed samples including healthy as well as clinical populations. These three meta-analyses examined the effect of yoga on cognition (Gothe & McAuley, 2015), on stress-related physiological measures (Pascoe et al., 2017), and on the prevention and therapy of hypertension (Wu et al., 2019). Only two meta-analyses investigated healthy populations. One of them looked at depression, anxiety, and stress in college students (Breedvelt et al., 2019), and the other on positive mental health (Hendriks et al., 2017). The latter concluded that there was a scarcity of studies investigating the effects of yoga on healthy populations, and specifically a lack of studies measuring positive outcomes. This is surprising as yoga initially was developed as a spiritual path for healthy persons and not as a treatment for clinical conditions (Sedlmeier & Srinivas, 2019).

Nevertheless, most meta-analyses found favorable effects for yoga (and other mind-body interventions) on depression, anxiety, stress and stress-related physiological measures, well-being, mood, quality of life, cognitive function, and a majority of (other) clinical symptoms. Most effects were small to moderate and usually larger when yoga was compared to passive control or usual care. Compared to active control, yoga/mind-body interventions had a moderate effect on several physiological measures (Pascoe et al., 2017) and on levels of depression in clinical samples (Cramer et al., 2013; Gong et al., 2015). However, yoga's positive effects diminished compared to physical exercise or other active controls in healthy populations (Breedvelt et al., 2019; Hendriks et al., 2017), and in populations with asthma (Cramer, Posadzki, et al., 2014), or hypertension (Cramer, Haller, et al., 2014; Hagins et al., 2013). There have been numerous other meta-analyses substantiating the positive effects of yoga. Yet, in this review, we focused on those that have conducted subgroup analyses for different components of yoga.

In an earlier summary of reviews, Büssing and colleagues (2012) concluded that yoga postures might be particularly beneficial for fitness, physical flexibility, and mental state. Breathing, relaxation and meditation techniques, on the other hand, might lead to greater awareness, less stress, and higher well-being and quality of life. This conclusion might also apply to the more recent meta-analyses displayed in Table 2.

A majority of meta-analyses constituted that combined interventions lead to greater effects than simpler yoga interventions or yoga postures (Chimiklis et al., 2018; Cramer et al., 2013; Cramer, Posadzki, et al., 2014; Gong et al., 2015; Gothe & McAuley, 2015; Hagins et al., 2013; Kumar et al., 2016; Thind et al., 2017; Wu et al., 2019). This seemed to apply specifically to clinical samples. Again, breathing and meditation techniques were particularly beneficial in this regard. Interventions based on these practices were more effective than yoga postures in increasing cognitive performance (Gothe & McAuley, 2015), reducing depressive symptoms (Cramer et al., 2013), and down regulating blood pressure (Cramer, Haller, et al., 2014). Similarly, including breathing and/or meditation practices into yoga interventions increased their effectiveness in

reducing prenatal depression (Gong et al., 2015) and elevated blood pressure (Hagins et al., 2013; Wu et al., 2019). Unsurprisingly, yoga interventions that were based on or included breathing practices were particularly helpful in alleviating respiratory diseases, such as asthma (Cramer, Posadzki, et al., 2014) and COPD (Cramer et al., 2019). Contrariwise, breathing-based yoga was not as effective in improving glycemic control and other diabetes-related measures (Kumar et al., 2016; Thind et al., 2017). The latter meta-analysis found that including meditation or relaxation practices was more helpful in this respect. No differences were found between exercise-based and meditation-based yoga interventions in alleviating chronic neck pain (Cramer et al., 2017).

Consequently, specific clinical conditions or objectives might require specific combinations of yoga practices in order to exhibit the greatest benefits. Future research should examine these combinations in more detail and evaluate which combinations suit which condition/objective best. This could eventually lead to the development of programs tailored to the needs of specific populations (Gard et al., 2012; Riley & Park, 2015; Schmalzl et al., 2015).

Meta-analyses on healthy populations found no differences between meditation, mindfulness-based or yoga interventions (Breedvelt et al., 2019; Hendriks et al., 2017). However, these two meta-analyses did not differentiate components of yoga or mindfulness-based practices and are, thus, less informative than other meta-analyses that do. Still, they suggest that equally complex interventions like yoga or mindfulness-based treatments yield similar effects. Conversely, MBSR was more effective than yoga in reducing stress-related physiological measures (Pascoe et al., 2017) or hyperactivity (Chimiklis et al. 2018), and yoga was more effective than MBSR in decreasing depression and anxiety in patients with inflammatory bowel disease (Ewais et al., 2019). Consequently, findings are inconclusive. More research is needed to determine the unique contribution of each component to the globally positive effect of combined interventions.

Discussion

Overall, the yoga studies and meta-analyses reviewed here vary greatly with regard to population, yoga components under investigation, intervention length, and control intervention(s). This seems to be symptomatic for yoga research, in general (Cramer, Lauche, et al., 2014; Elwy et al., 2014). To increase transparency and replicability of intervention studies, an extensive framework for developing yoga treatment protocols has been proposed and recommended (Sherman, 2012). Still, a systematic empirical investigation into the various components of yoga practice is missing.

One finding that was consistent throughout the reviewed literature was the superiority of combined over simple interventions. Treatments that included more components of traditional yoga, such as ethical education, postures, breathing, or meditation, were more effective than

treatments that were based on less components. Particularly breathing and meditation practices enhanced the efficacy of yoga treatments. However, some combinations of yoga practices were more useful for specific study populations or outcome variables than others—which combinations exactly has to be determined in future studies as the available evidence on this matter is still sparse.

None of the meta-analyses mentioned above examined the additive value of including the ethical aspect of yoga into intervention studies. Likewise, only few comparative investigations explicitly studied the effects of (ethical) education. Obviously, this is one of the major shortcomings in previous yoga research. The request of integrating more philosophical or ethical components into mind-body interventions has recently been discussed in mindfulness literature (Baer, 2015; Gordon et al., 2015; Monteiro et al., 2015; R. E. Purser, 2015). Chen and Jordan (2020) compared an ethically enriched with a standard mindfulness intervention, and found that both interventions reduced stress and increased life satisfaction. However, the ethical intervention also enhanced personal growth and prosocial behavior. Similar results have been obtained in the abovementioned ethical yoga study (J. A. Smith et al., 2011). Recent theoretical proposals (see above: Gard et al., 2014; Sullivan et al., 2017) also suggest evaluating yoga in its entirety, including its ethical aspects. Therefore, it is essential to carve out the impact of ethical education on outcomes of yoga treatments. The recently developed mind-body intervention *Meditation-Based Lifestyle Modification* (Bringmann et al., 2020) might be useful in this regard as it explicitly incorporates lectures on yogic *yamas* and *niyamas*.

Our review suggested that comparably complex mind-body interventions, such as yoga and mindfulness-based interventions (MBI) produce similar effects. Although both types of interventions originate from different spiritual traditions (Hindu and Buddhist, respectively), they share similar exercises. Both yoga and MBSR (but not necessarily other MBIs) include yoga postures, relaxation, meditation, and an educational component. Recently, two studies dismantled MBSR treatments and found differential effects for its components (Hunt et al., 2018; Sauer-Zavala et al., 2013). Still, more research is necessary to understand thoroughly how each component contributes to the efficacy of combined treatments. Additionally, current research has demonstrated that Hindu and Buddhist meditators show very distinct preferences for specific meditation techniques (Chapter 2). These differences between traditions might ultimately influence the outcomes of both related interventions and might account for the observed differences reviewed above.

In order to disentangle the components of yoga and other mind-body interventions, future studies should aim at either comparing specific, isolated components to each other. Alternatively, they should use additive designs in order to evaluate incremental effects of different combinations of yoga practices. Moreover, it is essential to evaluate yoga in its entirety including postures, breathing, meditation, and ethics. This is particularly relevant looking at the undeniable diversity of yoga studies and interventions reviewed above. To understand the basic working mechanisms of yoga, comparative studies should rely on healthy populations and aim

for representative samples. Clinical studies, on the other hand, could evaluate diverse combinations of yoga practices in order to find the most suited ones for specific clinical conditions.

Future studies should also take personality factors into account as several authors have pointed out that individual differences might tremendously influence the effects of yoga and other mind-body interventions (Gard et al., 2014; Hölzel et al., 2011; Schmalzl et al., 2015). Researchers could achieve this by employing more elaborate research designs, which offer a higher time resolution and keep better track of individual responses. Single-case research designs (Barlow et al., 2009) or ecological momentary assessment (Shiffman et al., 2008) seem to be promising approaches in this regard.

Most studies reviewed here investigated the effects of yoga on depression, anxiety, stress, well-being, and mood. Although yoga interventions, particularly combined ones, commonly yielded positive effects on these variables, future studies should focus more on positive outcome variables (Hendriks et al., 2017). This could help to gain a holistic understanding of yoga and move away from a deficiency-oriented to a more flourishing-oriented perspective. Furthermore, many variables in previous research were chosen ad hoc without referring to specific theoretical frameworks. This is another issue that is symptomatic for yoga research (Gard et al., 2014; Schmalzl et al., 2015). Accordingly, future studies should not only compare different yoga components, but also base these comparisons and the selection of appropriate variables on existing traditional or contemporary theoretical proposals.

Overall, there is a lot of variability and ambiguity in yoga research with repeated calls to investigate differential effects of yoga components systematically. One particularly under-researched area of interest constitutes the incorporation of yoga ethics into intervention studies. Our research team recently evaluated four different combinations of yoga components and found that the ethical component significantly enhanced well-being. I will describe the respective study in the next chapter. We encourage researchers to use rigorous and elaborate research designs to examine all components of yoga, individually and in diverse combinations. In the end, these research efforts could contribute substantially to truly understanding the manifold effects of the multifaceted practice of yoga.

Chapter Five

What Makes Yoga Effective?

Differential Effects of Ethical Education, Physical Yoga, and Mantra Meditation on Well-Being and Stress

This chapter is submitted as:

Matko, K., Sedlmeier, P., & Bringmann H. C. (2021). What makes yoga effective? Differential effects of ethical education, physical yoga, and mantra meditation on well-being and stress.

5. WHAT MAKES YOGA EFFECTIVE?

Yoga originates from a rich and ancient spiritual tradition that encompasses a variety of diverse practices, such as physical postures, breathing techniques, meditation techniques, and ethical teachings (Feuerstein, 2012; Telles & 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 & Srinivas, 2019). A growing amount of research acknowledges the positive effects of yoga on alleviating psychological disorders and stress-related diseases (Breedvelt et al., 2019; Büssing, Ostermann, et al., 2012; Cramer et al., 2013; Hofmann et al., 2016; Klatte et al., 2016; Pascoe et al., 2017) as well as promoting mental and physical health (Büssing, Michalsen, et al., 2012; Gothe & McAuley, 2015; Hendriks et al., 2017; Ross & Thomas, 2010). However, high heterogeneity among yoga practices and poor methodological quality have limited the generalizability of these findings. Apart from this, previous yoga research 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 neither know how each single component of yoga (ethics, postures, breathing, meditation) works, nor which 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 ten percent of yoga studies explicitly incorporated lectures on yoga philosophy or ethics in their interventions (Cramer, Lauche, et al., 2014). Conversely, traditional yoga experts advocate that yoga should be practiced in its entirety, including its ethical aspects (Varambally & Gangadhar, 2016).

Traditional yoga dates back over 5,000 years and, originally, was understood in a much broader sense than 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 and the only posture described in the Yoga Sutras was upright sitting. Patanjali described the aim of yoga as the stilling of the fluctuations and changing states of the mind which 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/moral observances), *niyamas* (individual ethics/self-discipline), *asana* (physical posture), *pranayama* (breath control), *pratyahara* (withdrawal of the senses), *dharana* (concentration), *dhyana* (meditation), and *samadhi* (full meditative absorption) (Bryant, 2015; Feuerstein, 2012). The *yamas* and *niyamas* comprise five ethical virtues each. The five *yamas* include non-violence, truthfulness, non-stealing, self-restraint, and non-hoarding. The five *niyamas* are cleanliness, contentment, self-discipline, self-

study, and devotion. A more detailed breakdown of these virtues, including their Sanskrit names, can be found in Table 3 in the methods section.

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, such as ethics, postures, breathing, and meditation. Specifically, they 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” eightfold yoga path. Many styles focus primarily on postures (*asana*) and breathing practices (*pranayama*), e.g., Ashtanga, Iyengar, or Hatha Yoga in general. There are also yoga styles that comprise mainly breathing practices, e.g., Surdashaan Kriya or Kirtan Kriya, or meditation, e.g., Sahaja Yoga. Some place particular attention on mantras, chanting and music, e.g., Kundalini or Jivamukti Yoga. For an overview on different yoga styles see McCrary (2013). Just as multifaceted as yoga styles are scientifically investigated yoga interventions. Cramer and colleagues (2016) reviewed study outcomes 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 compounds of yoga styles regarding postures, breathing, meditation, and ethics. Thus, it did not allow drawing conclusions about the relative effects or importance of each component.

There have been several studies examining and comparing the effects of different yoga components. Yet, the degree of specificity and disassembling of components and practices under investigation varied greatly among studies. We conducted a detailed review on comparative studies and meta-analyses on the effects of yoga components (Chapter 4). Although most comparative treatments were equal in length, outcomes were better for treatments combining several elements of yoga practice (Bowden et al., 2011; Melville et al., 2012; Park et al., 2017; Rohini et al., 2000; Shankarapillai et al., 2012; Shannahoff-Khalsa et al., 1999, 2019; J. A. Smith et al., 2011). 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 (Chimiklis et al., 2018; Cramer et al., 2013; Cramer, Posadzki, et al., 2014; Gong et al., 2015; Gothe & McAuley, 2015; Hagins et al., 2013; Wu et al., 2019). Nevertheless, these studies were very heterogeneous and many findings were inconclusive. Even if combined interventions were mostly more effective, we do not know how each single component of these combined interventions contributed to their overall effect. Additionally, we cannot deduce which combination of practices would have been most helpful in this regard.

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

behavior therapy program; however, both interventions included psychoeducation and relaxation. Hunt et al. (2018) compared a complex mindfulness intervention that included all parts of Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 2013) except mindful movement to a yoga intervention and to the full MBSR training. Employing such study designs definitely yields interesting insights, but makes it hard to disentangle the contributions of specific components of these complex programs. Some studies compared yoga interventions to meditation classes (Gorvine et al., 2019; Shannahoff-Khalsa et al., 1999). Yet, these classes taught participants a multitude of meditation techniques making it harder to draw reliable conclusions. As we know, different meditation techniques produce different effects (Fox et al., 2016; Kropp & Sedlmeier, 2019). 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). This study reported a higher efficiency of the ethical yoga intervention.

Thus, it seems advisable for yoga research to evaluate yoga in its entirety and disentangle the effects of each of the components of yoga practice. There have been repeated calls in this regard in order to fully understand the underlying mechanisms of yoga (Büssing, Michalsen, et al., 2012; Gard et al., 2014; McCall, 2013; Riley & Park, 2015; Schmalzl et al., 2015; Sherman, 2012). 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 few investigations into this matter. One particularly under researched area of interest constitutes the examination of incorporating 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 aims at bridging this gap. Employing a single case multiple-baseline design, we compared the relative increases of adding ethical education and/or physical postures to a simple mantra meditation intervention.

Aims and Methodology of the Present Study

Almost all meta-analyses and theoretical proposals on yoga criticize the lack of methodological accuracy in previous yoga studies. Methodological limitations of prior investigations include insufficient study design, ad hoc selection of variables, imprecise or single-sided instruments, inappropriate control groups, and poorly described interventions (Schmalzl et al., 2015). 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 and, thus, enhance methodological rigor (Kinser & Robins, 2013). Recently, there has been a rise in elaborate studies using daily assessments before, during and/or after an intervention to capture changes with a high time resolution (Bai et al., 2020; Kishida et al., 2019; Lindsay et al., 2018; May et al., 2014; Shoham et al., 2017). These studies have employed experience sampling or single-case research designs to provide more detailed insights into the trajectories and mechanisms of change during mind-body interventions. The present study is in line with these research efforts.

Experimental single-case research designs (Barlow et al., 2009) effectively overcome limitations of conventional pre-post designs as they are able to depict responses to a treatment in a much higher time resolution and with a higher power. Accordingly, they allow for a much closer examination of individual responses and processes, and are, thus, more suitable for explorative research questions such as ours. 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. Thus, the randomization in this design happens over time instead over people. This is achieved through having the participants commence their treatment at randomly chosen points of time, leading to different baseline lengths. This design has strong internal validity as it controls factors in the individual that change over time. Moreover, 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. One of the abovementioned studies (May et al., 2014) employed a similar design to compare the effects of two meditation techniques. Several authors have suggested that individual differences might tremendously influence the effects of meditation and yoga (Gard et al., 2014; Hölzel et al., 2011; Lippelt et al., 2014; Schmalzl et al., 2015). Single-case research designs provide the perfect means to take a closer look into this matter.

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 eudaimonic well-being, mental health, and human flourishing. MBLM is based on the eightfold yoga path and covers three main domains. These domains correspond, in short, to (1) yoga's ethical education, (2) postures and breathing practices, and (3) meditation. We will describe them in more detail in the methods section. The type of meditation taught is mantra meditation. Former reviews and meta-analyses substantiated the positive effects of mantra meditation (Lynch et al., 2018; Sedlmeier et al., 2012). However, they also criticized the poor methodological quality of most studies on mantra meditation and recommended conducting higher quality research into this topic. Our study meets this call and other calls from the yoga literature described above.

We employed MBLM as a testbed for our research. We dismantled the MBLM program and investigated different combinations of its components. With this, we hope to provide an answer to one of the most pressing issues in yoga research, namely, disentangling the contribution of diverse components to the positive outcomes of yoga. 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 MBSR, which originally was 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 has been initially designed as a spiritual path for healthy persons (Feuerstein, 2012). Therefore, we would expect positive outcomes for an intervention that incorporates as many yoga components as MBLM.

Both yoga theory and our literature review suggest that combined interventions should be more effective than simple interventions. Yet, research findings were inconclusive on determining which specific combinations were best for which purpose. Consequently, we chose an additive design to evaluate the incremental effects of each MBLM component. For this means, we designed four conditions – mantra meditation alone, meditation plus physical yoga, meditation plus ethical education, and the full MBLM program covering meditation, physical yoga, and ethical education. 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 (yoga or ethics), and the largest effect for the full program. Conversely, it might be equally reasonable from the literature that a specific combination of components is 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 (J. A. Smith et al., 2011). To our knowledge, no other study has contrasted all of these combinations in a comparative study, before. Moreover, no other study has employed a multiple-baseline design for this means.

We measured a wide range of dependent variables commonly associated with the effects of yoga and meditation. These variables were selected based on theoretical considerations and suggestions found in existing literature (Gard et al., 2014; Hölzel et al., 2011; Sullivan et al., 2017). For this paper, we decided to focus on the most commonly investigated outcomes in yoga literature: well-being, stress, and life satisfaction. Findings on these variables were not always equivocal, especially for stress and life satisfaction, with some studies discovering positive effects and others not. 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, which combinations of components are particularly effective? Is more more or is less more?

Method

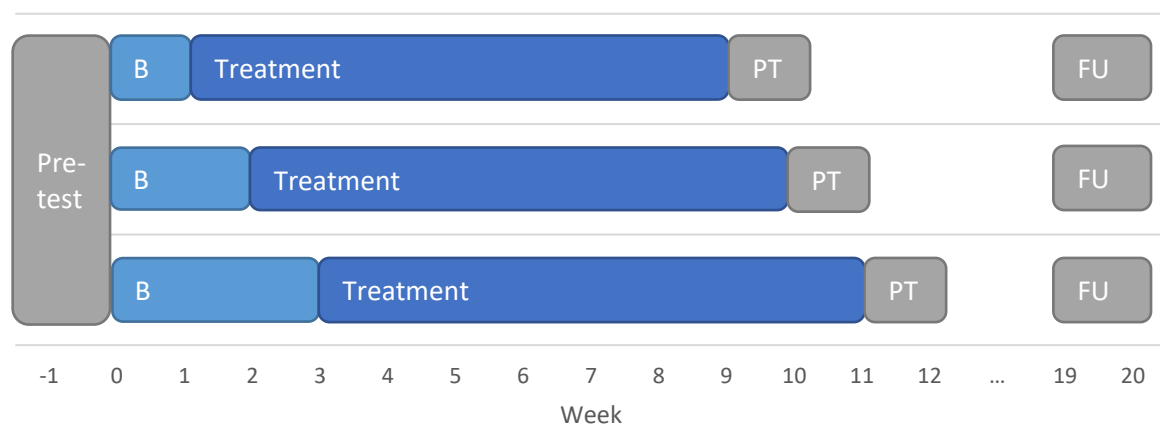
Procedure

We randomized participants across three baseline lengths (7, 14 or 21 days) and four treatment conditions, resulting in altogether twelve subgroups. 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 eight weeks and participants started consecutively according to their baseline. In the conditions with the shortest baseline, treatment started at the beginning of the second week. At the beginning of the following two weeks, 3-5 additional participants joined the group sessions in their respective condition. Thus, the overall study duration varied across participants, ranging from nine to eleven weeks.

All measurements were taken online. Participants completed an extensive battery of questionnaires 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 eight weeks and twelve months after posttest. Figure 1 depicts the study design. Table D1 in the Appendix D lists all instruments employed in this study.

Figure 1

Multiple-Baseline Design Employed in the Present Study



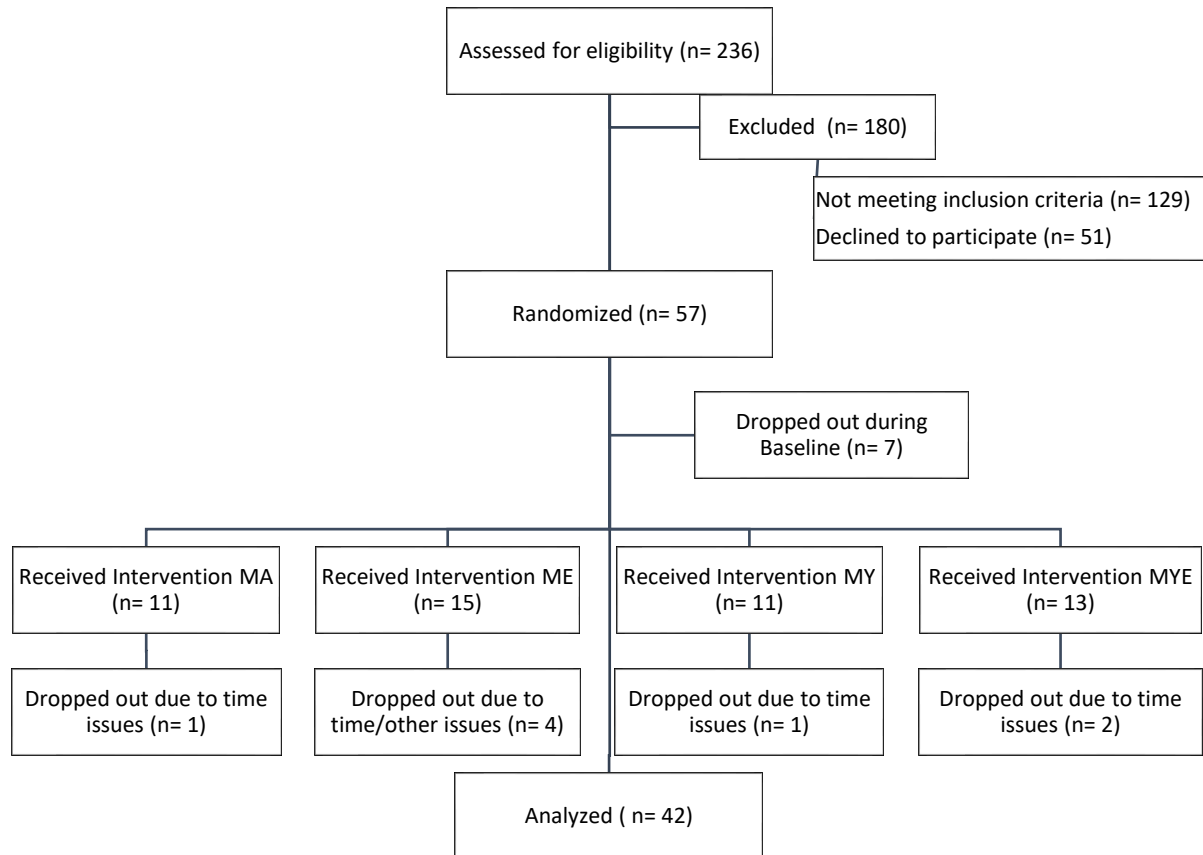
Note. B = Baseline, PT = Posttest, FU = Follow-up

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 bills distributed in Dresden. All those interested had to complete a short online screening survey. Two hundred thirty-six people completed the screening survey, of which 129 did not meet our inclusion/exclusion criteria and 51 declined to participate. Participants had to be older than 18 years and had to ensure 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 six months.

Those meeting our criteria were invited to an information event, which was led by KM and HCB. There, participants received information concerning study design and procedure and could address any questions they had. Participation was voluntarily and all participants provided written consent to participating in the study. They received no financial or other compensation for their participation in the study, but had the opportunity to win one of ten 50 € gift coupons. The institutional review board of the Chemnitz University of Technology approved the experimental protocol.

Fifty-seven meditation-naïve participants were randomized to one of twelve subgroups. Seven participants dropped out during the baseline phase before the intervention started. Eight participants dropped out during the intervention, mostly because of time issues (see Figure 2). Although there was some attrition (see below) towards the end of the data collection period, but not during posttest or follow-up, we decided to include all remaining participants into 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 years). Sociodemographic data according to condition can be found in Table 1.

Figure 2*CONSORT Flow Chart of Participants in the Study***Table 1***Sociodemographic Data of Participants in Each Condition*

	Condition				Total
	MA	ME	MY	MYE	
<i>n</i>	10	11	10	11	42
Gender					
% female	90.0	72.7	90.0	81.8	83.3
Age					
<i>M</i> (<i>SD</i>)	29.00 (10.40)	25.09 (5.74)	27.60 (12.32)	25.09 (2.95)	26.62 (8.37)
[<i>Range</i>]	[22—57]	[19—36]	[18—61]	[19—30]	[18—61]
Occupation					
% students	80.0	81.8	90.0	100.0	88.1
% employees	20.0	18.2	10.0	0.0	11.9

Note. Conditions were MA = meditation, ME = meditation plus ethical education, MY = meditation plus physical yoga, MYE = meditation plus physical yoga plus ethical education.

Treatment: MBLM and its Components

Weekly training sessions were designated to practicing together and discussing emergent questions or difficulties. In the ethical education groups, participants also engaged in a new topic of the *yamas* and *niyamas* every week. All treatments were led by KM and HCB, who are both experienced meditation teachers and trained in yoga. HCB is an accredited psychiatrist and psychotherapist. KM is a psychologist and certified yoga instructor with 700 h teacher training and six years of teaching experience.

The length of the weekly sessions varied across conditions as each component/domain had different time requirements: 25 min meditation, 50 min physical yoga, 75 min ethical education, at least 20 min group sharing, plus time for breaks as required. The overall duration for each condition was as follows: M = 60 min, MY = 105 min, ME = 135 min, MYE = 180 min. Each training session (except session 1) started with a discussion of participants' experiences and practice at home since the previous session, and ended with another group sharing.

All four conditions involved learning to meditate using mantra meditation. For this reason, participants received a short introduction into this practice half an hour before their first session started. During this introduction, we requested them to choose a mantra from a list of traditional mantras from different spiritual contexts (see Appendix D—Table D2). HCB read the list aloud to them and recommended them to choose a mantra by sound and first impression/liking. The key practice in this form of mantra meditation was silently repeating the chosen mantra while letting all other thoughts pass by and letting the breath flow naturally. This practice was supposed to help participants develop one-pointed concentration and, gradually, reach a calm and still state of mind. Moreover, participants were encouraged to take a curious and friendly approach toward their experience. If they wanted to, they could eventually let go of the mantra to reach deeper states of meditation. Each weekly session in every condition included a 25-minute silent (i.e., non-guided) mantra meditation practice. Additionally, we requested all participants to practice mantra meditation at home for at least 20 minutes each day. They received a comprehensive manual of mantra meditation and recordings with minimal guided mantra meditation instructions they could use for their home practice, if they wished to do so.

During the physical yoga practice, participants learned a set of simple yoga postures, simple yoga breathing techniques (full yogic breath and ujjayi pranayama), the sun salutation, and relaxation techniques. Table 2 gives an overview of the yoga exercises taught during the intervention (for more detailed information on yoga practices, see, e.g., Iyengar, 2009; Stephens, 2011). Each yoga class started with approximately 10 minutes of breathing exercises, followed by 30 minutes of postures and dynamic exercises, and concluded with a 10-minute guided relaxation. The set of yoga exercises was devised prior to the study by KM. She also led all yoga classes during the study. Yoga classes were designed to advance from simple to more advanced exercises during the course of the treatment and were adjusted to participants' needs and abilities by the yoga instructor. Participants received a handout including detailed instructions on

each exercise learned in class and were requested to engage in physical yoga exercises for at least 20 minutes every day at home.

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 (<i>pranayama</i>)		
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 slower, more fully and more controlled
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 (<i>asana</i>) and dynamic exercises (<i>vinyasa</i>)		
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 Padot-tanasana 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 Matsyendra-sana	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 Matsyendraasana	Relaxes spine and neck, opens chest, tones waist
Deep Relaxation in Corpse Pose	Savasana	Restorative, different relaxation techniques (autosuggestion, body scan)

Ethical education followed the protocol developed for the mind-body program MBLM (Bringmann et al., 2020). The *Ethical Living* domain of MBLM consists of eight weekly topics and related daily mindful living exercises based on the *yamas* and *niyamas* of yoga philosophy. Each week, we introduced one of the ten *yamas* and *niyamas*, with the last three *niyamas* (self-discipline, self-study and devotion) 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.

Participants also received handouts outlining the key aspects of the topic and presenting six related mindful living exercises to deepen understanding and transfer. We invited them to engage daily in these activities during the following week and write down their experiences in the respective fields on the handout. In the next session, they shared and reflected upon their experiences with the topic during the past week. Detailed information on the eight topics with sample mindful living exercises can be found in Table 3. Due to the multiple baseline design, the first two topics of the ethical education domain were repeated after eight weeks for the later cohorts.

The manualized MBLM training program was extensively pilot tested. A mixed-methods study has indicated that it is a highly acceptable and feasible program for outpatients with mild to moderate depression (Bringmann et al., 2021).

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
<i>Yamas</i> – Universal ethics/Right living with others			
1 & 9	Non-Violence	Ahimsa	Practice praising instead of criticizing (also myself) Practice respecting my boundaries (e.g., taking breaks)
2 & 10	Truthfulness	Satya	Write down how I really think and feel Practice being truthful in instead of “nice”
3	Non-Stealing	Asteya	Recognize inner and outer abundance in my life

			Practice giving when I receive sth.
4	Self-Restraint	Brahmacharya	Enjoy eating/ working/ watching TV before excess or inertia sets in
5	Non-Hoarding	Aparigraha	Clearing things out that I don't need Recognize expectations I have concerning myself and others
<i>Niyamas</i> – 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) Svadhya (self-study) Ishwara pranidana (devotion)	Practice faculty of discrimination (“Is this conducive to my goals?”) Read a spiritual text Try to connect to the miracles of life

Measures

The present study focuses on well-being, stress, and life satisfaction. We will discuss other variables assessed in the project in future publications. We gathered well-being continuously every day, stress once every week, and life satisfaction during pretest, posttest and follow-up. Furthermore, with the beginning of the treatment phase, we assessed participants' subjective experiences with their respective home practices every day. At posttest, we requested participants to rate their satisfaction with the course, and report any adverse events they experienced during the course or during home practice. Sociodemographic variables were collected during pretest.

Instruments for daily/weekly measures had to be suited for experimental single-case designs in that they were 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. Some questionnaires had to be shortened in order to reduce respondent burden for the daily measurements. We did not shorten the questionnaires used in this study.

All questionnaires were programmed and implemented with SoSci Survey (Leiner, 2019) and made available to participants on www.soscisurvey.com. Data was collected between 21 March 2019 and 31 July 2019.

Well-being. Participants' daily well-being was measured with the very short and economic World Health Organization Well-being Index (WHO-5; World Health Organization, 1998). The WHO-5 is a psychometrically sound self-report measure of well-being with high internal consistency and high convergent validity (Brähler et al., 2007). It consists of five items (e.g., "Over the last two weeks I have felt cheerful and in good spirits") 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 hours" instead of "the last two weeks".

Stress. The Perceived Stress Scale (PSS-10; Cohen & Williamson, 1988) is a widely used self-report measure which 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 (1 = *never* to 5 = *very often*). It has shown good internal consistency ($\alpha = .78$) 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 posttesting to determine participants' life satisfaction. The SWLS is a very short self-report measure with five items which were rated on a 7-point Likert scale (1 = *strongly disagree* to 7 = *strongly agree*). Internal consistency of the scale is high ($\alpha = .92$).

Daily Practice. With the beginning of the treatment phase, we requested 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 polar profile. They were presented with three items to measure (a) experienced difficulty/ease ("Meditating was very easy ... very difficult."), (b) wakefulness ("I was feeling sleepy ... awake."), and (c) restlessness/relaxation ("I was feeling very restless ... very relaxed."). Participants in conditions including physical yoga practice were requested to provide information on their yoga practice in a similar manner as described above concerning meditation practice. This included length and time of daily practice, as well as experienced difficulty/ease, wakefulness and restlessness/relaxation. We added one more item to assess perceived yoga practice and breath coherence ("The practice and my breath were coherent ... non-coherent."). Participants in ethical education conditions were only asked two questions: (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 Scale (CSQ-8; Attkisson & 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 participated. The CSQ-8 has eight items that are rated using a 4-point Likert scale. It is considered a reliable ($\alpha = .92$) 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 (Cebolla, Demarzo, et al., 2017; Lindahl et al., 2017; and Matsushita & Oka, 2015), and categorized all events and experiences into ten clusters of related symptoms. These clusters of symptoms were neurological, somatic, pain, cognitive, emotional, motivational, changes in necessities, difficulties in life, compulsive meditation, and altered states of consciousness. A full list of symptoms with associated clusters can be found in the Appendix D (Table D3). Participants were instructed to mark all events and sensations they had experienced during the treatment phase and which were related to the practices they had learned, and rate their severity (mild, moderate, severe) and duration in days (1-2, 3-6, 7-13, 14-20, >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

We analyzed data in three different ways—by visual inspection, calculating effect sizes using Tau-U, and multilevel modeling. If all three analyses converged, this would provide strong evidence for our findings. Visual inspection of dependent-variable-by-time plots is a common practice in single-case research designs like the present study. We examined individual plots for each participant for evidence of shifts in level and/or slope from A-to-B transitions. Visual inspection of these plots provided first insights on effects present in the data and individual differences in response to the treatment. Further statistical analysis was guided by theoretical considerations and, in some cases, by patterns found during visual inspection.

We employed two different statistical approaches – Tau-*U*, a family of effect size coefficients specifically developed for the purposes of single-case research (Parker et al., 2011), and multilevel modeling (also known as hierarchical linear modeling and mixed effects modeling). If the results of all three analyses converged, this would provide strong support for our findings. Analyses on the incremental effects of the four conditions were exploratory in nature. We reiterated two coding schemes using different dummy variables to determine which combination of program components yielded the largest effects, and which components were particularly effective in this regard. To investigate whether there were any general differences between all four conditions, we used three dummy variables to code the four conditions. To examine whether there were any differences regarding the inclusion of different program components, we prepared two other dummy variables. These coded the presence versus absence of ethical education or

physical yoga (0 = *without component*, 1 = *with component*) in the respective condition. Furthermore, we included age, gender, and baseline length into both models to control their influence statistically. 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. P -levels of $p < .05$ were considered 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 & 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).

Tau- U

Parker et al. (2011) initially proposed Tau- U as a nonparametric estimate of effect size in single-case research designs. It allows researchers to examine treatment effects on both between-phase differences as well as within-phase trends (Brossart et al., 2018). Tau- U statistics are non-overlap rank order correlations that, as such, are relatively robust to autocorrelation and have shown good statistical power. Its flexibility allows to control for phase A trend (Tau- U_A vs. B - Trend A), phase B trend (Tau- U_A vs. B + Trend B), or both (baseline and treatment - Tau- U_A vs. B + Trend B - Trend A) to provide corrected effect size estimates.

In this study, we used the R package *scan* to calculate Tau- U coefficients for each participant and each dependent variable, and to assess trends in the data both visually and statistically. If, for certain participants, trends were observed in the data, corrected effect size estimates were chosen and reported for these individuals (i.e., Tau- U_A vs. B - Trend A, Tau- U_A vs. B + Trend B or Tau- U_A vs. B + Trend B - Trend A). An effect size of less than 0.20 indicated a small effect; 0.20–0.60 a moderate effect; 0.60–0.80 a large effect; and 0.80 or above a very large effect (Vannest & Ninci, 2015).

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 (1) three dummy variables coding the four conditions, and (2) two dummy variables coding the presence of the two program components ethical education or physical yoga. Analyzing the effects of condition or component on effect size estimates resembles modelling cross-level interactions in multilevel modeling.

Multilevel Modeling

Multilevel modeling (MLM) is a powerful tool for modelling correlated data in which observations are nested within individuals (Dedrick et al., 2009; Hox, 2010). In this study, we modelled changes over time within each individual on one level and differences between individuals on a second level. We segmented time into baseline and intervention phase to enable comparisons

between study periods. 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 between time and condition/component, we will only report the final models. The full estimation procedure can be found in the Appendix E (Tables E4 and E8). The final two models resembled the regression models we calculated with the Tau-U effect size estimates. Again, we modeled a condition model using three dummy variables, and a component model using two dummy variables. In all models, we modelled a cross-level interaction between time and condition/ component dummy variables. This was done 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:

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

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, and predicted a positive logarithmic trend during the treatment phase. It was coded with zero for the baseline 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 modelled time as a random slope.

Data was screened and corrected for (illegitimate) outliers due to data-entry errors (e.g. inputting 2522525 for number of minutes of meditation). 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

Due to the admittedly high response load with daily questionnaires over a period of 71 to 85 days, we did have some missing data in the present study. We observed attrition specifically towards the end of the data collection period, but not during posttest. 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 which kept them from

responding. Mean amount of missing data across participants was 18.5 % (range 2.8 %—45.9 %). All analyses are based on the remaining data. There were almost no missing data for pre-, post- or follow-up-testing. 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 pre-post-variables.

Results

In this section, we will first report on participants' adherence to our treatment. Then, we will present the results on our four main outcome variables well-being, perceived stress, and life satisfaction. For the two continuously measured variables, we will first present individual plots for each participant and report the results of our visual inspection. Second, we will 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 will explore possible moderator variables that might help to 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 (meditation, yoga, and ethics).

In the following, we will use the subsequent abbreviations for the four conditions: Mantra meditation alone (MA), meditation plus ethical education (ME), meditation plus physical yoga (MY), and meditation plus yoga and ethical education (MYE).

Adherence

First, we looked 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, $M_{MA} = 18.2$ ($SD = 9.72$), $M_{ME} = 14.7$ ($SD = 9.26$), $M_{MY} = 14.0$ ($SD = 9.76$), $M_{MYE} = 13.1$ ($SD = 10.1$), $F(3, 38) = 23.44$, $p < .001$. 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. All plots can be found in Appendix F (Figures F1 to F3). For meditation practice, we observed a decline in practice duration across all conditions towards the end of the study. Participants also engaged in daily home practice of yoga and/or mindful living exercises according to their condition. Remarkably, participants in the MYE condition reported higher average practice duration/frequency in both exercises, compared to participants in the ME or MY conditions (Yoga: $M_{MYE} = 15.7$, $SD_{MYE} = 13.1$, $M_{MY} = 12.6$, $SD_{MY} = 12.2$, $t(959) = -3.81$, $p < .001$, and Ethics: $M_{MYE} = 0.74$, $SD_{MYE} = 0.44$, $M_{ME} = 0.68$, $SD_{ME} = 0.47$, $t(1046) = -2.18$, $p = .039$). Whereas ethical practice remained quite constant in the MYE condition, yoga practice declined over time. On the other hand, yoga practice remained constant in the MY condition whereas ethical practice declined over time in the ME condition. 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 as some participants reported during our weekly meetings. This may be true particularly for the final phase of the intervention.

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 out of 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 ($M_{MA} = 5.50$; $M_{MY} = 5.20$), this difference being marginally significant, $F(1, 40) = 3.80$, $p = .059$.

Well-being

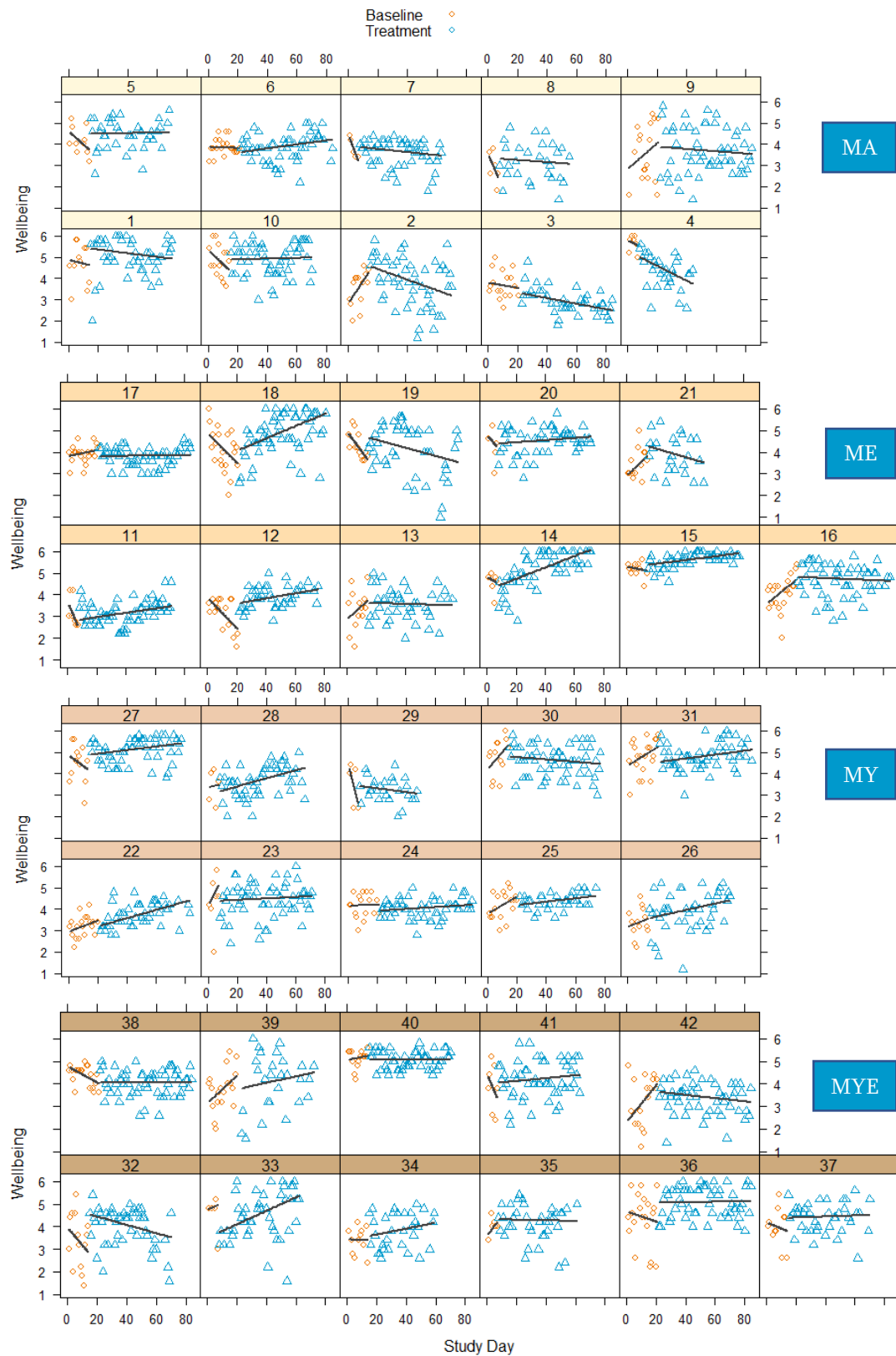
Visual Analysis

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. Cases 1 to 10 received mantra meditation only (MA), cases 11 to 21 received meditation and ethical education (ME), cases 22 to 31 received meditation and yoga (MY), and cases 32 to 42 received meditation, yoga and ethical education (MYE). As can be seen from this figure, well-being scores show strong fluctuation and variation over time. Some points in this figure stand out as days with especially low well-being. Most of these days correspond with life events participants experienced as very challenging, e.g., exams, illnesses or a separation, and reported during the weekly sessions.

Whereas some participants showed no observable changes (e.g., participants 9, 23, 31, 40), most participants profited from the treatment, some more prominent (e.g., participants 14, 15, 18, 22, 36) than others (e.g., participants 11, 26, 27, 28). Strong positive effects seem to be predominantly present in the ME condition. On the other hand, some participants exhibited a decline in well-being over the course of time, especially towards the end of the treatment. This might indicate an increasing fatigue with the intervention, which might particularly be true for those participants that 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, 2, 3, 4), possibly indicating growing boredom with the unvarying technique.

Figure 3

Well-Being Scores in Four Conditions During Baseline and Treatment Phases for Each Participant with Regression Lines for Each Phase



Note. MA = mantra meditation only, ME = meditation and ethical education, MY = meditation and physical yoga, MYE = meditation, physical yoga and ethical education.

Looking at Figure 3, more interindividual differences become apparent. The daily variance of well-being scores differs between participants as well as the rate of change after the onset of the treatment. For most participants, well-being increased gradually either from the beginning of the treatment or after a small delay of one or two weeks. Some participants exhibited an immediate shift in their level of well-being, sometimes followed by a decrease towards the middle of the treatment and a subsequent increase towards the end (e.g., participants 5, 10, 27, or 35). All of these observations represent common experiences during the process of learning meditation and correspond to reports of participants during our weekly meetings.

Quite a few participants stated mastering the meditation technique after initial difficulties at two 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 re-increase 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 will 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. Furthermore, 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 described in the following.

Statistical Analysis

Tau-*U*

The Tau-*U* statistic was calculated to assess the effect size of the intervention for each participant. We chose the appropriate Tau-*U* type based on a thorough evaluation of trends visually and/or statistically present in the data. The respective effect size estimates for each participant including mean well-being scores and standard deviations per experimental phase can be found in the Appendix E (Table E1). An inspection of these estimates indicated that the majority of participants experienced moderate improvements in their well-being. Most effect size estimates ranged from 0.20 to 0.40, indicating a moderate effect size. Participants 9, 10, 19, 23, 31, 40, and 42 had effect sizes around zero and, thus, did not experience any change in well-being throughout the study. We observed the largest positive effect sizes (0.42 to 0.46) for participants 14, 15, and 22. However, there were a couple of negative effect sizes, too. Most of these can be considered small (around -0.15), but three participants had a substantially lower well-being following

the treatment. Participants 3, 4, and 38 had effect sizes ranging from -0.30 to -0.51 , indicating a moderate negative effect. These results correspond with our visual analysis.

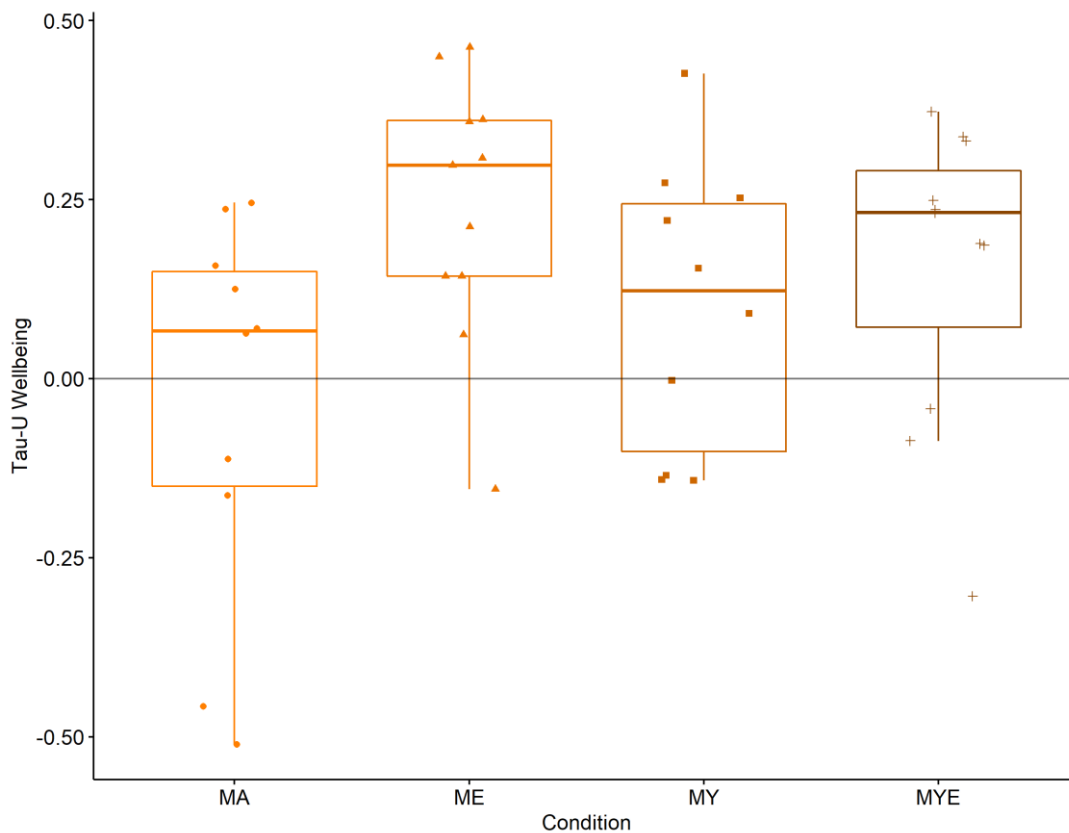
Next, we looked at potential explanations for the strong negative effects. Participant 3 (MA) had a specifically hard time trying to learn mantra meditation. She almost always rated her meditations as being very hard. Participant 38 (MYE) deeply appreciated her course but reported having elevated levels of stress due to getting started to 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 five of the treatment. However, she had meditated very conscientiously at home for 20-30 minutes nearly every day. Unfortunately, we do not know whether there were other reasons that caused her to drop out of the study. When we followed up our participants after twelve 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 often stayed 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 the present. They both continued to meditate whereby 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 until 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 explored the mean differences between the four conditions. Therefore, 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. *Med* refers to the median and *IQR* to the interquartile range. On average, the MA condition had no effect on participants' well-being (*Med* = 0.07, *IQR* = 0.30). All other conditions, however, enhanced participants' well-being. This was particularly pronounced in the two conditions involving ethical education, ME (*Med* = 0.30, *IQR* = 0.22), and MYE (*Med* = 0.23, *IQR* = 0.22), and less pronounced in the MY condition (*Med* = 0.12, *IQR* = 0.35). A simple analysis of variance (ANOVA) yielded a significant between-group effect, $F(3, 38) = 2.92, p = .047$.

Figure 4

Box Plots for Averaged Tau-U Well-Being Estimates in Each Condition. Individual Well-Being Estimates are Scattered Across the Box Plots



Note. MA = mantra meditation only, ME = meditation and ethical education, MY = meditation and physical yoga, MYE = meditation, physical yoga and ethical education

We further statistically explored these differences using multiple regression analysis. First, we entered the four conditions as predictors into the model to estimate their influence on well-being effect sizes. Second, we evaluated the relative importance of the two main components under investigation in this study, that is, ethical education and physical yoga. We applied one-tailed tests of significance to these regression estimates. The first model indicated a significant effect for the ME condition, $\beta = 0.48$, $p = .009$, and the MYE condition, $\beta = 0.32$, $p = .051$. The full regression table for this model can be found in the Appendix E (Table E2). The second model provided evidence for the effectiveness of the ethical education component in improving subjective well-being. It is depicted in Table 4.

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	<i>b</i>	β	<i>SE</i>	<i>t</i>	<i>p</i>
(Intercept)	-0.08	0.00	0.06	-1.33	.191
Ethical education (y/n)	0.14	0.31	0.07	1.95	.029
Physical yoga (y/n)	0.02	0.04	0.07	0.25	.402
Age	-0.01	-0.22	0.00	-1.39	.173
Gender	0.04	0.06	0.10	0.40	.695
Baseline length	0.00	-0.05	0.01	-0.34	.740

According to Table 4, neither the physical yoga component nor age, gender, or baseline length significantly predicted changes in well-being over time. The multiple R^2 was $R^2 = .18$ indicating that there was still some unexplained variance in this model. We will explore possible moderator variables at the end of the results section. In summary, it seems that the ethical education component had a positive effect on well-being whereas mantra meditation alone or in combination with physical yoga did not. Conversely, yoga seemed to buffer the negative effect of meditation alone. To evaluate these results further, we performed multilevel modeling on our data.

Multilevel Modeling

We mirrored our regression procedure employed on Tau-*U* effect sizes to assess the effects of the four conditions and the two components on well-being through multilevel modeling. The inspection of cross-level interactions between time and condition/component is most relevant in this respect. Again, we halved *p*-levels for these interactions as we expected the combined interventions to yield stronger effects than the simple meditation intervention. In addition, we tested the effect of time with a one-tailed test as we expected all treatments to lead to an amelioration of well-being. Furthermore, we modeled the time slopes as random effects to comply with the interindividual variability observed during visual inspection.

In the condition model, there was a significant effect of time, $\beta = 0.09$, $SE = 0.03$, $p = .004$, indicating that well-being increased for the majority of participants irrespective of their specific condition. However, all three interaction terms were significant, too, ME: $\beta = 0.12$, $SE = 0.04$, $p = .001$, MY: $\beta = 0.09$, $SE = 0.04$, $p = .012$, MYE: $\beta = 0.09$, $SE = 0.04$, $p = .011$. This speaks to the supplementary benefit of all three conditions involving one or two additional component of the yoga path in enhancing well-being. The component model is depicted in Table 5. Full multilevel regression tables for the condition model as well as all predecessor models can be found in the Appendix E (Table E3).

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	<i>SE</i>	<i>df</i>	<i>t</i>	<i>p</i>
Time	0.08	0.03	2493	2.44	.007
Ethical education (y/n)	0.04	0.10	36	0.44	.658
Physical yoga (y/n)	0.04	0.10	36	0.41	.680
Age	-0.03	0.09	36	-0.37	.712
Gender	0.09	0.10	36	0.91	.368
Baseline length	-0.02	0.10	36	-0.17	.870
Time * Ethical education	0.07	0.03	2493	2.08	.019
Time * Physical yoga	0.03	0.03	2493	0.92	.179

As can be seen 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 the ethical education component significantly enhanced this effect. Marginal R^2 of this model was $R^2 = .03$, and conditional R^2 equaled $R^2 = .44$, indicating that only 3 % of the variance could be explained by the fixed effects time, components, age, gender, and baseline length, whereas 44 % were attributable to individual differences. We will explore possible explanatory and moderator variables for these findings at the end of the results section.

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.

Stress

Visual Analysis

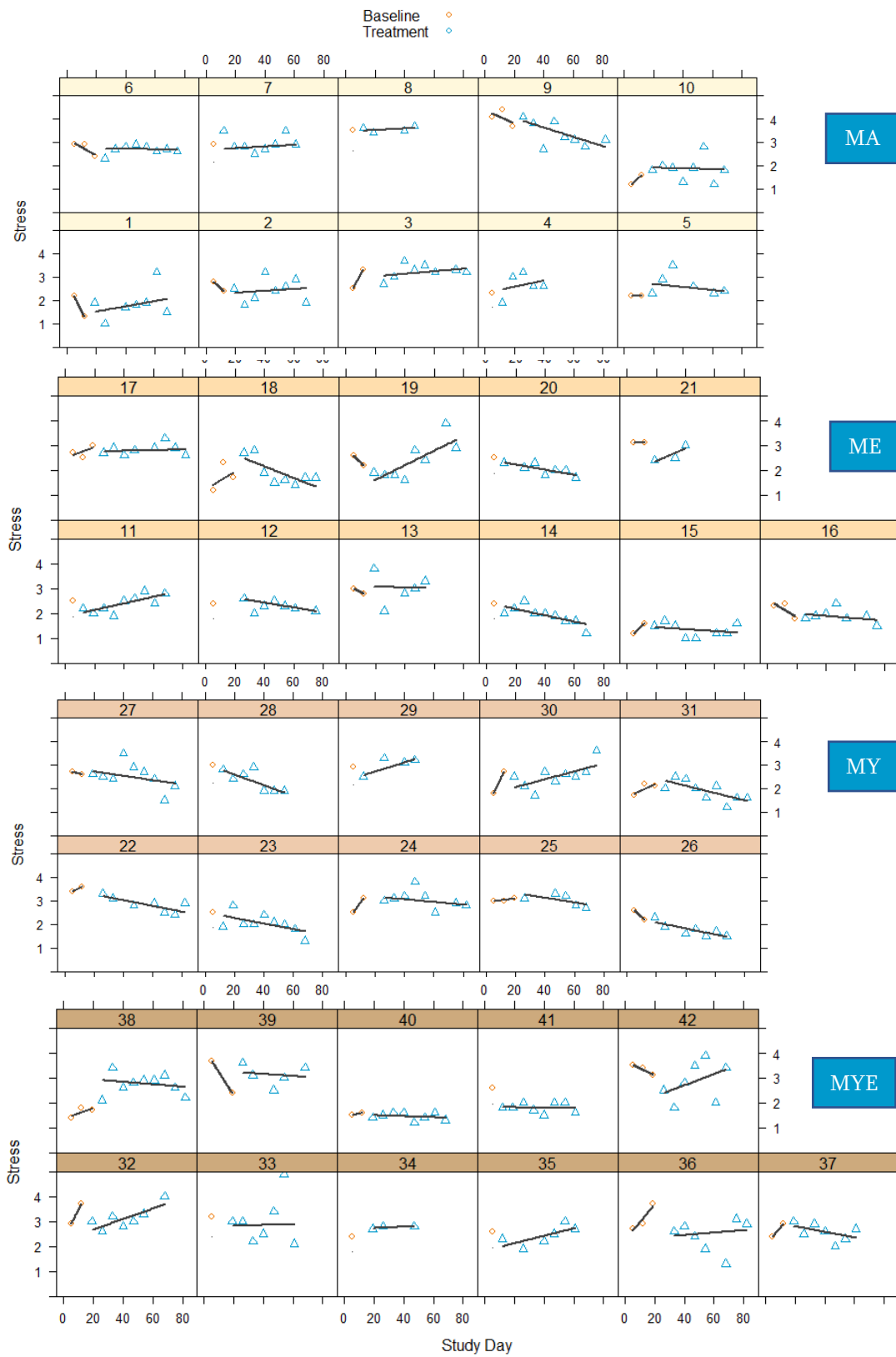
We measured perceived stress once every week to determine participants' weekly stress level. Figure 5 displays weekly stress scores for each participant over the course of the study.

Compared to well-being measurements, perceived stress seemed to fluctuate a lot less, with a few exceptions. Again, there is substantial variation in participants' general stress levels, the variance in their stress slopes as well as their response to the treatment. Admittedly, there was only one baseline reference point for participants with a baseline of seven days. This made it more difficult to draw reliable conclusions on average baseline stress levels. Nevertheless, it was still possible to compare this one measurement point cautiously with the many measurement points in the treatment phase.

Most curves show a slight to considerable downward trend indicating reduced stress levels. Only few participants exhibit unchanging stress levels from baseline to treatment phases (e.g., participants 7, 33, 39). However, corresponding with our analyses of well-being, some participants experienced an increase in perceived stress. This might possibly be due to the heightened effort in participating in our indeed quite demanding study. This might also be reflected in the upward trend in some participants' curves, specifically towards the end of the study (e.g., participants 3, 11, 19, 29, 30, 32, 42). It seems that the treatment was particularly demanding for participants in the most extensive condition MYE (e.g., participants 32, 34, 35, 38) as well as for participants in the MA condition (e.g., participants 3, 4, 5, 10). The latter repeatedly mentioned struggling with the monotonous and unguided mantra meditation practice during our weekly meetings. Conversely, most participants from MY condition exhibited a consistent reduction of perceived stress. This is also true for a large part of participants in the ME condition.

Figure 5

Stress Scores During Baseline and Treatment Phases for Each Participant with Regression Lines for Each Phase



Note. MA = mantra meditation only, ME = meditation and ethical education, MY = meditation and physical yoga, MYE = meditation, physical yoga and ethical education

Statistical Analysis

Tau-*U*

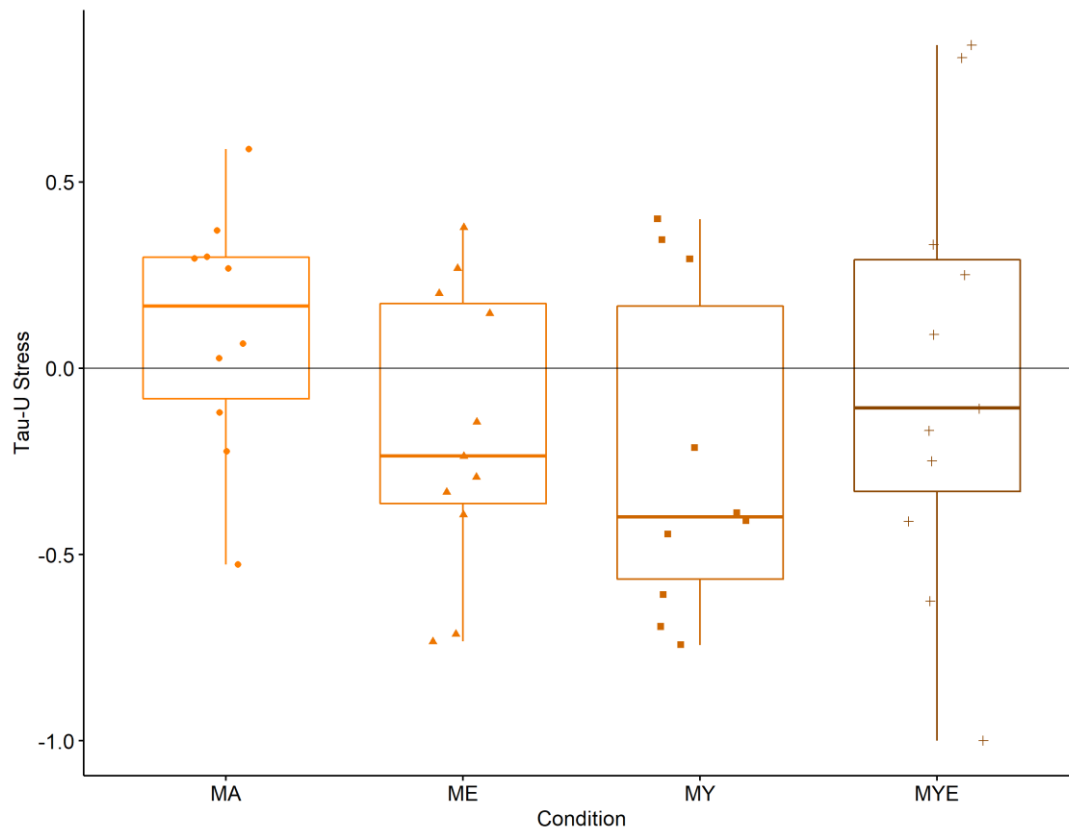
Effect size estimates for perceived stress were calculated for each participant. We had to rely on a lot less measurements for this calculation. Particularly estimates for participants with a baseline length of seven days are possibly overestimated and need to be interpreted with care. On average, effect 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 large effects on perceived stress. Whereas the stress level increased for 16 participants, it decreased for 22 participants. Only three participants had effect sizes close to zero. The full Tau-*U* table including mean scores and standard deviations for each phase, *p*-levels and Tau-*U* type can be found in the Appendix E (Table E5).

Six participants exhibited large decreases in perceived stress over time (participants 14, 20, 22, 26, 28, 36), and participant 41 showed a very large decrease. Three of these received the MY treatment. Indeed, the majority of participants from the MY condition reported decreased levels of stress throughout the treatment, contrary 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 seemed 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 differences between conditions by generating box plots for each condition (Figure 11) and conducting a couple of regression analyses.

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 (*Med* = 0.17, *IQR* = 0.38). Contrariwise, the treatment helped to reduce stress a little in the MYE condition (*Med* = -0.11, *IQR* = 0.62), and reduce it to a moderate amount in the ME condition (*Med* = -0.24, *IQR* = 0.54) and the MY condition (*Med* = -0.40, *IQR* = 0.73). Still, these effects were not very pronounced as a simple ANOVA yielded no significant between-group effect, $F(3, 38) = 1.28, p = .297$.

Figure 6

Box Plots for Averaged Tau-U Stress Estimates in Each Condition. Individual Stress Estimates are Scattered Across the Box Plots



Note. MA = mantra meditation only, ME = meditation and ethical education, MY = meditation and physical yoga, MYE = meditation, physical yoga and ethical education

Furthermore, we performed the same regression analyses as for well-being. The condition model is depicted in Table 6. It indicated a significant effect for the MY condition, and a marginally significant effect for the ME condition. Multiple R^2 of this model was $R^2 = .14$ indicating some unexplained variance in the model. There were no significant predictors in the component model suggesting that the positive effect of the MY condition was not generalizable to both conditions that included physical yoga. The most extensive condition (MYE) was more effective in reducing stress than the simple MA condition, but less effective than the two less extensive conditions (MY and ME). Neither age, gender, nor baseline length significantly predicted perceived stress in both models. The full regression table for the component model can be found in the Appendix E (Table E6).

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	<i>b</i>	β	<i>SE</i>	<i>t</i>	<i>p</i>
(Intercept)	0.06	0.00	0.13	0.44	.662
Ethical education (y/n)	-0.04	-0.04	0.15	-0.24	.405
Physical yoga (y/n)	-0.07	-0.08	0.14	-0.52	.303
Age	0.00	0.08	0.01	0.48	.637
Gender	0.22	0.18	0.20	1.10	.278
Baseline length	0.00	0.00	0.01	0.03	.978

This corresponds with our visual analysis indicating that the combination of meditation and physical yoga might be particularly beneficial in reducing stress. In addition, the null to slightly negative effect of the MA condition corresponds with the results we found for well-being. Expectedly, Tau-*U* estimates of well-being and stress correlate significantly ($r = -.39$).

Multilevel Modeling

Time was modelled as a random slope as perceived stress slopes varied across participants. Results in both multilevel models were similar to those we found with effect size estimates. There were no significant predictors in the component model (see Table 7).

Table 7

Multilevel Regression Estimates for Stress Scores as Dependent Variable and Time, Effective Component, Age, Gender, and Baseline Length as Predictors

Variable	β	<i>SE</i>	<i>df</i>	<i>t</i>	<i>p</i>
Time	0.04	0.12	332	0.36	.109
Ethical education (y/n)	-0.06	0.05	332	-1.23	.219
Physical yoga (y/n)	-0.14	0.13	36	-1.08	.287
Age	0.06	0.12	36	0.48	.635
Gender	-0.03	0.12	36	-0.22	.826
Baseline length	-0.09	0.13	36	-0.72	.478
Time * Ethical education	0.11	0.13	36	0.85	.447
Time * Physical yoga	0.01	0.05	332	0.13	.210

There were, however, significant predictors in the condition model (see Appendix E—Table E7 for the full regression table). The cross-level interaction between time and the MY condition was marginally significant, $\beta = -0.09$, $SE = 0.06$, $p = .053$, further demonstrating that this condition lead to the greatest reductions in perceived stress. We also found a marginally significant effect of time, $\beta = -0.06$, $SE = 0.05$, $p = .099$, indicating that all treatments taken together reduced stress to some extent. None of the moderators significantly predicted perceived stress. In this model, marginal R^2 equaled $R^2 = .08$, and conditional R^2 was $R^2 = .64$, indicating that only 8 % of the variance could be explained by the fixed effects, and 64 % were attributable to individual differences in perceived stress. Again, a large proportion of the variance could not be explained by the variables in this model. This points to the presence of other variables that are responsible for the observed interindividual differences, some of which we will look at shortly. All three analyses converge and point to a stress-relieving effect, which is unique to physical yoga and surpasses the effects of mantra meditation and ethical education.

Life Satisfaction

Life Satisfaction was measured during pretest, posttest and 2-month follow-up. A mixed two-way analysis of variance yielded a significant effect of time, $F(2, 72) = 3.46$, $p = .037$, with a small effect size, $\eta^2 = 0.01$. The four groups did not differ in their overall life satisfaction, $F(3, 36) = 1.27$, $p = .301$, nor was there a significant interaction between time and group, $F(6, 72) = 0.51$, $p = .796$. The mean life satisfaction across all groups was $M_{pre} = 4.86$ ($SD = 1.22$) before the study, $M_{post} = 5.17$ ($SD = 1.21$) at completion of the study, and $M_{fi} = 5.24$ ($SD = 1.14$) two months later. Thus, there was a continuous increase in life satisfaction, particularly from pre- to posttest, for all participants in our study. 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 will now explore a few variables, which might help to explain some of the interindividual variance we observed in the main analyses. For this analysis, we employed mainly exploratory and descriptive methods, such as diagrams, correlations, and frequency tables.

Course Satisfaction. After the 8-week intervention ended, participants rated their satisfaction with their course using the Client Satisfaction Scale. Apart from one participant (case 4) in condition MY who did attend class only once and primarily practiced on her own, class ratings were high in all conditions (the maximum rating being 4) – MA: $Med = 3.44$; ME: $Med = 3.75$; MY: $Med = 3.38$; MYE: $Med = 3.62$. Participants in the two conditions that involved ethical

education reported a somewhat higher satisfaction with their course, this difference being marginally significant, $F(1, 39) = 3.99, p = .053$. This higher course satisfaction 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.

All symptoms were mentioned by at least one participant. The five most common symptoms were exhaustion (21 participants), impression that something is missing in life (16), inner tension (15), strong positive feelings during meditation (13), and the feeling of oneness with all that is (13). 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 $M = 7.59$), followed by emotional symptoms ($M = 5.63$), and altered states of consciousness ($M = 5.07$). Two participants reported no symptoms, but this could as well represent a lack of diligence. On average, participants reported experiencing 11.2 symptoms ($SD = 9.67$, Range 1—44) with a mild severity ($M = 1.32, SD = 0.50$) for around 5.76 days ($SD = 4.40$). No adverse events necessitated referral to a health professional.

Participants from the MYE condition reported the most symptoms (altogether 138), followed by the MA condition (127), and the ME condition (117). The least symptoms were reported by the MY group (77). We tested all symptom clusters for significant differences between conditions employing one-way analyses of variance. Thereby, we found significant differences for the number and severity of emotional symptoms, $F(3, 38) = 2.72, p = .059$, and $F(3, 38) = 2.96, p = .045$, respectively, and the duration of neurological symptoms, $F(3, 38) = 3.05, p = .040$. Pairwise t-tests revealed that the MY and ME conditions experienced significantly less emotional symptoms than the MA condition, and, furthermore, the MY condition experienced them as less severe. On the other hand, the ME condition experienced significantly longer neurological symptoms than the other groups, but, specifically the MY condition. A detailed analysis revealed that these neurological symptoms were predominantly a numbness in parts of the body, 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 will now give a qualitative review on the changes and differences between conditions that we observed during visual inspection. Figures depicting individual trajectories in these variables can be found in the Appendix F (Figures F4 to F11). For all variables, we observed substantial variation between participants as well as strong day-to-day fluctuations within participants.

First, we will have a look at the meditation practice variables. Regarding perceived **meditation ease**, we detected a clear upward trend over time. This means that for the majority of participants, meditation got easier over the course of the intervention. This trend was most evident in participants from the ME condition. For some participants, meditation ease stayed more or less the same over time. These participants mainly belonged to the two conditions MA and MY. Three participants from the MYE condition experienced increased difficulty in meditating towards the end of the treatment. This might be due to growing fatigue towards the end of the admittedly very extensive intervention. The visual analysis of perceived **relaxation during meditation** revealed a transition from restlessness to a more relaxed state over the course of the treatment for the majority of participants. Still, ratings of perceived relaxation vs. restlessness varied strongly from day to day indicating that meditation quality strongly depended on mood and daily form, at least for beginners. Some participants experienced no perceivable change over time, and others experienced increased restlessness particularly towards the end of the treatment. 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 with strong fluctuations over time. For some participants, the level of wakefulness stayed more or less the same and a few participants got more tired towards the end. Participants from the MY condition appeared to show a more consistent upward trend from tiredness to wakefulness during meditation.

For **yoga experience variables**, there were no differences perceivable between the two conditions that received physical yoga as a treatment. Rather, individual differences in response to the treatment were more prominent than differences between conditions. 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 breathing increased over time for most participants. There were no consistent findings regarding perceived **ease of ethical exercises**. For a few participants there was an observable upward or downward trend, but for most, perceived ease was subject to strong fluctuations. This might be 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. In order 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. First, we calculated the mean perceived ease of each topic and created a ranking sequence from easiest (i.e., contentment, $M = 3.63$, $SD = 1.07$) to hardest topic (i.e., truthfulness, $M = 3.01$, $SD = 1.08$). Then,

we set the hardest topic as the reference category for the regression, and found that only two topics were significant predictors of perceived ease—non-stealing, $b = 0.50$, $SE = 0.14$, $p < .001$, and contentment, $b = 0.62$, $SE = 0.16$, $p < .001$. This means that these two topics were perceived as generally easier than all other topics.

In a next step, we looked whether there were any significant correlations between the subjective experience variables. Perceived meditation ease correlated highly with relaxation during meditation ($r = .56$), and moderately with relaxation during physical yoga ($r = .29$). Perceived relaxation during meditation and during yoga, in turn, correlated highly with each other ($r = .55$), as did perceived wakefulness during meditation and during yoga ($r = .58$). Relaxation during yoga also correlated moderately with wakefulness during yoga ($r = .37$), and coherence of yoga movements with breathing ($r = .36$). The latter also showed a moderate correlation with perceived yoga ease ($r = .28$). Perceived ease of ethical exercises had smaller correlations with relaxation during meditation ($r = .24$) and yoga ($r = .26$). Thus, there seems to be a relevant coherence between different subjective experiences and different components of practice. Our data does not allow for causal interferences. However, we can conclude that on “good” days participants perceived all of their home exercises as easier and were more relaxed and awake during meditation, yoga and/or ethical exercises. Interestingly, a more difficult ethical practice also influenced relaxation during meditation and/or yoga. Surprisingly, meditation or yoga practice duration did not correlate with any of the subjective experience variables. They did correlate with each other ($r = .48$), though, indicating that on days where participants practiced longer meditation, they also practiced longer yoga, and vice versa.

Dose-Response and Experience-Response Relations

To explore the possible influence of subjective experiences on our outcome variables, we conducted a couple multilevel regression analyses. We took the component models described above, and added four predictor variables on level-1 (meditation practice duration, perceived meditation ease, relaxation, and wakefulness). We decided to include only the meditation variables as all of our participants had practiced meditation. Similar to other studies (Fredrickson et al., 2017), we used unstandardized values in our models and person-mean centered the meditation variables. With this, we evaluated the effects of dosage and subjective experience on the daily fluctuations in our dependent variables during the treatment phase. In the following, we will point out main findings, full multilevel regression tables can be found in the Appendix E (Tables E9 and E10). 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 $p < .02$ to $p < .001$), 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. The experienced quality of meditation had a greater impact than the actual minutes spent meditating. 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. There were no clear-cut results for **stress**, but two marginally significant effects ($p < .08$). Remarkably, individually higher meditation practice duration and relaxation during meditation predicted lower stress levels on a given day. We were able to explore the direction of these effects tentatively by considering the time of meditation practice.

Fortunately, we required participants to provide the time of day they meditated. Time of meditation was reported less reliably than other meditation variables. Nevertheless, we were able to conduct some exploratory analyses. Our underlying assumption was that meditating in the morning would presumably influence well-being and stress during that day, whereas meditating in the evening would probably be influenced by events of the day. First, we split reported times into larger bands, that is, morning (5-11 am), midday (11 am-3 pm), afternoon (3-6 pm), and evening (6-12 pm). The majority of participants had a preferred time band for meditation (31 out of 42). The most popular time for meditating was during the evening ($n = 16$), followed by morning ($n = 9$), midday ($n = 5$), and afternoon ($n = 1$). There were no apparent differences in conditions regarding preference of meditation time. However, all participants also reported practicing regularly in more than one time band. This gave us the opportunity to explore how the time of meditation would relate to our dependent variables. We included three dummy variables coding the four time bands into our multilevel meditation model reported above. The evening band served as the reference category.

The most predictions stayed the same in the extended models. The full multilevel regression tables can be found in the Appendix E (Tables E11 and E12). We will only point out the effects of time of meditation and the most relevant changes we observed. The time of meditation had a significant effect on well-being. Participants reported higher levels of well-being on days when they had meditated in the morning, $b = 0.12$, $SE = 0.05$, $p = .031$, or during midday, $b = 0.09$, $SE = 0.05$, $p = .083$, though the latter was only marginally significant. Thus, meditating in the morning seemed to have a positive influence on well-being on that day. The time of meditation did not influence any other dependent variable. There were some changes in other predictors, though. As above, both individually higher meditation practice duration and relaxation during meditation were related to reduced stress, this effect being statistically significant ($p < .05$). Meditation practice duration also became a significant, but *negative* predictor of well-being ($p < .01$). This could imply that participants meditated less on days when they were feeling

well, as they were consistently reporting during our weekly meetings, and more when they were feeling less stressed. Whether they felt less stressed *because* they meditated longer, we cannot tell from our data. However, many participants reported during our meetings that they used meditation to calm themselves down on stressful days, and, in these cases, needed to meditate longer than usual.

Overall, there was much variability in subjective experiences during meditation both within and between different participants. These experiences were related to daily well-being and stress with positive experiences being associated with positive outcomes. This seemed to apply to all practice components. There were no observable differences between conditions during visual inspection, except for two. Wakefulness during meditation increased most for participants in the MY condition, whereas perceived meditation ease increased most prominently for participants in the ME condition. As the latter showed the greatest enhancement in daily well-being, too, it seems reasonable to conclude that both processes reinforced one another. Specifically meditating in the morning seemed to influence well-being on that day positively.

Discussion

The present study provides the first in-depth insights into the incremental impact of ethical education and physical yoga on mantra meditation in healthy participants. At the same time, it dismantled and investigated diverse combinations of the components of the new mind-body therapy Meditation-Based Lifestyle Modification (MBLM; Bringmann et al., 2020). We employed an additive design with all participants practicing mantra meditation and some additionally practicing physical yoga and/or yoga ethics. The single-case multiple-baseline design gave detailed access to individual responses and trajectories of change over the course of the treatment. Participants in all four conditions enjoyed their course and established a regular home practice. 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 coherent but less robust. 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.

We found significant increases in well-being in all combined conditions, but not in the meditation only condition (MA). This increase was most prominent in the two conditions that involved ethical education (ME and MYE). For stress, changes could not consistently be attributed to the inclusion of a specific component. Rather, both combined, but less extensive interventions (MY and ME) were more effective in reducing stress than the full MBLM program (MYE). The MY condition was the most efficient in this regard. This speaks to a stress-relieving effect of physical yoga. Conversely, some participants from the MA condition showed a decrease in well-being over time. In addition, participants from the MA and MYE conditions showed a

tendency to become more stressed towards the end of the treatment. This provides evidence for the differential effects various combinations of yoga components can elicit, and the potential relevance of personality factors in this regard.

Interestingly, life satisfaction significantly improved across all conditions from pre- to posttest and continued to improve until two months after the intervention had ended. 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 eudaimonic perspective, decreased hedonic well-being, as reported above for the MA condition, is not inconsistent with increased life satisfaction. 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. While some participants benefited strongly from their treatment, others did not change much, and yet others experienced a deterioration in their well-being or perceived stress. Similarly, some participants found meditating really easy from the beginning, for most it got easier as they practiced, and for some it remained equally difficult. Likewise, most participants exhibited strong fluctuations in their daily well-being and perceived meditation ease. We found that the daily quality of meditation correlated with daily well-being, and that meditating in the morning had a positive impact on well-being during that day. The actual duration of meditation practice was not as important. However, we also found that participants reported higher well-being on days with shorter meditation practice durations, and lower stress on days with longer durations—the direction of this link being unclear.

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 from 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, impair relaxation during meditation. Some ethics topics were perceived as more difficult than others. 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 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 appeared to be a very effective combination. The combination of physical yoga and meditation (MY), though, seemed to be 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 (Chapter 4), no study employed an additive design comparable to ours. Most studies compared rather complex interventions with each other, and few actually dismantled or added program components (e.g., Hunt et al., 2018; J. A. Smith et al., 2011). Only one study compared a complex Kundalini Yoga program (including breathing, meditation, and postures) to mantra meditation (Shannahoff-Khalsa et al., 2019) and found that yoga outperformed mantra meditation. 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 (Goyal et al., 2014; Lynch et al., 2018; Sedlmeier et al., 2012). However, there are to date only few investigations into the effects of mantra meditation on healthy participants that are methodologically sound. Thus, more research is needed to evaluate the usefulness of mantra meditation in healthy participants effectively.

Interestingly, our mantra meditation intervention differed significantly from earlier investigations. The format of teaching mantra meditation might not have been optimal. Participants only received minimal instructions and were then “thrown in at the deep end” with immediately practicing 20–25 minutes of silent meditation. Research has shown that letting participants engage in a guided meditation practice resulted in greater improvements in positive affect and heart-rate variability than letting them engage in silent 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 & Barnes, 2013). Nevertheless, individual factors might influence the liking and coping with a specific meditation technique and, therefore, its effects (Hölzel et al., 2011). We assessed a multitude of personality factors to explore possible interactions with subjective experiences and objective outcomes in future publications.

Furthermore, and more importantly, 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, Sahaj Samadhi, and Transcendental Meditation). Research has shown that spirituality is a critical ingredient in mantra meditation and can tremendously enhance its effects (Wachholtz et al., 2017; Wachholtz & Pargament, 2005; Wolf & Abell, 2003). 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 mantra meditation 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 to calm body and mind and develop a better connection to and understanding of one's own bodily processes (Kishida et al., 2018; Schmalzl et al., 2015). 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 like postures or meditation (Feuerstein, 2012).

Following these assumptions, the full MBLM program (MYE) should have led to the greatest effects. However, this was not the case. It seemed, rather, that certain combinations of practices were more helpful than others. Indeed, in this sample of healthy adults, a bit more was better than much more. One reason for this finding might have been the substantially longer class duration in the MYE condition as well as the larger amount of assigned home practice. Participants were requested to engage in three home practices (meditation, yoga and ethics) for a significant amount of time each day, which they did even more reliably than participants in the two less extensive conditions (MY and ME). Nonetheless, meditation practice duration was unrelated to changes in the outcome variables. Interestingly, in a systematic review, effect sizes did not change in shortened versus original MBSR treatments, and shorter assigned practice time was associated with larger effect sizes (Carmody & Baer, 2009). This indicates that less extensive interventions are probably easier to integrate into people's lives. Furthermore, the eightfold 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 & 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 only investigated four possible combinations of practices. In this study, on the one hand, the combination of mantra meditation with ethical education proved to be particularly beneficial for enhancing daily well-being as well as perceived meditation ease over time. The combination of mantra meditation and physical yoga, on the other hand, had a pronounced positive effect on weekly stress as well as on wakefulness during meditation. We will now look at these results more closely.

Most participants in the ME condition actively engaged in the discussion and practice of the ethical principles of *yamas* and *niyamas*, and found them sometimes challenging, but mostly very helpful. The intensive ethical confrontation invited them to reconsider some of their maladaptive cognitive, emotional and behavioral habits and divert them into 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; Shapiro et al., 2006). The difference to the current program, though, is its holistic approach and focus on human flourishing. The ethical education component of MBLM might help attendees to 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, e.g., 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 interventions (Gard et al., 2014; Sullivan et al., 2017).

Our findings are also in line with research demonstrating that incorporating ethical practice into yoga or mindfulness interventions increased their efficacy (Chen & Jordan, 2020; J. A. Smith et al., 2011). Remarkably, participants in the ME condition engaged strongest in intergroup discussions, even after the class had ended. In contrast to all other conditions, they 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 yoga practice and simple breathing exercises might have originated an upsurge in resilience. Physical yoga has been found to increase resilience to stress (Hartfiel et al., 2011; Manincor et al., 2016). Perceived stress decreased most in this condition and participants reported the least and the mildest emotional and other adverse symptoms during the treatment. This speaks to the protective effects of physical yoga practice. Interestingly, these protective effects did not outweigh the emotionally more challenging ethical education component in the MYE condition. Altogether, in both yoga conditions, physical yoga was experienced as pleasant and relaxing, and ease of yoga as well as its coherence with breathing improved over the course of the study. Findings from other studies support the positive effect of (physical) yoga on psychological well-being and stress (Bhat et al., 2012; Bowden et al., 2011; Gard et al., 2012; Gorvine et al., 2019; Hunt et al., 2018; Melville et al., 2012). Conversely, some studies found no effect on stress (Park et al., 2017, 2020; Quach et al., 2016). 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 usage 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 carefully 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 (Gorvine et al., 2019; Lindsay et al., 2018). This accepting stance might have passed over to the meditation practice and, in turn, made 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 & Park, 2015; Schmalzl et al., 2015), thereby intensifying the calming effect of yoga. In contrast to the other conditions (specifically the ME condition), participants from 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 a profound reorientation and reconsideration of values, which we observed in the two ethical education conditions.

Limitations and Future Directions

This study employed rigorous methodology with a powerful research design to address one of the core issues in yoga and meditation research, namely, the incremental impact of physical yoga and ethical education on meditation. This was one of the few studies effectively comparing diverse combinations of yoga components, and explicitly investigating the effects of the yogic *yamas* and *niyamas*. 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. Appropriately, we analyzed our extensive data set in a threefold way by visual inspection, calculating effect sizes (Tau-*U*), and multilevel modeling. Therefore, we consider the findings in this study to be relatively robust.

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 was 18 to 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 as being 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 amount of dropouts, missing data, and attrition towards the end of the study. Future studies should consider providing financial or other compensation to increase commitment in studies that employ such intense data gathering periods as the present one. Furthermore, this approach might also attract individuals who are less intrinsically motivated. Additionally, studies should aim at drawing samples who are representative of the general public to enhance the generalizability of findings.

In single-case research, a sample of 42 participants is considered exceptionally large. With up to 85 measurements per participant for daily measures (well-being, meditation experience), findings and effect size estimates should be very robust. This applies less to measures of stress that were collected only once per week. During piloting, we received feedback that perceived stress using the Perceived Stress Scale (PSS; Cohen et al., 1983) should only be measured once every week. However, this led to less precise estimates of stress, particularly in groups with a baseline of seven days. Usually, single-case research manuals recommend taking at least three baseline measurements (Barlow et al., 2009). 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 amount of data points at both levels. In our case, this would have meant recruiting substantially more participants. Yet, this was not feasible in the present study due to limited research resources. Therefore, results of multilevel modeling, especially *p*-values, should not be regarded as conclusive. More research is needed to validate our findings. Likewise, subgroup samples for the four conditions were comparatively small (10-11 participants) to draw reliable conclusions through analyses of variance. However, 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 depicting the effect of meditation as well as factors common to a group setting, like social support, attention from study staff, and a caring environment (Kinser & Robins, 2013; Stein & 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 on well-being.

A couple of improvements could be made in order 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. Both approaches have already been successfully implemented in existing studies (Bai et al., 2020; Kishida et al., 2019; Lindsay et al., 2018; May et al., 2014; Shoham et al., 2017). Furthermore, participants should be encouraged to make journal-like entrances in the daily questionnaire and reliably report challenging situations, such as exams. This would enable researchers to understand the fluctuations of their daily experience better. We did provide a field for exceptional experiences in our questionnaire, however, not all participants regularly made use of this.

Overall, we observed substantial individual differences in response to all four treatments and marked fluctuations in daily well-being. While some participants experienced a positive change in their emotional and cognitive states, some remained stable, while others, in turn, experience a negative change. This highlights the importance of acknowledging individual differences in responses to mind-body interventions (Gard et al., 2014; Hölzel et al., 2011; Lippelt et al., 2014; Schmalzl et al., 2015). A second step would be the identification of relevant moderators in this regard.

Finally, future studies could dismantle the effects of the eightfold 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, or only meditation. Alternatively, they could examine the effects of diverse meditation techniques (other than mantra meditation) in this context. Current research has revealed a multiplicity of meditation techniques (see Chapters 2 and 3), most of which are under researched at present. Furthermore, yoga incorporates a collection of diverse breathing techniques which can have quite different, sometimes even opposing effects on practitioners (Peng et al., 2004; Raghuraj et al., 1998). Thus, future studies should examine different combinations of ethical education, postures, breathing practices, and meditation techniques.

Overall, the present study provided intriguing evidence for the differential impact of diverse combinations of yoga components. While ethical education was particularly beneficial for increasing well-being, physical yoga lead to reductions in perceived stress. Participants in all conditions were satisfied with their course indicating that MBLM is a feasible and helpful intervention for a predominantly young and healthy population. We encourage researchers to evaluate MBLM and its components in larger and more diverse participant samples. Investigating and having an even closer look on the components of the eightfold yoga path seems to be a promising approach in truly understanding the multifaceted practice of yoga. In the end, these research efforts could contribute to the development of a profound theory of yoga.

Chapter Six

Conclusion and Outlook

6. CONCLUSION AND OUTLOOK

Meditation is, indeed, very diverse and complex. It encompasses an amazing variety of practices (Chapters 2 and 3), and practicing meditation in one of its original contexts can greatly enhance its effectiveness (Chapters 4 and 5). As I have outlined in the beginning of this thesis, many factors influence the effects of meditation. This thesis has addressed three of them—depicting the variety of practices, taking into account the traditional framework of practice, and displaying interindividual variability in the response to practice. I will elaborate on each of these three points in the following. However, as it is often the case in science, new insights lead to new questions. Obviously, many more factors play a role in meditation. I will also reflect upon those and give my humble advice on how they could be investigated in the future.

The current popularity of meditation in science and in the public clearly originates from the virtually meteoric rise of mindfulness. Everyone wants to be and act mindfully nowadays as mindfulness is being promoted as a panacea to almost anything (Van Dam et al., 2018). This issue has raised serious concerns and even led to the creation of the term “McMindfulness” (Purser, 2019). The good thing about these concerns is that they kick started an urgently needed critical evaluation of research. There have been discussions about the meaning and definition of mindfulness, how to measure it and its related constructs, what research methodology to use, and how to build appropriate theories and mechanistic models around it (Davidson & Kaszniak, 2015; Grabovac et al., 2011; Grossenbacher & Quaglia, 2017; Hölzel et al., 2011; Lutz et al., 2015; Raffone & Srinivasan, 2017; Y.-Y. Tang et al., 2015; Vago & Silbersweig, 2012). In addition, researchers began to distinguish different kinds of meditation and disentangle the components of complex interventions, such as MBSR (e.g., Hunt et al., 2018; Kropp & Sedlmeier, 2019). Recently, research has expanded beyond mindfulness and included meditative practices from other traditional backgrounds, too (Dahl et al., 2015; Nash & Newberg, 2013).

The work presented in this thesis stands in line with these research efforts and takes them one step further. To the best of my knowledge, the list of meditation techniques depicted in Chapter 2 is the most comprehensive and inclusive collection of techniques to date. This may certainly do justice to meditation’s inherent variety and crucially broaden the scope of research. However, acknowledging this variety causes new challenges. Researchers already had trouble in finding a suitable definition for meditation (Chapter 3). With this amplified variety, finding an overarching definition subsuming all of these practices appears almost impossible. In the third chapter, I presented a classification system of meditation. The seven clusters of similar meditation techniques definitely make the huge range of techniques more manageable. Moreover, they effectively overcome the limitations of the popular focused attention—open monitoring distinction (Lutz et al., 2008). Nonetheless, as I pointed out earlier, at least three techniques in this

classification system represent broad categories in themselves. These are visualizations, meditation with movement, and manipulating the breath. The latter two represent central elements of the traditional eightfold yoga path that I have elaborated on in Chapter 4. In the fifth chapter, I demonstrated how adding, for example, meditative movement to a mantra meditation intervention markedly enhanced its efficacy. Other research has also shown how distinct meditative practices or combinations of practices lead to differential outcomes (Bhavanani et al., 2017; Fredrickson et al., 2017; Sauer-Zavala et al., 2013). Therefore, as I have argued in Chapter 2, it might be reasonable to develop multiple definitions of meditation. The clusters presented in Chapter 3 might serve as a good starting point for this.

Having said that, there still might be certain features all of these diverse practices have in common. Looking back at the meditation techniques described in this thesis, two possible commonalities catch the eye—they all include some form of mental training, and they all relate to the body in one way or the other. Meditators practicing any of the meditation techniques introduced in Chapter 2 deliberately alter their focus and/or content of awareness and train their mind to consolidate this alteration. They train their ability to develop “awareness of awareness itself” (West, 2016, p. 4). The actual modality (or technique) used for this form of mental training varies considerably. Notably, meditators do not only train cognitive processes (Slagter et al., 2011). As I have outlined in Chapter 3, meditation is inherently embodied and meditators implicitly used embodied dimensions to classify meditation techniques. Varela et al. (2016) point out that meditation is not about developing a certain skill, but rather about reconnecting body and mind:

“When the mindfulness meditator finally begins to let go rather than to struggle to achieve some particular state of activity, then body and mind are found to be naturally coordinated and embodied” (p. 29-30).

Potentially, this unique combination of mental training and embodiment might be the distinctive feature that distinguishes meditative practices from other activities.

In addition, meditative practices might share another characteristic. In the first chapter, I elucidated that meditative practices can be found across many different cultures and that they were developed for a similar purpose. This shared traditional goal mostly entails reaching a ineffable state of consciousness, which allows one to see or realize how the world really is or to become one with God (Reddy & Roy, 2019; Sedlmeier & Srinivas, 2019; West, 2016). This state has different names in different traditions (*nibbana*, *samadhi*, *devekut*, *fana*, or *unio mystica*, to name a few). In research literature, these states have been described as “non-dual awareness” (Josipovic, 2010) or “pure consciousness”. They have been characterized by a dramatic form of self-loss, which can also occur during some drug-induced psychedelic states (Millière et al., 2018). Indeed, indigenous cultures have used psychedelic drugs for similar (transcendental) purposes for a very long time (Labate & Cavnar, 2014). Obviously, most modern meditators

meditate for much more mundane reasons, such as improving well-being or self-care (Sedlmeier & Theumer, 2020).

When remembering its original purpose, one has to consider that meditation was usually situated within a larger context. People would not only sit and meditate for 20 minutes a day. They would be taught spiritual belief systems and ethical guidelines to follow, would usually practice within a community and under the guidance of a skilled teacher, and would be instructed on a multitude of different practices (Sedlmeier, 2016). This groundedness in a larger framework would also guide practitioners through times of difficult and challenging experiences. These were considered to be natural occurrences on the spiritual path (Bryant, 2015; Buddhaghosa, 2010). In fact, current research has revealed that challenging experiences are quite common among meditators of different traditions (Cebolla, Demarzo, et al., 2017; Lindahl et al., 2017). Interestingly, engaging in physical yoga reduced the amount of adverse events participants reported in the intervention study I described in Chapter 5. This was not true for participants who received additional ethical education. Still, both types of additive treatments proved to be enormously beneficial for participants in that study. Thus, learning meditation in one of its original contexts seems to be very advisable to enhance its effectiveness.

Additionally, traditional accounts acknowledge pre-existing differences between meditators and the need to “personalize” recommended meditation practices (Sedlmeier & Srinivas, 2016). The ancient Indian systems of Samkhya and Yoga, for example, postulate the existence of three qualities (*gunas*) that constitute everything material. Their individual composition determines the personality of a person, and following the eightfold yoga path is assumed to have a favorable impact on this composition (Putra & Sedlmeier, 2014). The Buddhist Visuddhimagga also describes six personality types that could be referred to for choosing suitable meditation practices (Buddhaghosa, 2010). Consequently, these two traditions assumed and facilitated a person-technique fit that seems to have been lost in modern meditation research. The intervention study in Chapter 5 revealed a great heterogeneity in responses to the treatment. The mantra meditation technique had not been equally beneficial for all participants. During follow-up, some participants reported that they had changed their meditation technique after the study had ended and got along much better with their new technique. Recently, studies have begun incorporating and examining the impact of personality factors on meditation interventions (Barkan et al., 2016; Ding et al., 2015; Krick & Felfe, 2020; R. Tang & Braver, 2020). Still, more research is needed to evaluate these interrelations thoroughly. Moreover, truly custom-tailored advice will only be possible if the variety of meditation techniques depicted above is considered.

It becomes apparent that meditation is a complex issue. Scientifically, it is poorly understood and a comprehensive theory is missing. The research presented in this thesis denotes a step in the right direction. Future research should further explore the variety of meditation practices and their influential factors. In order to understand the basic working mechanisms of meditation, all of its components should be isolated and investigated through comparative studies. These studies should preferably be longitudinal and methodologically rigorous like the study

reported in Chapter 5. The basic meditation techniques introduced in Chapter 2 should be investigated separately and in different combinations. The classification system presented in Chapter 3 could serve as a basis to select and compare techniques from remote clusters. Thereby, researchers should examine phenomenological, psychological, behavioral, physiological, and neuroscientific aspects as well as person-technique fit. These studies should recruit meditation-naïve persons and follow them up for longer periods.

As long as we do not have a sound theory of meditation, studies should be exploratory in nature. Alternatively, they should explicitly refer to and examine already proposed mechanistic models (see above and Chapter 4). Furthermore, studies should evaluate factors that relate to the traditional context of meditation. These could be components of traditional paths, such as ethical teachings or meditative movements (Chapter 5), or traditional recommendations based on personality theories (see above). Possible adverse events or extraordinary experiences related to meditative practices should be taken into consideration. Future studies should also address setting factors, such as the location of training or group- and teacher-related processes. Overall, I am confident that meditation research is on the right track and soon we will unravel some of the secrets of these ancient practices.

BIBLIOGRAPHY

- Adyashanti. (2006). *True meditation: Discover the freedom of pure awareness*. Sounds True.
- Ainsworth, B., Eddershaw, R., Meron, D., Baldwin, D. S., & Garner, M. (2013). The effect of focused attention and open monitoring meditation on attention network function in healthy volunteers. *Psychiatry Research, 210*(3), 1226–1231.
- Allbritton, M., & Heeter, C. (2018). Meditation as an intervention for health: A framework for understanding meditation research. *OBM Integrative and Complementary Medicine, 3*(4), Article 025. <https://doi.org/10.21926/obm.icm.1804025>
- Amihai, I., & Kozhevnikov, M. (2014). Arousal vs. relaxation: A comparison of the neurophysiological and cognitive correlates of Vajrayana and Theravada meditative practices. *PloS One, 9*(7), Article e102990. <https://doi.org/10.1371/journal.pone.0102990>
- Anālayo. (2003). *Satipaṭṭhāna: The direct path to realization*. Windhorse Publications.
- Anālayo, B. (2016). Early Buddhist mindfulness and memory, the body, and pain. *Mindfulness, 7*(6), 1271–1280.
- Attkisson, C. C., & Zwick, R. (1982). The Client Satisfaction Questionnaire: Psychometric properties and correlations with service utilization and psychotherapy outcome. *Evaluation and Program Planning, 5*(3), 233–237.
- Austin, J. H. (1998). *Zen and the brain*. MIT Press.
- Awasthi, B. (2013). Issues and perspectives in meditation research: In search for a definition. *Frontiers in Psychology, 3*, Article 613. <https://doi.org/10.3389/fpsyg.2012.00613>
- Bach, J. M., & Guse, T. (2015). The effect of contemplation and meditation on ‘great compassion’ on the psychological well-being of adolescents. *The Journal of Positive Psychology, 10*(4), 359–369.
- Baer, R. (2015). Ethics, values, virtues, and character strengths in mindfulness-based interventions: A psychological science perspective. *Mindfulness, 6*(4), 956–969. <https://doi.org/10.1007/s12671-015-0419-2>
- Bai, S., Elavsky, S., Kishida, M., Dvořáková, K., & Greenberg, M. T. (2020). Effects of mindfulness training on daily stress response in college students: Ecological momentary assessment of a randomized controlled trial. *Mindfulness, 11*(6), 1433–1445. <https://doi.org/10.1007/s12671-020-01358-x>
- Bansal, A., Mittal, A., & Seth, V. (2016). Osho Dynamic Meditation’s effect on serum cortisol level. *Journal of Clinical and Diagnostic Research, 10*(11), CC05. <https://doi.org/10.7860/JCDR/2016/23492.8827>
- Barkan, T., Hoerger, M., & Gallegos, A. M. (2016). Personality predicts utilization of Mindfulness-Based Stress Reduction during and post-intervention in a community sample of older adults. *The Journal of Alternative and Complementary Medicine, 22*(5), 390–395.

- Barlow, D. H., Nock, M., & Hersen, M. (2009). *Single case experimental designs: Strategies for studying behavior for change* (3rd ed.). Pearson.
- Barsalou, L. W. (2010). Grounded cognition: Past, present, and future. *Topics in Cognitive Science*, 2(4), 716–724. <https://doi.org/10.1111/j.1756-8765.2010.01115.x>
- Bäumer, B. (2008). *Vijñāna Bhairava—Das göttliche Bewusstsein: 112 Weisen der mystischen Erfahrung im Śivaismus von Kashmir*. Verlag der Weltreligionen.
- Bayot, M., Vermeulen, N., Kever, A., & Mikolajczak, M. (2020). Mindfulness and empathy: Differential effects of explicit and implicit Buddhist teachings. *Mindfulness*, 11(1), 5–17. <https://doi.org/10.1007/s12671-018-0966-4>
- Benson, H. (1975). *The relaxation response*. Morrow.
- Berkovich-Ohana, A., & Glicksohn, J. (2017). Meditation, absorption, transcendent experience, and affect: Tying it all together via the Consciousness State Space (CSS) model. *Mindfulness*, 8(1), 68–77. <https://doi.org/10.1007/s12671-015-0481-9>
- Bhat, P. S., Chopra, V., Mehta, S. G., Srivastava, K., Kumar, S. R., & Prakash, J. (2012). Psychological benefits of yoga in industrial workers. *Industrial Psychiatry Journal*, 21(2), 98–103. <https://doi.org/10.4103/0972-6748.119592>
- Bhavanani, A. B., Ramanathan, M., Dayanidy, G., Trakroo, M., & Renuka, K. (2017). A comparative study of the differential effects of short term asana and pranayama training on reaction time. *Annals of Medical and Health Sciences Research*, 7(3), 80–83.
- Bhavanani, A. B., Ramanathan, M., Balaji, R., & Pushpa, D. (2014). Differential effects of uninostril and alternate nostril pranayamas on cardiovascular parameters and reaction time. *International Journal of Yoga*, 7(1), 60–65.
- Bhagal, R. S., Thakur, G. S., & Shete, S. U. (2016). Differential impact of Shavasana and meditation on memory scores in healthy college students: A randomized controlled study. *Yoga Mimamsa*, 48(1), 9–12.
- Bishop, S. R., Lau, M., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., Segal, Z. V., Abbey, S., Speca, M., & Velting, D. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*, 11(3), 230–241.
- Bodian, S. (2016). *Meditation for dummies*. John Wiley & Sons.
- Bond, K., Ospina, M. B., Hooton, N., Bialy, L., Dryden, D. M., Buscemi, N., Shannahoff-Khalsa, D., Dusek, J., & Carlson, L. E. (2009). Defining a complex intervention: The development of demarcation criteria for “meditation.” *Psychology of Religion and Spirituality*, 1(2), 129–137. <https://doi.org/10.1037/a0015736>
- Borg, I., Groenen, P. J. F., & Mair, P. (2018). *Applied multidimensional scaling and unfolding*. Springer. <https://doi.org/10.1007/978-3-319-73471-2>
- Bowden, D., Gaudry, C., An, S. C., & Gruzelier, J. (2011). A comparative randomised controlled trial of the effects of Brain Wave Vibration Training, Iyengar Yoga, and mindfulness on mood, well-being, and salivary cortisol. *Evidence-Based Complementary and Alternative Medicine*, 2012, Article e234713. <https://doi.org/10.1155/2012/234713>
- Brähler, E., Mühlhan, H., Albani, C., & Schmidt, S. (2007). Teststatistische Prüfung und Normierung der deutschen Versionen des EUROHIS-QOL Lebensqualität-Index und des WHO-5 Wohlbefindens-Index. *Diagnostica*, 53(2), 83–96. <https://doi.org/10.1026/0012-1924.53.2.83>

- Brandmeyer, T., Delorme, A., & Wahbeh, H. (2019). The neuroscience of meditation: Classification, phenomenology, correlates, and mechanisms. In N. Srinivasan (Ed.), *Progress in brain research* (Vol. 244, pp. 1–29). Elsevier. <https://doi.org/10.1016/bs.pbr.2018.10.020>
- Breedvelt, J. J. F., Amanvermez, Y., Harrer, M., Karyotaki, E., Gilbody, S., Bockting, C. L. H., Cuijpers, P., & Ebert, D. D. (2019). The effects of meditation, yoga, and mindfulness on depression, anxiety, and stress in tertiary education students: A meta-analysis. *Frontiers in Psychiatry, 10*, Article 193. <https://doi.org/10.3389/fpsy.2019.00193>
- Bringmann, H. C., Bringmann, N., Jaitler, M., Brunnhuber, S., Michalsen, A., & Sedlmeier, P. (2021). Meditation Based Lifestyle Modification (MBLM) in outpatients with mild to moderate depression: A mixed-methods feasibility study. *Complementary Therapies in Medicine, 56*, Article 102598. <https://doi.org/10.1016/j.ctim.2020.102598>
- Bringmann, H. C., Bringmann, N., Jaitler, M., Brunnhuber, S., Michalsen, A., & Sedlmeier, P. (2020). Meditation-Based Lifestyle Modification: Development of an integrative mind-body program for mental health and human flourishing. *Complementary Medicine Research, 1–11*. <https://doi.org/10.1159/000512333>
- Brossart, D. F., Laird, V. C., & Armstrong, T. W. (2018). Interpreting Kendall's Tau and Tau-U for single-case experimental designs. *Cogent Psychology, 5*(1), Article 1518687. <https://doi.org/10.1080/23311908.2018.1518687>
- Brown, R. P., & Gerbarg, P. L. (2005). Sudarshan Kriya yogic breathing in the treatment of stress, anxiety, and depression: Part I—neurophysiologic model. *Journal of Alternative & Complementary Medicine, 11*(1), 189–201.
- Brunstein, J. C. (1993). Personal goals and subjective well-being: A longitudinal study. *Journal of Personality and Social Psychology, 65*(5), 1061–1070. <https://doi.org/10.1037/0022-3514.65.5.1061>
- Bryant, E. F. (2015). *The Yoga Sutras of Patañjali: A new edition, translation, and commentary*. Farrar, Straus and Giroux.
- Buddhaghosa, B. (2010). *The path of purification: Visuddhimagga*. Pariyatti.
- Burke, A. (2012). Comparing individual preferences for four meditation techniques: Zen, Vipassana (mindfulness), Qigong, and Mantra. *Explore: The Journal of Science and Healing, 8*(4), 237–242. <https://doi.org/10.1016/j.explore.2012.04.003>
- Büssing, A., Michalsen, A., Khalsa, S. B. S., Telles, S., & Sherman, K. J. (2012). Effects of yoga on mental and physical health: A short summary of reviews. *Evidence-Based Complementary and Alternative Medicine, 2012*, Article e165410. <https://doi.org/10.1155/2012/165410>
- Büssing, A., Ostermann, T., Lüdtke, R., & Michalsen, A. (2012). Effects of yoga interventions on pain and pain-associated disability: A meta-analysis. *The Journal of Pain, 13*(1), 1–9.
- Büssing, A., Ostermann, T., & Matthiessen, P. F. (2007). Distinct expressions of vital spirituality: The ASP questionnaire as an explorative research tool. *Journal of Religion and Health, 46*(2), 267–286. JSTOR.
- Buswell Jr., R. E., & Lopez Jr., D. S. (2014). *The Princeton Dictionary of Buddhism*. Princeton University Press.
- Cacioppo, J. T., Petty, R. E., & Kao, C. F. (1984). The efficient assessment of need for cognition. *Journal of Personality Assessment, 48*(3), 306–307. https://doi.org/10.1207/s15327752jpa4803_13

- Cakmak, Y. O., Ekinici, G., Heinecke, A., & Çavdar, S. (2017). A possible role of prolonged whirling episodes on structural plasticity of the cortical networks and altered vertigo perception: The cortex of sufi whirling dervishes. *Frontiers in Human Neuroscience, 11*, Article 3. <https://doi.org/10.3389/fnhum.2017.00003>
- Carmody, J., & Baer, R. A. (2008). Relationships between mindfulness practice and levels of mindfulness, medical and psychological symptoms and well-being in a mindfulness-based stress reduction program. *Journal of Behavioral Medicine, 31*(1), 23–33.
- Carmody, J., & Baer, R. A. (2009). How long does a mindfulness-based stress reduction program need to be? A review of class contact hours and effect sizes for psychological distress. *Journal of Clinical Psychology, 65*(6), 627–638. <https://doi.org/10.1002/jclp.20555>
- Cebolla, A., Campos, D., Galiana, L., Oliver, A., Tomás, J. M., Feliu-Soler, A., Soler, J., García-Campayo, J., Demarzo, M., & Baños, R. M. (2017). Exploring relations among mindfulness facets and various meditation practices: Do they work in different ways? *Consciousness and Cognition, 49*, 172–180. <https://doi.org/10.1016/j.concog.2017.01.012>
- Cebolla, A., Demarzo, M., Martins, P., Soler, J., & Garcia-Campayo, J. (2017). Unwanted effects: Is there a negative side of meditation? A multicentre survey. *PLoS ONE, 12*(9), Article e0183137. <https://doi.org/10.1371/journal.pone.0183137>
- Cebolla, A., Miragall, M., Palomo, P., Llorens, R., Soler, J., Demarzo, M., García-Campayo, J., & Baños, R. M. (2016). Embodiment and body awareness in meditators. *Mindfulness, 7*(6), 1297–1305. <https://doi.org/10.1007/s12671-016-0569-x>
- Chen, S., & Jordan, C. H. (2020). Incorporating ethics into brief mindfulness practice: Effects on well-being and prosocial behavior. *Mindfulness, 11*(1), 18–29. <https://doi.org/10.1007/s12671-018-0915-2>
- Chiesa, A., & Malinowski, P. (2011). Mindfulness-based approaches: Are they all the same? *Journal of Clinical Psychology, 67*(4), 404–424. <https://doi.org/10.1002/jclp.20776>
- Chimiklis, A. L., Dahl, V., Spears, A. P., Goss, K., Fogarty, K., & Chacko, A. (2018). Yoga, mindfulness, and meditation interventions for youth with ADHD: Systematic review and meta-analysis. *Journal of Child and Family Studies, 27*(10), 3155–3168. <https://doi.org/10.1007/s10826-018-1148-7>
- Chinmoy, S. (2013). *Meditation*. Golden Shore.
- Cillessen, L., Schellekens, M. P. J., Ven, M. O. M. V. de, Donders, A. R. T., Compen, F. R., Bisseling, E. M., Lee, M. L. V. der, & Speckens, A. E. M. (2018). Consolidation and prediction of long-term treatment effect of group and online mindfulness-based cognitive therapy for distressed cancer patients. *Acta Oncologica, 57*(10), 1293–1302. <https://doi.org/10.1080/0284186X.2018.1479071>
- Clark, A. (1999). An embodied cognitive science? *Trends in Cognitive Sciences, 3*(9), 345–351.
- Clarke, T. C., Black, L. I., Stussman, B. J., Barnes, P. M., & Nahin, R. L. (2015). Trends in the use of complementary health approaches among adults: United States, 2002–2012. *National Health Statistics Reports, 79*, 1–16.
- Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of Health and Social Behavior, 24*(4), 385–396. <https://doi.org/10.2307/2136404>

- Cohen, S., & Williamson, G. M. (1988). Perceived stress in a probability sample of the United States. In S. Spacapan & S. Oskamp (Eds.), *The social psychology of health: Claremont Symposium on Applied Social Psychology* (pp. 31–67). Sage.
- Colgan, D. D., Christopher, M., Michael, P., & Wahbeh, H. (2016). The body scan and mindful breathing among veterans with PTSD: Type of intervention moderates the relationship between changes in mindfulness and post-treatment depression. *Mindfulness*, *7*(2), 372–383. <https://doi.org/10.1007/s12671-015-0453-0>
- Colzato, L. S., Szapora, A., & Hommel, B. (2012). Meditate to create: The impact of focused-attention and open-monitoring training on convergent and divergent thinking. *Frontiers in Psychology*, *3*, Article 116. <https://doi.org/10.3389/fpsyg.2012.00116>
- Conrad, A., Müller, A., Doberenz, S., Kim, S., Meuret, A. E., Wollburg, E., & Roth, W. T. (2007). Psychophysiological effects of breathing instructions for stress management. *Applied Psychophysiology and Biofeedback*, *32*(2), 89–98.
- Craig, A. D. (2003). Interoception: The sense of the physiological condition of the body. *Current Opinion in Neurobiology*, *13*(4), 500–505. [https://doi.org/10.1016/S0959-4388\(03\)00090-4](https://doi.org/10.1016/S0959-4388(03)00090-4)
- Cramer, H., Haller, H., Klose, P., Ward, L., Chung, V. C., & Lauche, R. (2019). The risks and benefits of yoga for patients with chronic obstructive pulmonary disease: A systematic review and meta-analysis. *Clinical Rehabilitation*, *33*(12), 1847–1862. <https://doi.org/10.1177/0269215519860551>
- Cramer, H., Haller, H., Lauche, R., Steckhan, N., Michalsen, A., & Dobos, G. (2014). A systematic review and meta-analysis of yoga for hypertension. *American Journal of Hypertension*, *27*(9), 1146–1151. <https://doi.org/10.1093/ajh/hpu078>
- Cramer, H., Klose, P., Brinkhaus, B., Michalsen, A., & Dobos, G. (2017). Effects of yoga on chronic neck pain: A systematic review and meta-analysis. *Clinical Rehabilitation*, *31*(11), 1457–1465. <https://doi.org/10.1177/0269215517698735>
- Cramer, H., Lauche, R., & Dobos, G. (2014). Characteristics of randomized controlled trials of yoga: A bibliometric analysis. *BMC Complementary and Alternative Medicine*, *14*(1), Article 328. <https://doi.org/10.1186/1472-6882-14-328>
- Cramer, H., Lauche, R., Langhorst, J., & Dobos, G. (2013). Yoga for depression: A systematic review and meta-analysis. *Depression and Anxiety*, *30*(11), 1068–1083.
- Cramer, H., Lauche, R., Langhorst, J., & Dobos, G. (2016). Is one yoga style better than another? A systematic review of associations of yoga style and conclusions in randomized yoga trials. *Complementary Therapies in Medicine*, *25*, 178–187. <https://doi.org/10.1016/j.ctim.2016.02.015>
- Cramer, H., Posadzki, P., Dobos, G., & Langhorst, J. (2014). Yoga for asthma: A systematic review and meta-analysis. *Annals of Allergy, Asthma & Immunology*, *112*(6), 503–510.e5. <https://doi.org/10.1016/j.anai.2014.03.014>
- Dahl, C. J., Lutz, A., & Davidson, R. J. (2015). Reconstructing and deconstructing the self: Cognitive mechanisms in meditation practice. *Trends in Cognitive Sciences*, *19*(9), 515–523. <https://doi.org/10.1016/j.tics.2015.07.001>
- Damasio, A. R. (2006). *Descartes' error: Emotion, reason, and the human brain*. Random House.
- Dambrun, M., Berniard, A., Didelot, T., Chaulet, M., Droit-Volet, S., Corman, M., Juneau, C., & Martinon, L. M. (2019). Unified consciousness and the effect of body scan meditation on

- happiness: Alteration of inner-body experience and feeling of harmony as central processes. *Mindfulness*, *10*(8), 1530–1544. <https://doi.org/10.1007/s12671-019-01104-y>
- Davidson, R. J., & Dahl, C. J. (2018). Outstanding challenges in scientific research on mindfulness and meditation. *Perspectives on Psychological Science*, *13*(1), 62–65.
- Davidson, R. J., & Kaszniak, A. W. (2015). Conceptual and methodological issues in research on mindfulness and meditation. *The American Psychologist*, *70*(7), 581–592. <https://doi.org/10.1037/a0039512>
- de Manincor, M., Bensoussan, A., Smith, C., Fahey, P., & Bouchier, S. (2015). Establishing key components of yoga interventions for reducing depression and anxiety, and improving well-being: A Delphi method study. *BMC Complementary and Alternative Medicine*, *15*(1), Article 85. <https://doi.org/10.1186/s12906-015-0614-7>
- de Vries, A., & Ripley, B. D. (2020). *ggdendro: Create dendrograms and tree diagrams using “ggplot2”* (R package version 0.1.22) [Computer software]. <https://CRAN.R-project.org/package=ggdendro>
- Deci, E. L., & Ryan, R. M. (1985). The general causality orientations scale: Self-determination in personality. *Journal of Research in Personality*, *19*(2), 109–134.
- Dedrick, R. F., Ferron, J. M., Hess, M. R., Hogarty, K. Y., Kromrey, J. D., Lang, T. R., Niles, J. D., & Lee, R. S. (2009). Multilevel modeling: A review of methodological issues and applications. *Review of Educational Research*, *79*(1), 69–102.
- Deshmukh, V. D. (2006). Neuroscience of meditation. *The Scientific World Journal*, *6*, 2239–2253. <https://doi.org/10.1100/tsw.2006.353>
- Devananda, S. V. (1999). *Meditation and mantras*. Motilal Banarsidass.
- Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The Satisfaction with Life Scale. *Journal of Personality Assessment*, *49*(1), 71–75.
- Ding, X., Tang, Y.-Y., Deng, Y., Tang, R., & Posner, M. I. (2015). Mood and personality predict improvement in creativity due to meditation training. *Learning and Individual Differences*, *37*, 217–221.
- Doll, A., Hölzel, B. K., Mulej Bratec, S., Boucard, C. C., Xie, X., Wohlschläger, A. M., & Sorg, C. (2016). Mindful attention to breath regulates emotions via increased amygdala–prefrontal cortex connectivity. *NeuroImage*, *134*, 305–313. <https://doi.org/10.1016/j.neuroimage.2016.03.041>
- Dorjee, D. (2016). Defining contemplative science: The metacognitive self-regulatory capacity of the mind, context of meditation practice and modes of existential awareness. *Frontiers in Psychology*, *7*, Article 1788. <https://doi.org/10.3389/fpsyg.2016.01788>
- Dunne, J. D. (2018, August). *Track “Transdisciplinary Contemplative Research.”* European Summer Research Institute of Mind & Life Europe, Fraueninsel, Chiemsee.
- Eardley, S., Bishop, F. L., Prescott, P., Cardini, F., Brinkhaus, B., Santos-Rey, K., Vas, J., von Ammon, K., Hegyi, G., Dragan, S., Uehleke, B., Fønnebo, V., & Lewith, G. (2012). A systematic literature review of complementary and alternative medicine prevalence in EU. *Complementary Medicine Research*, *19*(2), 18–28. <https://doi.org/10.1159/000342708>
- Eberth, J., & Sedlmeier, P. (2012). The effects of mindfulness meditation: A meta-analysis. *Mindfulness*, *3*(3), 174–189. <https://doi.org/10.1007/s12671-012-0101-x>

- Elwy, A. R., Groessl, E. J., Eisen, S. V., Riley, K. E., Maiya, M., Lee, J. P., Sarkin, A., & Park, C. L. (2014). A systematic scoping review of yoga intervention components and study quality. *American Journal of Preventive Medicine, 47*(2), 220–232.
- Ewais, T., Begun, J., Kenny, M., Rickett, K., Hay, K., Ajilchi, B., & Kisely, S. (2019). A systematic review and meta-analysis of mindfulness based interventions and yoga in inflammatory bowel disease. *Journal of Psychosomatic Research, 116*, 44–53.
- Fan, J., McCandliss, B. D., Sommer, T., Raz, A., & Posner, M. I. (2002). Testing the efficiency and independence of attentional networks. *Journal of Cognitive Neuroscience, 14*(3), 340–347.
- Farb, N., Daubenmier, J., Price, C. J., Gard, T., Kerr, C., Dunn, B. D., Klein, A. C., Paulus, M. P., & Mehling, W. E. (2015). Interoception, contemplative practice, and health. *Frontiers in Psychology, 6*, Article 763. <https://doi.org/10.3389/fpsyg.2015.00763>
- Feldman, G., Greeson, J., & Senville, J. (2010). Differential effects of mindful breathing, progressive muscle relaxation, and loving kindness meditation on decentering and negative reactions to repetitive thoughts. *Behaviour Research and Therapy, 48*(10), 1002–1011. <https://doi.org/10.1016/j.brat.2010.06.006>
- Feuerstein, G. (2006). Yogic meditation. In J. Shear (Ed.), *The experience of meditation: Experts introduce the major systems*. Paragon House.
- Feuerstein, G. (2012). *The yoga tradition: Its history, literature, philosophy and practice*. SCB Distributors.
- Fischer, D., Messner, M., & Pollatos, O. (2017). Improvement of interoceptive processes after an 8-week body scan intervention. *Frontiers in Human Neuroscience, 11*, Article 452. <https://doi.org/10.3389/fnhum.2017.00452>
- Fox, K. C. R., Dixon, M. L., Nijeboer, S., Girn, M., Floman, J. L., Lifshitz, M., Ellamil, M., Sedlmeier, P., & Christoff, K. (2016). Functional neuroanatomy of meditation: A review and meta-analysis of 78 functional neuroimaging investigations. *Neuroscience & Biobehavioral Reviews, 65*, 208–228. <https://doi.org/10.1016/j.neubiorev.2016.03.021>
- Fox, K. C. R., Nijeboer, S., Dixon, M. L., Floman, J. L., Ellamil, M., Rumak, S. P., Sedlmeier, P., & Christoff, K. (2014). Is meditation associated with altered brain structure? A systematic review and meta-analysis of morphometric neuroimaging in meditation practitioners. *Neuroscience & Biobehavioral Reviews, 43*, 48–73. <https://doi.org/10.1016/j.neubiorev.2014.03.016>
- Franquesa, A., Cebolla, A., García-Campayo, J., Demarzo, M., Elices, M., Pascual, J. C., & Soler, J. (2017). Meditation practice is associated with a values-oriented life: The mediating role of decentering and mindfulness. *Mindfulness, 8*(5), 1259–1268. <https://doi.org/10.1007/s12671-017-0702-5>
- Fredrickson, B. L., Boulton, A. J., Firestone, A. M., Van Cappellen, P., Algoe, S. B., Brantley, M. M., Kim, S. L., Brantley, J., & Salzberg, S. (2017). Positive emotion correlates of meditation practice: A comparison of mindfulness meditation and loving-kindness meditation. *Mindfulness, 8*(6), 1623–1633. <https://doi.org/10.1007/s12671-017-0735-9>
- Fresco, D. M., Moore, M. T., van Dulmen, M. H., Segal, Z. V., Ma, S. H., Teasdale, J. D., & Williams, J. M. G. (2007). Initial psychometric properties of the Experiences Questionnaire: Validation of a self-report measure of decentering. *Behavior Therapy, 38*, 234–246.

- Gallegos, A. M., Hoerger, M., Talbot, N. L., Krasner, M. S., Knight, J. M., Moynihan, J. A., & Duberstein, P. R. (2013). Toward identifying the effects of the specific components of Mindfulness-Based Stress Reduction on biologic and emotional outcomes among older adults. *Journal of Alternative and Complementary Medicine*, *19*(10), 787–792. <https://doi.org/10.1089/acm.2012.0028>
- Gard, T., Brach, N., Hölzel, B. K., Noggle, J. J., Conboy, L. A., & Lazar, S. W. (2012). Effects of a yoga-based intervention for young adults on quality of life and perceived stress: The potential mediating roles of mindfulness and self-compassion. *The Journal of Positive Psychology*, *7*(3), 165–175.
- Gard, T., Noggle, J. J., Park, C. L., Vago, D. R., & Wilson, A. (2014). Potential self-regulatory mechanisms of yoga for psychological health. *Frontiers in Human Neuroscience*, *8*, Article 770. <https://doi.org/10.3389/fnhum.2014.00770>
- Gibson, J. (2019). Mindfulness, interoception, and the body: A contemporary perspective. *Frontiers in Psychology*, *10*, Article 2012. <https://doi.org/10.3389/fpsyg.2019.02012>
- Gong, H., Ni, C., Shen, X., Wu, T., & Jiang, C. (2015). Yoga for prenatal depression: A systematic review and meta-analysis. *BMC Psychiatry*, *15*(1), Article 14. <https://doi.org/10.1186/s12888-015-0393-1>
- Gordon, W. V., Shonin, E., & Griffiths, M. D. (2015). Towards a second generation of mindfulness-based interventions. *Australian & New Zealand Journal of Psychiatry*, *49*(7), 591–592. <https://doi.org/10.1177/0004867415577437>
- Gorvine, M. M., Zaller, N. D., Hudson, H. K., Demers, D., & Kennedy, L. A. (2019). A naturalistic study of yoga, meditation, self-perceived stress, self-compassion, and mindfulness in college students. *Health Psychology and Behavioral Medicine*, *7*(1), 385–395. <https://doi.org/10.1080/21642850.2019.1688154>
- Gothe, N. P., & McAuley, E. (2015). Yoga and cognition: A meta-analysis of chronic and acute effects. *Psychosomatic Medicine*, *77*(7), 784–797.
- Goyal, M., Singh, S., Sibinga, E. M., Gould, N. F., Rowland-Seymour, A., Sharma, R., Berger, Z., Sleicher, D., Maron, D. D., & Shihab, H. M. (2014). Meditation programs for psychological stress and well-being: A systematic review and meta-analysis. *JAMA Internal Medicine*, *174*(3), 357–368. <https://doi.org/10.1001/jamainternmed.2013.13018>
- Grabovac, A. D., Lau, M. A., & Willett, B. R. (2011). Mechanisms of mindfulness: A Buddhist psychological model. *Mindfulness*, *2*(3), 154–166.
- Granath, J., Ingvarsson, S., von Thiele, U., & Lundberg, U. (2006). Stress management: A randomized study of cognitive behavioural therapy and yoga. *Cognitive Behaviour Therapy*, *35*(1), 3–10.
- Gratz, K. L., & Roemer, L. (2003). Multidimensional assessment of emotion regulation and dysregulation: Development, factor structure, and initial validation of the Difficulties in Emotion Regulation Scale. *Journal of Psychopathology and Behavioral Assessment*, *26*(1), 41–54.
- Greif, S., & Berg, C. (2011). *Result-oriented self-reflection: Report on the construct validation of theory-based scales*. University of Osnabrück. <http://www.home.uniosnabrueck.de/sgreif/english/downloads.html>
- Grossenbacher, P. G., & Quaglia, J. T. (2017). Contemplative cognition: A more integrative framework for advancing mindfulness and meditation research. *Mindfulness*, *8*(6), 1580–1593.

- Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research*, *57*(1), 35–43. [https://doi.org/10.1016/S0022-3999\(03\)00573-7](https://doi.org/10.1016/S0022-3999(03)00573-7)
- Gul, L., & Jahangir, S. F. (2019). The effectiveness of mindfulness-based stress reduction programme (MBSRP) and sufi meditation (SM) in the treatment of neurotic anxiety among females. *FWU Journal of Social Sciences*, *13*(1), 120–130.
- Hagins, M., States, R., Selfe, T., & Innes, K. (2013). Effectiveness of yoga for hypertension: Systematic review and meta-analysis. *Evidence-Based Complementary and Alternative Medicine*, *2013*, Article e649836. <https://doi.org/10.1155/2013/649836>
- Harada Roshi, S. (2006). Zazen meditation in Japanese Rinzai Zen. In J. Shear (Ed.), *The experience of meditation: Experts introduce the major systems*. Paragon House.
- Harne, B. P., Tahseen, A. A., Hiwale, A. S., & Dhekekar, R. S. (2019). Survey on Om meditation: Its effects on the human body and Om meditation as a tool for stress management. *Psychological Thought*, *12*(1), 1–11. <https://doi.org/10.5964/psyct.v12i1.275>
- Hartfiel, N., Havenhand, J., Khalsa, S. B., Clarke, G., & Krayner, A. (2011). The effectiveness of yoga for the improvement of well-being and resilience to stress in the workplace. *Scandinavian Journal of Work, Environment, and Health*, *37*(1), 70–76. <https://doi.org/10.5271/sjweh.2916>
- Harvey, P. (2012). *An introduction to Buddhism: Teachings, history and practices*. Cambridge University Press.
- Hayes, S. C., Follette, V. M., & Linehan, M. (Eds.). (2004). *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition*. Guilford Press.
- Hendriks, T., de Jong, J., & Cramer, H. (2017). The effects of yoga on positive mental health among healthy adults: A systematic review and meta-analysis. *The Journal of Alternative and Complementary Medicine*, *23*(7), 505–517.
- Hofmann, S. G., Andreoli, G., Carpenter, J. K., & Curtiss, J. (2016). Effect of Hatha yoga on anxiety: A meta-analysis. *Journal of Evidence-Based Medicine*, *9*(3), 116–124. <https://doi.org/10.1111/jebm.12204>
- Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science*, *6*(6), 537–559. <https://doi.org/10.1177/1745691611419671>
- Hölzel, B. K., & Ott, U. (2006). Relationships between meditation depth, absorption, meditation practice, and mindfulness: A latent variable approach. *Journal of Transpersonal Psychology*, *38*(2), 179–199.
- Hox, J. J. (2010). *Multilevel analysis: Techniques and applications* (2nd ed.). Routledge.
- Huijbers, M. J., Crane, R. S., Kuyken, W., Heijke, L., van den Hout, I., Donders, A. R. T., & Speckens, A. E. M. (2017). Teacher competence in Mindfulness-Based Cognitive Therapy for depression and its relation to treatment outcome. *Mindfulness*, *8*(4), 960–972. <https://doi.org/10.1007/s12671-016-0672-z>
- Hunt, M., Al-Braiki, F., Dailey, S., Russell, R., & Simon, K. (2018). Mindfulness training, yoga, or both? Dismantling the active components of a Mindfulness-Based Stress Reduction intervention. *Mindfulness*, *9*(2), 512–520. <https://doi.org/10.1007/s12671-017-0793-z>

- Isbel, B., & Summers, M. J. (2017). Distinguishing the cognitive processes of mindfulness: Developing a standardised mindfulness technique for use in longitudinal randomised control trials. *Consciousness and Cognition*, *52*, 75–92. <https://doi.org/10.1016/j.concog.2017.04.019>
- Iyengar, B. K. S. (2009). *Light on yoga: Yoga Dipika*. Harper Collins.
- Jaseja, H. (2009). Definition of meditation: Seeking a consensus. *Medical Hypotheses*, *72*(4), 483. <https://doi.org/10.1016/j.mehy.2008.11.015>
- Jones, R. N., Rosenberg, A. L., Morris, J. N., Allaire, J. C., McCoy, K. J., Marsiske, M., Kleinman, K. P., Rebok, G. W., & Malloy, P. F. (2005). A growth curve model of learning acquisition among cognitively normal older adults. *Experimental Aging Research*, *31*(3), 291–312.
- Josipovic, Z. (2010). Duality and nonduality in meditation research. *Consciousness and Cognition*, *19*(4), 1119–1121. <https://doi.org/10.1016/j.concog.2010.03.016>
- Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry*, *4*(1), 33–47.
- Kabat-Zinn, J. (2013). *Full catastrophe living: How to cope with stress, pain and illness using mindfulness meditation* (Rev. ed.). Piatkus.
- Kassambara, A. (2020). *ggpubr: “ggplot2” based publication ready plots* (R package version 0.4.0) [Computer software]. <https://CRAN.R-project.org/package=ggpubr>
- Kaufman, L., & Rousseeuw, P. J. (2009). *Finding groups in data: An introduction to cluster analysis*. John Wiley & Sons.
- Kerr, C. E., Sacchet, M. D., Lazar, S. W., Moore, C. I., & Jones, S. R. (2013). Mindfulness starts with the body: Somatosensory attention and top-down modulation of cortical alpha rhythms in mindfulness meditation. *Frontiers in Human Neuroscience*, *7*, Article 12. <https://doi.org/10.3389/fnhum.2013.00012>
- Khoury, B., Knäuper, B., Pagnini, F., Trent, N., Chiesa, A., & Carrière, K. (2017). Embodied mindfulness. *Mindfulness*, *8*(5), 1160–1171.
- Kinser, P. A., & Robins, J. L. (2013). Control group design: Enhancing rigor in research of mind-body therapies for depression. *Evidence-Based Complementary and Alternative Medicine*, *2013*, Article e140467. <https://doi.org/10.1155/2013/140467>
- Kishida, M., Mama, S. K., Larkey, L. K., & Elavsky, S. (2018). “Yoga resets my inner peace barometer”: A qualitative study illuminating the pathways of how yoga impacts one’s relationship to oneself and to others. *Complementary Therapies in Medicine*, *40*, 215–221. <https://doi.org/10.1016/j.ctim.2017.10.002>
- Kishida, M., Molenaar, P. C. M., & Elavsky, S. (2019). The impact of trait mindfulness on relational outcomes in novice yoga practitioners participating in an academic yoga course. *Journal of American College Health*, *67*(3), 250–262. <https://doi.org/10.1080/07448481.2018.1469505>
- Kjaer, T. W., Bertelsen, C., Piccini, P., Brooks, D., Alving, J., & Lou, H. C. (2002). Increased dopamine tone during meditation-induced change of consciousness. *Cognitive Brain Research*, *13*(2), 255–259. [https://doi.org/10.1016/S0926-6410\(01\)00106-9](https://doi.org/10.1016/S0926-6410(01)00106-9)
- Klatte, R., Pabst, S., Beelmann, A., & Rosendahl, J. (2016). The efficacy of body-oriented yoga in mental disorders: A systematic review and meta-analysis. *Deutsches Aerzteblatt International*, *113*, 195–202. <https://doi.org/10.3238/arztebl.2016.0195>

- Kocovski, N. L., Segal, Z. V., & Battista, S. R. (2009). Mindfulness and psychopathology: Problem formulation. In F. Didonna (Ed.), *Clinical Handbook of Mindfulness* (pp. 85–98). Springer. https://doi.org/10.1007/978-0-387-09593-6_6
- Kok, B. E., & Singer, T. (2017). Phenomenological fingerprints of four meditations: Differential state changes in affect, mind-wandering, meta-cognition, and interoception before and after daily practice across 9 months of training. *Mindfulness*, *8*(1), 218–231. <https://doi.org/10.1007/s12671-016-0594-9>
- Kornfield, J. (2009). *The wise heart: A guide to the universal teachings of Buddhist psychology*. Bantam.
- Krick, A., & Felfe, J. (2020). Who benefits from mindfulness? The moderating role of personality and social norms for the effectiveness on psychological and physiological outcomes among police officers. *Journal of Occupational Health Psychology*, *25*(2), 99–112. <https://doi.org/10.1037/ocp0000159>
- Kropp, A., & Sedlmeier, P. (2019). What makes mindfulness-based interventions effective? An examination of common components. *Mindfulness*, *10*(10), 2060–2072. <https://doi.org/10.1007/s12671-019-01167-x>
- Kumar, V., Jagannathan, A., Philip, M., Thulasi, A., Angadi, P., & Raghuram, N. (2016). Role of yoga for patients with type II diabetes mellitus: A systematic review and meta-analysis. *Complementary Therapies in Medicine*, *25*, 104–112. <https://doi.org/10.1016/j.ctim.2016.02.001>
- Labate, B. C., & Cavnar, C. (2014). *Ayahuasca Shamanism in the Amazon and beyond*. Oxford University Press.
- Laux, L., Glanzmann, P., Schaffner, P., & Spielberger, C. D. (1981). *Das State-Trait-Angstinventar*. Hogrefe.
- Lee, T. M., Leung, M.-K., Hou, W.-K., Tang, J. C., Yin, J., So, K.-F., Lee, C.-F., & Chan, C. C. (2012). Distinct neural activity associated with focused-attention meditation and loving-kindness meditation. *PLoS One*, *7*(8), Article e40054.
- Lehrer, P. M., Woolfolk, R. L., & Sime, W. E. (2007). *Principles and practice of stress management* (3rd ed.). Guilford Press.
- Leiner, D. J. (2019). *SoSci Survey* (Version 3.1.06) [Computer software]. <https://www.socisurvey.de>
- Liang, S.-Y., & Wu, W.-C. (2006). Taoist Qigong. In J. Shear (Ed.), *The experience of meditation: Experts introduce the major systems*. Paragon House.
- Lifshitz, M., van Elk, M., & Luhrmann, T. M. (2019). Absorption and spiritual experience: A review of evidence and potential mechanisms. *Consciousness and Cognition*, *73*, Article 102760. <https://doi.org/10.1016/j.concog.2019.05.008>
- Lindahl, J. R., Fisher, N. E., Cooper, D. J., Rosen, R. K., & Britton, W. B. (2017). The varieties of contemplative experience: A mixed-methods study of meditation-related challenges in Western Buddhists. *PLoS ONE*, *12*(5), Article e0176239.
- Lindsay, E. K., Chin, B., Greco, C. M., Young, S., Brown, K. W., Wright, A. G. C., Smyth, J. M., Burkett, D., & Creswell, J. D. (2018). How mindfulness training promotes positive emotions: Dismantling acceptance skills training in two randomized controlled trials. *Journal of Personality and Social Psychology*, *115*(6), 944–973. <https://doi.org/10.1037/pspa0000134>

- Lippelt, D. P., Hommel, B., & Colzato, L. S. (2014). Focused attention, open monitoring and loving kindness meditation: Effects on attention, conflict monitoring, and creativity: A review. *Frontiers in Psychology, 5*, Article 1083. <https://doi.org/10.3389/fpsyg.2014.01083>
- Lou, H. C., Kjaer, T. W., Friberg, L., Wildschiodtz, G., Holm, S., & Nowak, M. (1999). A 15O-H₂O PET study of meditation and the resting state of normal consciousness. *Human Brain Mapping, 7*(2), 98–105.
- Lumma, A.-L., Kok, B. E., & Singer, T. (2015). Is meditation always relaxing? Investigating heart rate, heart rate variability, experienced effort and likeability during training of three types of meditation. *International Journal of Psychophysiology, 97*(1), 38–45. <https://doi.org/10.1016/j.ijpsycho.2015.04.017>
- Lutz, A., Dunne, J. D., & Davidson, R. J. (2007). Meditation and the neuroscience of consciousness: An introduction. In P. D. Zelazo, M. Moscovitch, & E. Thompson (Eds.), *The Cambridge handbook of consciousness* (Vol. 19, pp. 499–555). Cambridge University Press.
- Lutz, A., Jha, A. P., Dunne, J. D., & Saron, C. D. (2015). Investigating the phenomenological matrix of mindfulness-related practices from a neurocognitive perspective. *American Psychologist, 70*(7), 632–658. <https://doi.org/10.1037/a0039585>
- Lutz, A., Slagter, H. A., Dunne, J. D., & Davidson, R. J. (2008). Attention regulation and monitoring in meditation. *Trends in Cognitive Sciences, 12*(4), 163–169. <https://doi.org/10.1016/j.tics.2008.01.005>
- Lymeus, F., Lindberg, P., & Hartig, T. (2019). A natural meditation setting improves compliance with mindfulness training. *Journal of Environmental Psychology, 64*, 98–106. <https://doi.org/10.1016/j.jenvp.2019.05.008>
- Lynch, J., Prihodova, L., Dunne, P. J., Carroll, Á., Walsh, C., McMahon, G., & White, B. (2018). Mantra meditation for mental health in the general population: A systematic review. *European Journal of Integrative Medicine, 23*, 101–108. <https://doi.org/10.1016/j.eujim.2018.09.010>
- Mahasi, S. (1970). *Practical Vipassana exercises*. Buddha Dharma Education Association. <http://www.buddhanet.net>
- Main, J. (2013). *Word into silence: A manual for christian meditation*. Canterbury Press.
- Manincor, M. de, Bensoussan, A., Smith, C. A., Barr, K., Schweickle, M., Donoghoe, L.-L., Bouchier, S., & Fahey, P. (2016). Individualized yoga for reducing depression and anxiety, and improving well-being: A randomized controlled trial. *Depression and Anxiety, 33*(9), 816–828. <https://doi.org/10.1002/da.22502>
- Manna, A., Raffone, A., Perrucci, M. G., Nardo, D., Ferretti, A., Tartaro, A., Londei, A., Del Gratta, C., Belardinelli, M. O., & Romani, G. L. (2010). Neural correlates of focused attention and cognitive monitoring in meditation. *Brain Research Bulletin, 82*(1–2), 46–56.
- Mantzios, M., & Giannou, K. (2014). Group vs. single mindfulness meditation: Exploring avoidance, impulsivity, and weight management in two separate mindfulness meditation settings. *Applied Psychology: Health and Well-Being, 6*(2), 173–191. <https://doi.org/10.1111/aphw.12023>
- Matsushita, T., & Oka, T. (2015). A large-scale survey of adverse events experienced in yoga classes. *BioPsychoSocial Medicine, 9*(1), Article 9. <https://doi.org/10.1186/s13030-015-0037-1>

- May, C. J., Weyker, J. R., Spengel, S. K., Finkler, L. J., & Hendrix, S. E. (2014). Tracking longitudinal changes in affect and mindfulness caused by concentration and loving-kindness meditation with hierarchical linear modeling. *Mindfulness*, *5*(3), 249–258. <https://doi.org/10.1007/s12671-012-0172-8>
- McCall, M. C. (2013). How might yoga work? An overview of potential underlying mechanisms. *Journal of Yoga & Physical Therapy*, *3*(1), Article 130. <https://doi.org/10.4172/2157-7595.1000130>
- McCrary, M. (2013). *Pick your yoga practice: Exploring and understanding different styles of yoga*. New World Library.
- Mehling, W. E., Price, C., Daubenmier, J. J., Acree, M., Bartmess, E., & Stewart, A. (2012). The Multidimensional Assessment of Interoceptive Awareness (MAIA). *PloS One*, *7*(11), Article e48230.
- Melville, G. W., Chang, D., Colagiuri, B., Marshall, P. W., & Cheema, B. S. (2012). Fifteen minutes of chair-based yoga postures or guided meditation performed in the office can elicit a relaxation response. *Evidence-Based Complementary and Alternative Medicine*, *2012*, Article e501986. <https://doi.org/10.1155/2012/501986>
- Michalak, J., Burg, J., & Heidenreich, T. (2012). Don't forget your body: Mindfulness, embodiment, and the treatment of depression. *Mindfulness*, *3*(3), 190–199. <https://doi.org/10.1007/s12671-012-0107-4>
- Miller, L. C., Murphy, R., & Buss, A. H. (1981). Consciousness of body: Private and public. *Journal of Personality and Social Psychology*, *41*(2), 397–406. <https://doi.org/10.1037/0022-3514.41.2.397>
- Millière, R., Carhart-Harris, R. L., Roseman, L., Trautwein, F.-M., & Berkovich-Ohana, A. (2018). Psychedelics, meditation, and self-consciousness. *Frontiers in Psychology*, *9*, Article 1475. <https://doi.org/10.3389/fpsyg.2018.01475>
- Monteiro, L. M., Musten, R. F., & Compson, J. (2015). Traditional and contemporary mindfulness: Finding the middle path in the tangle of concerns. *Mindfulness*, *6*(1), 1–13. <https://doi.org/10.1007/s12671-014-0301-7>
- Mrazek, M. D., Phillips, D. T., Franklin, M. S., Broadway, J. M., & Schooler, J. W. (2013). Young and restless: Validation of the Mind-Wandering Questionnaire (MWQ) reveals disruptive impact of mind-wandering for youth. *Frontiers in Psychology*, *4*, Article 560.
- Nakagawa, S., & Schielzeth, H. (2013). A general and simple method for obtaining R² from generalized linear mixed-effects models. *Methods in Ecology and Evolution*, *4*(2), 133–142. <https://doi.org/10.1111/j.2041-210x.2012.00261.x>
- Nandamalabhivamsa, A. (2013). *Samatha und Vipassana. Konzentrations- und Einsichtsmeditation* (A. Agganyani, Trans.). Centre for Buddhist Studies.
- Nash, J. D., & Newberg, A. (2013). Toward a unifying taxonomy and definition for meditation. *Frontiers in Psychology*, *4*, Article 806. <https://doi.org/10.3389/fpsyg.2013.00806>
- Neff, K. D. (2003). The development and validation of a scale to measure self-compassion. *Self and Identity*, *2*(3), 223–250.
- Orme-Johnson, D. W., & Barnes, V. A. (2013). Effects of the Transcendental Meditation technique on trait anxiety: A meta-analysis of randomized controlled trials. *The Journal of Alternative and Complementary Medicine*, *20*(5), 330–341. <https://doi.org/10.1089/acm.2013.0204>

- Osho, B. S. R. (1983). *The orange book: The meditation techniques of Bhagwan Shree Rajneesh* (2nd ed.). Rajneesh Foundation International.
- Ospina, M. B., Bond, K., Karkhaneh, M., Tjosvold, L., Vandermeer, B., Liang, Y., Bialy, L., Hooton, N., Buscemi, N., & Dryden, D. M. (2007). Meditation practices for health: State of the research. In *Evidence Report/Technology Assessment* (Vol. 155, pp. 1–263).
- Ott, U. (2010). *Meditation für Skeptiker: Ein Neurowissenschaftler erklärt den Weg zum Selbst*. O. W. Barth.
- Ott, U. (2013). *Yoga für Skeptiker: Ein Neurowissenschaftler erklärt die uralte Weisheitslehre*. O. W. Barth.
- Ott, U., & Epe, J. (2018). *Gesund durch Atmen: Ein Neurowissenschaftler erklärt die Heilkraft der bewussten Yoga-Atmung*. O. W. Barth.
- Pa Auk, S. (2003). *Knowing and seeing* (Revised Edition). Wave Publications.
- Park, C. L., Finkelstein-Fox, L., Sacco, S. J., Braun, T. D., & Lazar, S. (2020). How does yoga reduce stress? A clinical trial testing psychological mechanisms. *Stress and Health*, 1–11. <https://doi.org/10.1002/smi.2977>
- Park, C. L., Quinker, D., Dobos, G., & Cramer, H. (2019). Motivations for adopting and maintaining a yoga practice: A national cross-sectional survey. *The Journal of Alternative and Complementary Medicine*, 25(10), 1009–1014. <https://doi.org/10.1089/acm.2019.0232>
- Park, C. L., Riley, K. E., Bedesin, E., & Stewart, V. M. (2016). Why practice yoga? Practitioners' motivations for adopting and maintaining yoga practice. *Journal of Health Psychology*, 21(6), 887–896.
- Park, C. L., Riley, K. E., Braun, T. D., Jung, J. Y., Suh, H. G., Pescatello, L. S., & Antoni, M. H. (2017). Yoga and cognitive-behavioral interventions to reduce stress in incoming college students: A pilot study. *Journal of Applied Biobehavioral Research*, 22(4), Article e12068. <https://doi.org/10.1111/jabr.12068>
- Parker, R. I., Vannest, K. J., Davis, J. L., & Sauber, S. B. (2011). Combining nonoverlap and trend for single-case research: Tau-U. *Behavior Therapy*, 42(2), 284–299.
- Pascoe, M. C., Thompson, D. R., & Ski, C. F. (2017). Yoga, mindfulness-based stress reduction and stress-related physiological measures: A meta-analysis. *Psychoneuroendocrinology*, 86, 152–168.
- Peng, C.-K., Henry, I. C., Mietus, J. E., Hausdorff, J. M., Khalsa, G., Benson, H., & Goldberger, A. L. (2004). Heart rate dynamics during three forms of meditation. *International Journal of Cardiology*, 95(1), 19–27. <https://doi.org/10.1016/j.ijcard.2003.02.006>
- Pennington, B. (2006). Centering prayer. In J. Shear (Ed.), *The experience of meditation: Experts introduce the major systems*. Paragon House.
- Pilla, D., Qina'au, J., Patel, A., Meddaoui, B., Watson, N., Dugad, S., & Saskin, M. (2020). Toward a framework for reporting and differentiating key features of meditation- and mindfulness-based interventions. *Mindfulness*, 11, 2613–2628. <https://doi.org/10.1007/s12671-020-01475-7>
- Pinheiro, J., Bates, D., DebRoy, S., Sarkar, D., & R Core Team. (2020). *nlme: Linear and Nonlinear Mixed Effects Models* (R package version 3.1-144) [Computer software]. <https://CRAN.R-project.org/package=nlme>

- Pölönen, P., Lappi, O., & Tervaniemi, M. (2019). Effect of meditative movement on affect and flow in Qigong practitioners. *Frontiers in Psychology, 10*, Article 2375. <https://doi.org/10.3389/fpsyg.2019.02375>
- Powers, J. (2007). *Introduction to Tibetan Buddhism* (Rev. ed.). Snow Lion.
- Powers, M. B., de Kleine, R. A., & Smits, J. A. J. (2017). Core mechanisms of cognitive behavioral therapy for anxiety and depression: A review. *Psychiatric Clinics of North America, 40*(4), 611–623. <https://doi.org/10.1016/j.psc.2017.08.010>
- Przyrembel, M., & Singer, T. (2018). Experiencing meditation: Evidence for differential effects of three contemplative mental practices in micro-phenomenological interviews. *Consciousness and Cognition, 62*, 82–101.
- Purser, R. (2019). *McMindfulness: How mindfulness became the new capitalist spirituality*. Watkins Media Limited.
- Purser, R. E. (2015). Clearing the muddled path of traditional and contemporary mindfulness: A response to Monteiro, Musten, and Compson. *Mindfulness, 6*(1), 23–45. <https://doi.org/10.1007/s12671-014-0373-4>
- Puta, M., & Sedlmeier, P. (2014). The concept of tri-guna: A working model. In S. Schmidt & H. Walach (Eds.), *Meditation: Neuroscientific approaches and philosophical implications. Studies in Neuroscience, Consciousness and Spirituality* (Vol. 2, pp. 317–364). Springer.
- Quach, D., Mano, K. E. J., & Alexander, K. (2016). A randomized controlled trial examining the effect of mindfulness meditation on working memory capacity in adolescents. *Journal of Adolescent Health, 58*(5), 489–496. <https://doi.org/10.1016/j.jadohealth.2015.09.024>
- Quasten, L. C. (2019). *Die Untersuchung psychologischer Maße in der Meditationsforschung im Rahmen Experimenteller Einzelfallanalysen* [Unpublished Master's thesis].
- R Core Team. (2020). *R: A language and environment for statistical computing*. R Foundation for Statistical Computing. <https://www.R-project.org/>
- Raffone, A., & Srinivasan, N. (2017). Mindfulness and cognitive functions: Toward a unifying neurocognitive framework. *Mindfulness, 8*(1), 1–9. <https://doi.org/10.1007/s12671-016-0654-1>
- Raghuraj, P., Ramakrishnan, A. G., Nagendra, H. R., & Telles, S. (1998). Effect of two selected yogic breathing techniques on heart rate variability. *Indian Journal of Physiology and Pharmacology, 42*, 467–472.
- Rammstedt, B., & John, O. P. (2007). Measuring personality in one minute or less: A 10-item short version of the Big Five Inventory in English and German. *Journal of Research in Personality, 41*(1), 203–212.
- Reddy, J. S. K., & Roy, S. (2019). Understanding meditation based on the subjective experience and traditional goal: Implications for current meditation research. *Frontiers in Psychology, 10*, Article 1827. <https://doi.org/10.3389/fpsyg.2019.01827>
- Riley, K. E., & Park, C. L. (2015). How does yoga reduce stress? A systematic review of mechanisms of change and guide to future inquiry. *Health Psychology Review, 9*(3), 379–396.
- Rinpoche Dagsay Tulku. (2002). *The practice of Tibetan Meditation: Exercises, visualizations, and mantras for health and well-being*. Inner Traditions/Bear & Co.

- Robertson, I. H., Manly, T., Andrade, J., Baddeley, B. T., & Yiend, J. (1997). Oops!': Performance correlates of everyday attentional failures in traumatic brain injured and normal subjects. *Neuropsychologia*, *35*(6), 747–758.
- Robinson, S. L., & Bennett, R. J. (1995). A typology of deviant workplace behaviors: A multidimensional scaling study. *Academy of Management Journal*, *38*(2), 555–572.
- Rohini, V., Pandey, R. S., Janakiramaiah, N., Gangadhar, B. N., & Vedamurthachar, A. (2000). A comparative study of full and partial Sudarshan Kriya Yoga (SKY) in major depressive disorder. *NIMHANS Journal*, *18*(1–2), 53–57.
- Rose, S., Zell, E., & Strickhouser, J. E. (2020). The effect of meditation on health: A metasynthesis of randomized controlled trials. *Mindfulness*, *11*(2), 507–516. <https://doi.org/10.1007/s12671-019-01277-6>
- Ross, A., & Thomas, S. (2010). The health benefits of yoga and exercise: A review of comparison studies. *Journal of Alternative and Complementary Medicine*, *16*(1), 3–12. <https://doi.org/10.1089/acm.2009.0044>
- Ruijgrok-Lupton, P. E., Crane, R. S., & Dorjee, D. (2018). Impact of mindfulness-based teacher training on MBSR participant well-being outcomes and course satisfaction. *Mindfulness*, *9*(1), 117–128. <https://doi.org/10.1007/s12671-017-0750-x>
- Russell, J. A., Weiss, A., & Mendelsohn, G. A. (1989). Affect grid: A single-item scale of pleasure and arousal. *Journal of Personality and Social Psychology*, *57*(3), 493–502.
- Saradananda, S. (2011). *The essential guide to chakras: Discover the healing power of chakras for mind, body, and spirit*. Watkins.
- Sarkar, D. (2008). *lattice: Multivariate data visualization with R*. Springer. <http://lmdvr.r-forge.r-project.org>
- Sauer-Zavala, S. E., Walsh, E. C., Eisenlohr-Moul, T. A., & Lykins, E. L. B. (2013). Comparing mindfulness-based intervention strategies: Differential effects of sitting meditation, body scan, and mindful yoga. *Mindfulness*, *4*(4), 383–388. <https://doi.org/10.1007/s12671-012-0139-9>
- Schimmel, A. (1992). *Mystische Dimension des Islam. Die Geschichte des Sufismus*. Insel Verlag.
- Schmalzl, L., Powers, C., & Henje Blom, E. (2015). Neurophysiological and neurocognitive mechanisms underlying the effects of yoga-based practices: Towards a comprehensive theoretical framework. *Frontiers in Human Neuroscience*, *9*, Article 235. <https://doi.org/10.3389/fnhum.2015.00235>
- Schmidt, S. (2014). Opening up meditation for science: The development of a meditation classification system. In S. Schmidt & H. Walach (Eds.), *Meditation: Neuroscientific approaches and philosophical implications. Studies in Neuroscience, Consciousness and Spirituality* (Vol. 1–2, pp. 137–152). Springer.
- Schwartz, J. M., & Clark, B. (2006). Theravada Buddhist meditation. In J. Shear (Ed.), *The experience of meditation: Experts introduce the major systems*. Paragon House.
- Sedlmeier, P. (2016). *Die Kraft der Meditation: Was die Wissenschaft darüber weiß*. Rowohlt Polaris.
- Sedlmeier, P., Eberth, J., & Puta, M. (2016). Meditation: Future theory and research. In M. A. West (Ed.), *The psychology of meditation: Research and practice* (pp. 285–310). Oxford University Press.

- Sedlmeier, P., Eberth, J., Schwarz, M., Zimmermann, D., Haarig, F., Jaeger, S., & Kunze, S. (2012). The psychological effects of meditation: A meta-analysis. *Psychological Bulletin*, *138*(6), 1139–1171. <https://doi.org/10.1037/a0028168>
- Sedlmeier, P., Lofse, C., & Quasten, L. C. (2018). Psychological effects of meditation for healthy practitioners: An update. *Mindfulness*, *9*(2), 371–387. <https://doi.org/10.1007/s12671-017-0780-4>
- Sedlmeier, P., & Srinivas, K. (2016). How do theories of cognition and consciousness in ancient indian thought systems relate to current western theorizing and research? *Frontiers in Psychology*, *7*, Article 343. <https://doi.org/10.3389/fpsyg.2016.00343>
- Sedlmeier, P., & Srinivas, K. (2019). Psychological theories of meditation based on early Buddhism and Samkhya/Yoga. In M. Farias, D. Brazier, & M. Lalljee (Eds.), *The Oxford handbook of meditation*. Oxford University Press.
- Sedlmeier, P., & Theumer, J. (2020). Why do people begin to meditate and why do they continue? *Mindfulness*, *11*(6), 1527–1545. <https://doi.org/10.1007/s12671-020-01367-w>
- Seligman, M. E. P. (2004). *Authentic happiness: Using the new positive psychology to realize your potential for lasting fulfillment*. Simon and Schuster.
- Sengupta, P. (2012). Health impacts of yoga and pranayama: A state-of-the-art review. *International Journal of Preventive Medicine*, *3*(7), 444–458.
- Shankarapillai, R., Nair, M. A., & George, R. (2012). The effect of yoga in stress reduction for dental students performing their first periodontal surgery: A randomized controlled study. *International Journal of Yoga*, *5*(1), 48–51. <https://doi.org/10.4103/0973-6131.91714>
- Shannahoff-Khalsa, D. S. (2004). An introduction to Kundalini Yoga meditation techniques that are specific for the treatment of psychiatric disorders. *The Journal of Alternative & Complementary Medicine*, *10*(1), 91–101. <https://doi.org/10.1089/107555304322849011>
- Shannahoff-Khalsa, D. S., Fernandes, R. Y., Pereira, C. A. de B., March, J. S., Leckman, J. F., Golshan, S., Vieira, M. S. R., Polanczyk, G. V., Miguel, E. C., & Shavitt, R. G. (2019). Kundalini Yoga meditation versus the Relaxation Response meditation for treating adults with obsessive-compulsive disorder: A randomized clinical trial. *Frontiers in Psychiatry*, *10*, Article 793. <https://doi.org/10.3389/fpsyg.2019.00793>
- Shannahoff-Khalsa, D. S., Ray, L. E., Levine, S., Gallen, C. C., Schwartz, B. J., & Sidorowich, J. J. (1999). Randomized controlled trial of yogic meditation techniques for patients with obsessive-compulsive disorder. *CNS Spectrums*, *4*(12), 34–47.
- Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology*, *62*(3), 373–386.
- Shear, J. (Ed.). (2006). *The experience of meditation: Experts introduce the major systems*. Paragon House.
- Sherman, K. J. (2012). Guidelines for developing yoga interventions for randomized trials. *Evidence-Based Complementary and Alternative Medicine*, *2012*, Article e143271. <https://doi.org/10.1155/2012/143271>
- Shields, S. A., Mallory, M. E., & Simon, A. (1989). The Body Awareness Questionnaire: Reliability and validity. *Journal of Personality Assessment*, *53*(4), 802–815. https://doi.org/10.1207/s15327752jpa5304_16

- Shiffman, S., Stone, A. A., & Hufford, M. R. (2008). Ecological momentary assessment. *Annual Review of Clinical Psychology*, *4*(1), 1–32. <https://doi.org/10.1146/annurev.clinpsy.3.022806.091415>
- Shoham, A., Goldstein, P., Oren, R., Spivak, D., & Bernstein, A. (2017). Decentering in the process of cultivating mindfulness: An experience-sampling study in time and context. *Journal of Consulting and Clinical Psychology*, *85*(2), 123–134. <https://doi.org/10.1037/ccp0000154>
- Simons, J. S., & Gaher, R. M. (2005). The Distress Tolerance Scale: Development and validation of a self-report measure. *Motivation and Emotion*, *29*(2), 83–102. <https://doi.org/10.1007/s11031-005-7955-3>
- Singer, T., Kok, B. E., Bornemann, B., Zurborg, S., Bolz, M., & Bochow, C. (2016). *The ReSource Project: Background, design, samples, and measurements*. (2nd ed.). Max Planck Institute for Human Cognitive and Brain Sciences.
- Sivananda, S. (1975). *Concentration and meditation*. Divine Life Society Shivanandanagar.
- Slagter, H. A., Davidson, R. J., & Lutz, A. (2011). Mental training as a tool in the neuroscientific study of brain and cognitive plasticity. *Frontiers in Human Neuroscience*, *5*, Article 17. <https://doi.org/10.3389/fnhum.2011.00017>
- Smith, C., Hancock, H., Blake-Mortimer, J., & Eckert, K. (2007). A randomised comparative trial of yoga and relaxation to reduce stress and anxiety. *Complementary Therapies in Medicine*, *15*(2), 77–83. <https://doi.org/10.1016/j.ctim.2006.05.001>
- Smith, J. A., Greer, T., Sheets, T., & Watson, S. (2011). Is there more to yoga than exercise? *Alternative Therapies in Health & Medicine*, *17*(3), 22–29.
- Stein, E., & Witkiewitz, K. (2020). Dismantling mindfulness-based programs: A systematic review to identify active components of treatment. *Mindfulness*, *11*, 2470–2485. <https://doi.org/10.1007/s12671-020-01444-0>
- Stephens, M. (2011). *Teaching yoga: Essential foundations and techniques*. North Atlantic Books.
- Sullivan, M. B., Moonaz, S., Weber, K., Taylor, J. N., & Schmalzl, L. (2017). Toward an explanatory framework for yoga therapy informed by philosophical and ethical perspectives. *Alternative Therapies in Health and Medicine*, *23*(7), 38–47.
- Tang, R., & Braver, T. S. (2020). Predicting individual preferences in mindfulness techniques using personality traits. *Frontiers in Psychology*, *11*, Article 1163. <https://doi.org/10.3389/fpsyg.2020.01163>
- Tang, Y.-Y., Hölzel, B. K., & Posner, M. I. (2015). The neuroscience of mindfulness meditation. *Nature Reviews Neuroscience*, *16*(4), 213–225. <https://doi.org/10.3389/10.1038/nrn3916>
- Tellegen, A., & Atkinson, G. (1974). Openness to absorbing and self-altering experiences (“absorption”), a trait related to hypnotic susceptibility. *Journal of Abnormal Psychology*, *83*(3), 268–277.
- Telles, S., & Singh, N. (2013). Science of the mind: Ancient yoga texts and modern studies. *Psychiatric Clinics*, *36*(1), 93–108. <https://doi.org/10.1016/j.psc.2013.01.010>
- Thind, H., Lantini, R., Balletto, B. L., Donahue, M. L., Salmoirago-Blotcher, E., Bock, B. C., & Scott-Sheldon, L. A. J. (2017). The effects of yoga among adults with type 2 diabetes: A systematic review and meta-analysis. *Preventive Medicine*, *105*, 116–126. <https://doi.org/10.1016/j.ypmed.2017.08.017>

- Thompson, E., & Varela, F. J. (2001). Radical embodiment: Neural dynamics and consciousness. *Trends in Cognitive Sciences*, *5*(10), 418–425.
- Titz, J. (2020). mimosa: A modern graphical user interface for 2-level mixed models. *Journal of Open Source Software*, *5*(49), Article 2116. <https://doi.org/10.21105/joss.02116>
- Tomasino, B., Chiesa, A., & Fabbro, F. (2014). Disentangling the neural mechanisms involved in Hinduism- and Buddhism-related meditations. *Brain and Cognition*, *90*, 32–40. <https://doi.org/10.1016/j.bandc.2014.03.013>
- Trautwein, F.-M., Kanske, P., Böckler, A., & Singer, T. (2020). Differential benefits of mental training types for attention, compassion, and theory of mind. *Cognition*, *194*, 104039. <https://doi.org/10.1016/j.cognition.2019.104039>
- Travis, F., & Shear, J. (2010). Focused attention, open monitoring and automatic self-transcending: Categories to organize meditations from Vedic, Buddhist and Chinese traditions. *Consciousness and Cognition*, *19*(4), 1110–1118. <https://doi.org/10.1016/j.concog.2010.01.007>
- Trivedi, G. Y., Patel, V., Shah, M. H., Dhok, M. J., & Bhojania, K. (2020). Comparative study of the impact of active meditation protocol and silence meditation on heart rate variability and mood in women. *International Journal of Yoga*, *13*(3), 255–260. https://doi.org/10.4103/ijoy.IJOY_18_20
- Trives, E. (2018, August). *The role of intention in a breath focused attention practice. An experimental design* [Poster session]. European Summer Research Institute of Mind & Life Europe, Fraueninsel, Chiemsee.
- Vago, D. R., & Silbersweig, D. (2012). Self-awareness, self-regulation, and self-transcendence (S-ART): A framework for understanding the neurobiological mechanisms of mindfulness. *Frontiers in Human Neuroscience*, *6*, 296. <https://doi.org/10.3389/fnhum.2012.00296>
- Valentine, E. R., & Sweet, P. L. (1999). Meditation and attention: A comparison of the effects of concentrative and mindfulness meditation on sustained attention. *Mental Health, Religion & Culture*, *2*(1), 59–70.
- Van Dam, N. T., van Vugt, M. K., Vago, D. R., Schmalzl, L., Saron, C. D., Olendzki, A., Meissner, T., Lazar, S. W., Kerr, C. E., & Gorchov, J. (2018). Mind the hype: A critical evaluation and prescriptive agenda for research on mindfulness and meditation. *Perspectives on Psychological Science*, *13*(1), 36–61.
- van Vugt, M. K., Pollock, J., Johnson, B., Gyatso, K., Norbu, N., Lodroe, T., Gyaltzen, T., Phuntsok, L., Thakchoe, J., Khechok, J., Lobsang, J., Tenzin, L., Gyaltzen, J., Moye, A., & Fresco, D. M. (2020). Inter-brain synchronization in the practice of Tibetan monastic debate. *Mindfulness*, *11*(5), 1105–1119. <https://doi.org/10.1007/s12671-020-01338-1>
- Vannest, K. J., & Ninci, J. (2015). Evaluating intervention effects in single-case research designs. *Journal of Counseling & Development*, *93*(4), 403–411. <https://doi.org/10.1002/jcad.12038>
- Varambally, S., & Gangadhar, B. N. (2016). Current status of yoga in mental health services. *International Review of Psychiatry*, *28*(3), 233–235. <https://doi.org/10.3109/09540261.2016.1159950>
- Varela, F. J., Thompson, E., & Rosch, E. (2016). *The embodied mind: Cognitive science and human experience*. MIT Press.
- Vaughn-Lee, L. (2006). The Sufi meditation of the heart. In J. Shear (Ed.), *The experience of meditation: Experts introduce the major systems*. Paragon House.

- Venkatesh, S., Raju, T. R., Shivani, Y., Tompkins, G., & Meti, B. L. (1997). A study of structure of phenomenology of consciousness in meditative and non-meditative states. *Indian Journal of Physiology and Pharmacology*, *41*, 149–153.
- Vieten, C., Wahbeh, H., Cahn, B. R., MacLean, K., Estrada, M., Mills, P., Murphy, M., Shapiro, S., Radin, D., Josipovic, Z., Presti, D. E., Sapiro, M., Chazen Bays, J., Russell, P., Vago, D., Travis, F., Walsh, R., & Delorme, A. (2018). Future directions in meditation research: Recommendations for expanding the field of contemplative science. *PLoS One*, *13*(11), Article e0205740. <https://doi.org/10.1371/journal.pone.0205740>
- Wachholtz, A. B., Malone, C. D., & Pargament, K. I. (2017). Effect of different meditation types on migraine headache medication use. *Behavioral Medicine*, *43*(1), 1–8. <https://doi.org/10.1080/08964289.2015.1024601>
- Wachholtz, A. B., & Pargament, K. I. (2005). Is spirituality a critical ingredient of meditation? Comparing the effects of spiritual meditation, secular meditation, and relaxation on spiritual, psychological, cardiac, and pain outcomes. *Journal of Behavioral Medicine*, *28*(4), 369–384. <https://doi.org/10.1007/s10865-005-9008-5>
- Walsh, R., & Shapiro, S. L. (2006). The meeting of meditative disciplines and Western psychology: A mutually enriching dialogue. *American Psychologist*, *61*(3), 227–239. <https://doi.org/10.1037/0003-066X.61.3.227>
- West, M. A. (2016). The practice of meditation. In M. A. West (Ed.), *The psychology of meditation: Research and practice*. Oxford University Press.
- Wickham, H. (2016). *ggplot2: Elegant graphics for data analysis*. Springer. <https://ggplot2.tidyverse.org>
- Wilbert, J., & Lueke, T. (2019). *scan: Single-case data analyses for single and multiple baseline designs* (R package version 0.40) [Computer software]. <https://CRAN.R-project.org/package=scan>
- Wilson, M. (2002). Six views of embodied cognition. *Psychonomic Bulletin & Review*, *9*(4), 625–636.
- Winkielman, P., Niedenthal, P., Wielgosz, J., Eelen, J., & Kavanagh, L. C. (2015). Embodiment of cognition and emotion. *APA Handbook of Personality and Social Psychology*, *1*, 151–175.
- Wolever, R. Q., Bobinet, K. J., McCabe, K., Mackenzie, E. R., Fekete, E., Kusnick, C. A., & Baime, M. (2012). Effective and viable mind-body stress reduction in the workplace: A randomized controlled trial. *Journal of Occupational Health Psychology*, *17*(2), 246–258. <https://doi.org/10.1037/a0027278>
- Wolf, D. B., & Abell, N. (2003). Examining the effects of meditation techniques on psychosocial functioning. *Research on Social Work Practice*, *13*(1), 27–42. <https://doi.org/10.1177/104973102237471>
- World Health Organization. (1998). Info package: Mastering depression in primary care, version 2.2. *WHO, Regional Office for Europe*.
- Wu, Y., Johnson, B. T., Acabchuk, R. L., Chen, S., Lewis, H. K., Livingston, J., Park, C. L., & Pescatello, L. S. (2019). Yoga as antihypertensive lifestyle therapy: A systematic review and meta-analysis. *Mayo Clinic Proceedings*, *94*(3), 432–446. <https://doi.org/10.1016/j.mayocp.2018.09.023>

Appendix

APPENDIX A – LIST OF 309 MEDITATION TECHNIQUES

PRIMARY TECHNIQUE	SECONDARY TECHNIQUE
Concentrate on the respiratory flow in the entire body	Combined with a simple mantra (Om, Soham) or a simple word for inhalation and exhalation Combined with a visualization that light enters the scalp during inhalation and spreads in the body during exhalation
Alternate nostril breathing	
Concentrate on the feeling at the tip of the nose while breathing	
Observe the breath and the sensations of the breath, particularly in the nose	Combined with a visualization that one inhales pure white light and exhales black smoke
Observe how thoughts arise in the mind	Combined with an associated visualization of clouds that dull the sky but pass by
Prayer - devotion and opening oneself up to blessings and inspiration	
Goal-oriented contemplation on given sentences, instructions or line of thoughts with the aim of gaining insights and transfer these insights into daily life	Letting the object of meditation grow in the mind
	Developing inner comprehension of the object of meditation
	Dwelling upon the object of meditation without losing it
	Developing good intentions
Conscious breathing with short intervals of holding the breath	Combined with mentally repeating the syllables Om on inhalation, Ah on holding, and Hum on exhalation
Concentrate on the formless flow of breathing at the tip of the nose	
Silently repeat the four central thoughts	
Seek refuge	
Visualize a light or energy form of a specific Buddha with his/her specific attributes	Taking in these positive attributes
Repeat mantra with prayer beads (Mala)	Finding one's own rhythm, reciting loudly whispering or silently
Creating a visual representation of a deity and then merging with this visualization, taking in his/her attributes	
Giving one's positive impressions as a gift	

Visualize a golden Buddha over one's head, allowing it to resolve into light and trickle into one's heart

Scan and feel the entire body, skipping no part and not giving more attention to any particular body part, all are equal, if there is a blind spot, briefly sense it

Beginning at the fontanel, then on the outside of the body, from top to bottom, in smaller or broader strips, then from the inside

Pass through and sense the chakras from bottom to top

Combined with a visualization of the colors and energy qualities associated with each chakra

Leave concentration on the chakra that is the most present, and expand from there

Opening up to the above and invite the cosmic energy to flow inside, while at the same time receiving earth energy from below and letting go of depleted energy, establishing a circular flow

Successively inhale into each chakra letting it glow, and expand it on the outbreath

Astral journey - go into a deep state of meditation to visit or travel to other places, out-of-body experiences

Making 108 prostrations

Chating the four sutras

Sitting straight, open, sense and make use of one's sound tube, ground oneself to be able to open up to the above

Sit straight letting the eyes open and not fixating anything, gaze at the wall or the floor

Combine with a mudra - rest left palm in right palm with thumbs slightly touching

Sit and gaze at the wall, observe oneself doing nothing

Inhale deeply into one's center, observe how the air expands and relaxes the abdomen

Let all thoughts sink downwards into the center (digest instead of pushing the away)

Contemplate on the question "Who am I? Who is observing? What is this I? Where do those thoughts come from?" and open up to any insight that might arise

Establish "dont-know mind" and get out of the "know-everything mind"

Observe and count the breath

Focus on one's center

Silently repeat a mantra as fast as possible

With or without Mala

Let everything go, just observe what is, no task, action, technique, or object, rest with the complete awareness with oneself

Listen to Koan and take it home as an impulse

Walking meditation - walk one after the other through the room, be in the present moment (movement of feet, legs, clothing, hair, perspective, contact to the floor)

Continue practice employed during sitting meditation

Soenyu - seven easy movements that are performed in synchrony with the breath

Combine with observing of the mind

Repeat mantra associated with a specific god or goddess using a Mala

Visualize specific god or goddess with all its attributes to then merge with this visualization (aim is a mystical state)

Pranayama - voluntary manipulation of the breath

Feeling the body, the floor, the breath, anything that is there, be open

Combine with visualization of thoughts passing by like clouds in the sky or waves in the ocean - observe and let go

Stare at a candle flame or picture without blinking, then close eyes and feel, possibly repeating the practice	
Repeat mantra	Synchronize it with the breath
	Focus on a point of concentration
	Visualize light, love etc.
Repeat mantra unconsciously in the back of one's mind without focusing on it, informally	
Concentrate on something contradictory (Mahavakyas) without thinking discursively about it, maybe an insight arises	Take it along as an idea and see what happens
	Let go and allow it to unfold an effect, develop an intuitive understanding (samyaama), advance into its essence
Perceiving, then releasing emotions and tensions while scanning the body	Letting the breath flow into tensions - inhale resolve, exhale flow off
	Let emotions speak a sentence, give them room to articulate themselves
Release the whole body, succumb	Combine with repetition of sentences like "I succumb myself", "Thy will be done not mine", "I am ready to die now", "Lead me from illusion to reality" and feel their effect
Produce simple sounds corresponding to specific centers of the body - A heart, U pelvis, M head, at last AUM jointly	Hands can be placed at corresponding regions of the body
	Can be practiced alone or in the group, sitting or standing
	Also possible with seven sounds corresponding to the seven chakras - ascending U-O-Ö-A-E-I-M
Listen to the sound of singing bowls that are hit successively, concentrate on the corresponding chakra, then go into silent meditation	Lying or sitting
	Supportively, affirmations, elements and characteristics of the chakras can be listened to
Select a small object that elicits joy for oneself (candle, flower, picture etc.) and look at it with half-open eyes and concentrate	
Try to feel one's heart beat	
1-4-2 Breathing: Inhale, hold breath and repeat a word that represents the divine or pure best for oneself (Om, Light, God, Tao), exhale	
Alternate nostril breathing	
Breath very calmly, after exhaling make a short pause without straining yourself	
Inhale positive attribute (love, peace, joy etc.), exhale its opposite (fear, restlessness, melancholia etc.)	
Visualize something calm and vast, e.g. calm surface of the water, deep ocean, sky, vastness at the top of a mountain	
Visualize a caterpillar of light above the head	

Visualize a flower in the heart and expand this visualization until you become the flower

Visualize the sky in front of yourself, then in your heart, in yourself, and expand on and on

Visualize a golden shield that repels all thoughts in front of one's forehead

Repeat words (love, peace) and feel again and again what arises in the heart

Repeat sentences: "I have no mind. I have only heart/soul. I am the heart/soul."

Repeat mantra - OM (O in the heart, U in the throat, M ind the forehead), or "Supreme" in the heart, or one's own spiritual name

Sing/Chant spiritual songs (Kirtan), preferably within a community - opens the heart

Read certain paragraphs in books or poems over and over again

Look at image of the master - first the whole image, then focus on the third eye or heart

Possible to "breathe" with the picture

Visualize that you receive the awareness of the creator and perceive him/her as creation

God as the beloved, seeker as the loving

Everything is meditation, everything that was created/Shakti, can become the energetic gateway for awareness/Shiva, e.g., intense sneezing

Focus the pause between inhalation and exhalation, carefully observing what happens

Stare at a candle flame, then close the eyes after a certain period or when you feel something, direct the view inwards, feel and observe what happens, repeat several times

Sound or hum, preferably in a completely silent space, after a certain time, when you feel something, go into silence, feel and listen to internal sounds

At the beginning, place hands over ears to intensify the internal sound

Experiment with frequencies, under- and overtones, pitch, exploit new rooms, let the voice flow and observe carefully what the voice does

Repeat mantra - arabic words (99 names of Allah, beginnings of Koran Suras, invocations of grace and mercy, personal mantra received from a teacher), aim is reaching a trance

Repeat silently or loudly (77x, 99x, 101x or more often)

Also employ prayer beads

Sometimes accompanied by music

Stronger effect in community (approx. once per week) - collective invocation of God to collectively fall into trance/meditative state

Spin around one's own axis with arms spread out - for hours, prior to this going into trance, commonly in community, as devotion with the aim of experiencing God

Perceive the floor beneath the feet, the body, the breath

Connect breathing to a word that is important to oneself (Jesus, Christ, own name, possible to combine it with an invocation or plea), repeat word in the rhythm of breathing

First repeat loudly, then silently, then in the rhythm of breathing or the heartbeat until it is completely internalized (unconscious steady repetition)

For support, employ rosary or string of knots

Read or listen to a biblic text, then allow it to take effect in the silence, devote oneself to the text

Become empty, let thoughts and expectations come to rest, aim is experiencing God (God talks in the silence)

1. Breathing chaotically through the nose - change rhythm as soon as the mind starts to interfere

2. Catharsis: Let go of all suppressed emotions, express them through sound and movement

3. Hoo-Phase: With arms raised high above your head, jump up and down, land on the flats of your feet and loudly shout the mantra "Hoo!"

4. Stop: Freeze and do not move anymore, in silence

5. Celebrate and dance as you wish

1. Shake and tremble letting go of all tensions, let it happen by itself

2. Free dancing

3. Sitting silent meditation, indifferently watch what happens internally and externally, be there

4. Lie flat on the back and become silent

1. Sit and hum with closed mouth letting the lips vibrate in a relaxed way, pitch and position of the body can be varied

2. Move palms as slowly as possible upward and away from the navel/Hara (giving), then move palms downward toward the navel (receiving), then sit in silence

Go through each chakra, three times from bottom to top, then three times from top to bottom, music and specific movement for each chakra

1. Inhale, hold breath as long as possible, exhale, hold breath as long as possible

2. Normal rhythm of breathing, stare at candle flame

3. Stand upright with the eyes closed, and allow the body to move smoothly without intervening

4. Lie silently on the back

1. Walk in place with eyes open, pull knees up, become faster, breath deeply

2. Sit with eyes closed and allow the body to circle around one's own axis

3. Lie on back with eyes open, let eyes circle in clockwise direction, become faster, relax the jaw

4. Close eyes and become silent

1. Spin around one's own axis with arms spread out and eyes open, become faster

2. Drop down to the floor, lie prone, feel how the body connects with the floor, close eyes and observe silently

1. Sit calmly and listen to music	
2. Make meaningless sounds/talk gibberish in a soft conversational tone	
3. Stand up and allow the body to move softly in harmony with these sounds	
4. Lie down and become silent	
Repeat and make yourself understand that "I am a living energy expressing itself through this body." "I become aware that I am a soul and I've taken this body to play my role." => first repeat, then analyse, observe yourself, ask "Who am I?" and wait for response	
Repeat "I focus on myself - the soul"	Focus attention on center of forehead (3rd eye)
Breath in and feel living energy/peace, breath out and vibrate peace/give it to the atmosphere	
Repeat "I am a pure and peaceful soul" and practice every moment with eyes open in whatever you're doing = meditation in action	
Speak out loud what you feel/ you want to feel, repeat quality in you again and again, circulate energy	
Look at a yantra of a chakra with open eyes and allow it to take effect on oneself	
Meditate on the qualities of a chakra	Hold the corresponding Mudra (hand posture) Silently repeat affirmation
Walking meditation - walk slowly and place full attention on the movement of the body	Combine it with breathing Visualize grounding oneself
Visualize the mind as a lake that has diamond at its bottom, focus on the diamond	Decelerate breathing
Remember situation that caused anger or irritation, relive it and develop mental image, then slowly alter this image, instead of picturing oneself having become angry, picture having stayed calm, mentally repeat this positive picture a few times	
Mentally repeat positive wishes - for oneself, someone close, someone in need, someone who hurt you	Visualize that the heart is a closed rose petal that slowly opens Notice and observe the warmth
Listen to the breath naturally saying So-Ham on each inbreath and outbreath	Being silent and open to the experience Identify with the true self, Soham means "I am That"
Remove glasses or contacts, place right hand in front of face, raise little finger and stare at the tip of the little finger (5 min) without blinking, there may be tears, then release hand but continue to stare at the same point	
Visualize how bright white light enters the crown chakra and flows down through the body, let the whole body become saturated and illuminated by this light, become one with the light	Fell as a channel

	Repeat affirmation
	Visualize a person and let her/him bath in light
	Say thank you
Repeat mantra and synchronize it with breathing	Focus on the point between brows or heart, let breath flow through this point of concentration
	Visualize light at the point of concentration
Let everything happen, let the mind become calm by itself	
Reduce breathing - inhale and exhale for 3-4 seconds with as little air as possible	
Feel into all parts of the body (bottom/floor contact, left and right side, back, front, top), breath into them and feel how they expand, expand in all directions	Repeat autosuggestion "I am one with the infinite"
Breath deeply into the abdomen, feel how the energy in the abdomen grows stronger, gather this energy and then channel it from the solar plexus to the base chakra during exhalation, and from there through the spine to the head during inhalation	Visualize sun in the abdomen
Inhale channel breath/energy downwards at the front of the body, exhale channel it upwards through the spine	
Repeat an affirmation, e.g., "I am calm", and develop the respective positive trait	Contemplate on this trait or think about a person who has this trait
	Feel the trait, merge with the feeling fo this trait
	Visualize oneself acting with this trait in different situations
Allow everything to be as it is, no direction, methods or goals	All objects are left to their natural functioning, no effort should be made to manipulate or surpress any object of awareness, gently relax into awareness, listening, attitude of open receptivity, free of any goal or anticipation
	Resting on primordial awareness/consciousness, in state of profound stillness and silence, as an eternal witness
Ask a spiritually powerful question to gain spiritual insight und break free of meditative states, a question that has energy for you - what is the most important thing for you in your deepest heart? - e.g. "Who or what am I?" "Who is aware?"	Feel it in your body, in all cells of your being
Undistracted focus of attention on one object, e.g. breath or colored disks	
Hold focus of attention to an internally generated image of Deity surrounded by its entourage	Colorful, three-dimensional image (body, ornaments, environment), body schema, feelings, emotions of Deity
	Temporally replace sense of self and internal perception of real world
Visualize dissolution of Deity and its entourage into emptiness	
Evenly distribute attention so it is not directed toward any object or experience	Let experiences subside without dwelling on them

	Achieve awareness devoid of conceptualization
Focus without effort on mantra (sat nam, whahe guru), breath goes naturally in and out	Focus at center of brow
Rapid breathing (140/min) through nose, equally in and out, powered from navel point and solarplexus	Focus at center of brow
Divide breath into eight equal steps on inhalation and eight equal steps on exhalation	May put a mantra on the steps (Sa Ta Na Ma)
Wish yourself benevolent feelings by repeating sentences, then extent beneficial wishes to familiy, friends, strangers, people you have difficulties with and finally all living beings	
Focus attention on coming and going of your own thoughts	Familiarize with dynamic nature of stream of thoughts
	Detach from thoughts and develop meta-awareness
Focus on chosen phrase: „God (or any term that describes center of spirituality) is peace/joy/good/love“ and refocus if you mentally drift away	
Focus on chosen phrase: „I am content/joyful/good/happy“ and refocus if you mentally drift away	
Count breaths	Inhale count one, exhale count two, repeat Count to ten and then start again from one
Breath regularly and naturally, relax mind and body, hold the mind where the breathing air touches	
Focus on object	Move from holding attention on the object to rejoicing in the object to being happy with the object
	Possible objects are the four elements (earth, water, fire, air), the concepts of color (dark blue, yellow, red, white), the object of space or the object of light
Mentally note (not label) all intuitive experiences of the present moment	Observe the object of mental states and notice/"note" its characteristics
Label all mental experiences with words that describe these experiences, e.g., "thought", "feeling", "memory" etc.	
Observe and recognize the universal characteristics of mental states (annica - impermanence, dukkha - suffering, anatta - lack of reality)	
Contemplate on the conditional emergence of experiences (cause & effect)	Notice breathing air and the place where it touches the body, if both meet, consciousness of the body arises
Informal Practice - Integration of mindfulness skills into everyday life	Notice one's body while walking, being aware of thoughts and feelings while washing the dishes, bringing attention to one's breath upon awakening
Mindful contemplation on the body and its internal and external activity	Breathing
	Posture

	Locomotion, eating, drinking..
	Skin and intestines
	Material elements
	Decay of the body
Mindful contemplation of feelings, mentally describing/taking notes on how you feel in the present moment, e.g., pleasant, painful etc.	
Mindful contemplation of consciousness and mentally describing/taking notes on the content that is prevalent in your consciousness at the present moment, e.g., lust, hate, ignorance etc.	
Mindful contemplation of mental objects and mentally describing/taking notes how they arise and subside from moment to moment	Sense-desire/anger/sloth and torpor/agitation and remorse/doubt
	Material form, feeling, perception, formations, consciousness
	Eye and visual forms, ear and sounds, the nose and smells, the tongue and flavors, the body and tactual objects
	Mental objects (energy, joy, tranquillity, concentration, equanimity)
	Repeat "This is suffering,", "This is the origin of suffering," "This is the cessation of suffering," "This is the road leading to the cessation of suffering,"
Sustained concentration on a single object such as the breath, or affective state such as compassion	
Sustained attention on the movements of breath while mentally counting inhalations and exhalations	
Direct attention toward specific areas of the body, such as the point beneath the navel, and sustaining awareness in that area for extended periods of time	
Scanning the body from top to bottom	
Walking, dividing the walking process into parts, and internally labeling each partial movement	
Resting attention on a specific aspect of experience	Sensory percept (e.g. visual object, physical sensation), thought (e.g. mentally repeated word or sound, mantra), emotion (e.g. compassion)
Repetition of a sacred word or phrase, through which the mind becomes increasingly still and subtle aspects of consciousness are accessed	
Releasing attentional focus on a specific object and maintaining awareness of whatever thoughts, feelings, or percepts arise as objects within the field of awareness	
Releasing the orientation of attention toward an object and instead sustaining awareness of the process of knowing itself	
Systematically cultivating and sustaining the active care and concern to alleviate the suffering (compassion) or nurture the	

happiness (loving-kindness) of the object of one's meditation, which may be oneself, another being, or all beings

Cultivating both the aspiration and active commitment to help all beings achieve complete freedom from suffering and dissatisfaction and to fully embody wisdom and compassion

Repeating a sacred word to connect to the presence of the divine, whenever you become aware of anything (thoughts, feelings, perceptions, images, associations, etc.), simply return to your sacred word, your anchor

Prayer that is centered entirely on the presence of God

Let that word be gently present as your symbol of your sincere intention to be in the Lord's presence and open to His divine action within you

Contemplating a series of topics, including recollections of the positive qualities of virtue and generosity, in order to calm and stabilize the mind and to induce a sense of joy and confidence (pasada) in the practice

Buddha, the Dhamma, the Sangha, virtue, generosity, and the Devas

Contemplating the preciousness of human life, death and impermanence

Contemplating on the principle of causality

Contemplating on the pervasive nature of suffering and dissatisfaction

Contemplates the fragility of life, the many circumstances that can bring an end to life, and other topics that aim to put the meditator in touch with his or her own mortality

Developmental stage- imagination and creative visualization of a god or goddess

One common technique is to imagine oneself as an enlightened being who fully embodies wisdom and compassion

Imagining the human body in various states of decay and mentally dissecting the body into its component parts to undermine lust and sensual desire

Contemplation in which one either experientially investigates and/or logically analyzes ontological beliefs and views, especially concerning the nature of the self

Listen to or read paradoxical stories and phrases to demonstrate the inadequacy of concepts and to elicit a direct experience of non-conceptual wisdom

Maraqaba- one's sense of individual identity dissolves and one merges with the divine. In practice, this form of meditation proceeds in stages that involve gaining access to increasingly subtle aspects of consciousness

Being guided to a direct experience of the non-dual essence of awareness, in which the sense of being a perceiver or agent that stands apart from the objects of consciousness is absent

Primary practice involves returning to this recognition over and over again until it stabilizes and can be integrated with various activities and psychological states

Effortlessly resting in the non-dual essence of awareness

Simple act of sitting, without effort or contrivance, expresses the awakened presence of mind, a non-conceptual experience in which the dualistic framework of consciousness falls away

Cultivating a sustained awareness of the sense of personal identity until it falls away altogether, leading to an experience of non-dual awareness

Fundamental attitude of continuous attention, which means constant tension and consciousness, as well as vigilance exercised at every moment, relinquishing his concern about the past and future, over which he has no control, and focusing his attention (prosochē) exclusively on the present

Memorization and assimilation of the fundamental dogmas and rules of life to have our preconceptions clear and ready at hand

Practice of personalizing the principles of Stoicism for one's own life and put them in writing, e.g., poems, koans, a few brief words, or a few paragraphs

With a specific intention (e.g., open one's heart, raise one's mood) select and repeat a mantra (in Gumukhi or English)

Sing/Chant loudly, whispering or silently

Combine with associated hand postures or arm movements

With Mala

For wealth - repeat Har in the center of the body

Arm movement: Place palms together alternatingly with pointer or little finger performing a circle

Healing Meditation - repeat Rama Dasa Sa Se So Hung

Open arms widely to the above

For the heart - repeat Guru Guru Wahe Guru

Fold hands in front of the heart

Kirtan Kriya - repeat Sa Ta Na Ma

Alternatingly pressing the tip of the thumbs against the tips of the other fingers corresponding with the parts of the mantra

5 min loudly, 5 min whisperingly, 10 min silently, 5 min whisperingly, 5 min loudly

Repeat Sat Nam

Locate and feel own pulse and repeat Sat Nam in the rhythm of the pulse

Singing together (1 h) as a powerful, heart-opening practice in the morning

Repeat Wa with focus on left eye, He focus on right eye, Guru focus on the tip of the nose

Lie down, relax and listen to the sound of a gong that is struck for 31 minutes

Deliberate detachment or blocking of sensory inputs, including pain, with the eventual goal of transcending any narrow sense of self or personal identity

Dissolve or attenuate the boundaries between subject and object

Deliberate dampening of sensory inputs to induce a „hypnagogic“ state and enhance one's capacity to carry out visualisations and relaxation practices

Enhancing meta-awareness during dreaming („lucid“ dreaming), and/or maintaining awareness during deep, dreamless sleep

Meditation in movement (Qigong) - when the movement sequence is automatized and internalized and breath flows naturally, one enters a calm and gentle meditative state

Place one hand on the abdomen and the other hand on the chest, feel the movement of the breath and try to direct the breath into the abdomen

Count how long the inbreaths and outbreaths are, slowly extending the breath cycle

Paradox breath - inhale and contract the abdomen, exhale and relax the abdomen

Chant sounds that correspond with the organs (lung-tsss, heart-ha, triple-heater-chi) to harmonize and connect the organs

Visualize corresponding colors

Standing pillar - Stand upright in an axis between earth and sky, effortless, release tensions, breath deeply into the abdomen, feeling of being supported and able to lean backwards using support bases, stop if restlessness arises

Open joints and connect different points of the body, first through the touch of the teacher, then internally, to enable the body to stand upright with ease

Successively focus on and observe energetically important points in the body (e.g., Dan Tien, pubis, tailbone, shoulder blades, crown, throat, heart, solar plexus)

Synchronize with the breath

APPENDIX B – ADDITIONAL TABLES FOR CHAPTER 2

Table B1

Number of Experience Meditators per Experience Rating Score for Each Basic Meditation Technique

Technique	1 = No ex- perience	2	3	4	5	6 = A lot of experience
Scan_Body	23	46	73	87	129	277
Abdomen_Breath	26	44	83	68	145	269
Observe_Thoughts	24	42	71	98	152	248
Resp_Flow	31	55	74	94	143	238
Release_Tensions	36	61	74	120	123	221
Singing_Sutras_Mantras	73	69	65	96	112	220
Lying_Relaxing	69	76	73	80	121	216
Compassion	35	60	88	119	135	198
Observe_Body	41	69	87	109	133	196
Recite_Mantra	152	83	60	68	83	189
Concentrate_Energy	66	71	78	103	135	182
Nose_Breath	62	74	84	94	140	181
Observe_Emotions	49	82	90	106	135	173
Manipulate_Breath	114	99	89	66	94	173
Singing_Together	111	82	83	94	95	170
Pause_Breath	59	74	83	116	137	166
Repeat_Words_Breath	137	83	69	88	98	160
Mantra_Mnemonic	178	93	63	62	80	159
Point_Breath	112	93	79	89	112	150
Channel_Energy	115	91	69	98	112	150
Count_Breath	88	94	102	84	119	148
Breath_Visualization	115	89	82	93	109	147
Opening_Up	117	101	76	93	117	131
Walking_Senses	69	81	108	137	111	129
Meditative_Movement	119	107	87	91	102	129

Mantra_Bodypoints	200	101	72	68	68	126
Visualize_Thoughts_Silence	156	90	75	105	89	120
Visualize_Expanding	137	86	85	102	106	119
Repeat_Affirmation	132	126	98	94	74	111
Listen_Sounds	116	124	110	104	82	99
Contemplate_Question	108	118	112	112	93	92
Intention_Mantra	196	120	82	75	72	90
Feel_Heartbeat	171	120	94	87	75	88
Visualize_Heart_Opening	174	105	89	105	74	88
Fixate_Object	133	123	113	100	86	80
Visualize_Light_Fire	219	94	76	81	85	80
Sitting_Do_Nothing	237	114	72	72	65	75
Contemplate_Death	199	117	90	83	73	73
Contemplate_Condition	210	122	79	89	65	70
Focus_Object	239	132	58	67	71	68
Move_Smoothly	227	113	77	84	67	67
Labeling	199	127	82	96	67	64
Deity_Merging	295	122	58	49	53	58
Walking_Labeling	194	156	83	77	67	58
Read_Text	206	139	95	81	58	56
Internal_Sounds	190	135	111	79	64	56
Humming	240	133	80	70	56	56
Contradiction	357	108	55	58	28	29
Spinning	385	118	60	34	22	16
Visualize_Decay	419	113	35	31	24	13

Table B2

Number and Percentage of Meditators Practicing in One or More Subgroups of Buddhist and Hindu Meditative Traditions

Tradition	Buddhist		Hindu		
	<i>n</i>	%	<i>n</i>	%	
Zen	117	42.2	0	0	
Theravada, Vipassana	89	32.1	0	0	
Tibetan Buddhism	71	25.6	0	0	
Sivananda Yoga	0	0	112	45.0	
Kundalini Yoga	0	0	28	11.2	
Yoga (other)	0	0	25	10.0	
Hindu (other)	0	0	68	27.3	
Osho	0	0	16	6.4	
Sum	277	100	249	100	526

Table B3

Mean Rating Scores and Standard Deviations of the 10 Most Popular Meditation Techniques Across Buddhist Meditators (n = 216)

Meditation technique	<i>M</i>	<i>SD</i>
Observing how thoughts arise in the mind without adhering to them	4.94	1.37
Being mindful of the rise and fall of the abdomen while breathing	4.39	1.56
Cultivating compassion, sympathetic joy, equanimity, loving kindness (for oneself, friends, neutral people, enemies, the whole world)	4.36	1.63
Observing emotions without adhering to them	4.35	1.58
Scanning the entire body	4.35	1.56
Observing how bodily sensations arise without adhering to them	4.32	1.64
Being mindful of the respiratory flow in the entire body	4.25	1.62
Walking and being mindful of sensory perceptions (movement of the feet, legs, clothing, air, hair etc.), coordinating it with the breath if necessary	4.14	1.63
Perceiving, then releasing emotions and tensions (e.g., with the help of the breath), while scanning the body	4.13	1.63
Being mindful of the sensations arising in the nose during inhalation and exhalation	4.10	1.73

Table B4

Mean Rating Scores and Standard Deviations of the 10 Most Popular Meditation Techniques Across Hindu Meditators (n = 204)

Meditation technique	M	SD
Singing sutras/mantras	5.08	1.29
Being mindful of the rise and fall of the abdomen while breathing	4.92	1.48
Scanning the entire body	4.91	1.38
Fostering and focusing on a spiritual connection created by singing together	4.78	1.43
Concentrating on a location in the body (e.g., abdomen or an "energy center" like chakra, Dan Tien) or on a series of locations in the body/ "energy centers"	4.72	1.46
Lying down and going into a state of deep relaxation while being fully conscious	4.61	1.64
Being mindful of the respiratory flow in the entire body	4.61	1.52
Voluntary manipulation of breath, e.g., reducing the strenght of breathing or "pranayama" with holding one's breath	4.59	1.62
Reciting a mantra loudly, in a whisper, and silently	4.55	1.78
Accumulating energy in specific centers (e.g., abdomen) and channeling it through certain pathways (e.g., spine)	4.54	1.62

Table B5

Tradition-Specific Meditation Techniques Not Ranked in the Top 10 by Any Other Tradition

Tradition	Meditation technique
Christian	Repeating an affirmation (e.g., "I am patient")
Hindu (other)	Looking at/focusing on a sacred object (image of the master, sacred geometric pattern, etc.)
Kundalini Yoga	With a specific intention (e.g., open one's heart, raise one's mood) selecting and repeating a mantra, combining it with associated hand postures or arm movements; Carrying out predetermined, meditation sequences of movements while allowing the breath to flow naturally; Repeating a mantra while focusing on corresponding points in the body
Qigong/Tai Chi	Combining inhalation and exhalation with visualization of energy, qualities, light, smoke etc.; Contemplating on a spiritually important question (e.g., "Who am I?"); Visualizing that thoughts are inherently restless, and focusing on the silence and the vastness that lies beyond them
Tibetan	Creating a visual representation of a deity and then merging with this visualization; Contemplating death and one's own mortality
Zen	Sitting and gazing at the wall, observing oneself doing nothing; Counting breaths

Table B6

Sample Size, Gender Ratio, Mean Age and Mean Meditation Experience in Subgroups of Meditators From 12 Major Meditative Traditions

Tradition				Meditation ex- perience		Age	
	<i>n</i>	%	% female	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Zen	123	19.4	39.9	17.4	11.3	54.4	11.5
Theravada, Vipassana	84	13.2	50.0	13.7	11.0	52.6	12.8
Tibetan	73	11.5	53.4	18.9	11.3	55.8	8.5
Sivananda Yoga	122	19.2	81.2	9.0	7.6	50.5	9.2
Kundalini Yoga	27	4.3	92.6	10.3	7.7	47.9	10.4
Yoga (other)	39	6.1	74.4	14.4	9.9	49.3	10.5
Hindu (other)	66	10.4	60.6	16.8	12.8	49.4	9.7
Osho	16	2.5	56.3	21.1	11.3	54.6	9.5
MBSR	9	1.4	77.8	11.7	6.9	51.6	13.7
Christian	12	1.9	50.0	22.7	12.5	52.2	7.3
Sufism	24	3.8	62.5	22.0	10.7	59.2	9.1
Qigong/Tai Chi	5	0.8	20.0	10.4	4.0	43.6	10.1
Total	635	100.0	59.9	15.7	9.8	51.8	10.2

APPENDIX C – FULL RANKING SEQUENCES OF PREFERRED MEDITATION TECHNIQUES IN 12 MAJOR 176

MEDITATIVE TRADITIONS

Part I

Zen, Theravada and Tibetan Buddhist Meditators

Zen	M	Theravada	M	Tibetan	M
Observe_Thoughts	4.86	Observe_Thoughts	4.98	Compassion	5.14
Abdomen_Breath	4.32	Scan_Body	4.89	Observe_Thoughts	4.97
Sitting_Do_Nothing	4.32	Observe_Body	4.82	Mantra_Mnemonic	4.85
Resp_Flow	4.25	Compassion	4.75	Deity_Merging	4.55
Walking_Senses	4.24	Abdomen_Breath	4.71	Observe_Emotions	4.52
Observe_Body	4.11	Release_Tensions	4.71	Abdomen_Breath	4.49
Scan_Body	4.09	Nose_Breath	4.69	Scan_Body	4.49
Observe_Emotions	4.08	Resp_Flow	4.68	Release_Tensions	4.37
Count_Breath	4.02	Observe_Emotions	4.52	Singing_Sutras_Mantras	4.36
Release_Tensions	3.85	Pause_Breath	4.34	Contemplate_Death	4.36
Compassion	3.63	Walking_Senses	4.30	Opening_Up	4.30
Nose_Breath	3.62	Lying_Relaxing	3.95	Observe_Body	4.26
Pause_Breath	3.54	Count_Breath	3.82	Nose_Breath	4.26
Lying_Relaxing	3.43	Walking_Labeling	3.75	Contemplate_Condition	4.25
Contemplate_Question	3.38	Concentrate_Energy	3.52	Recite_Mantra	4.19
Concentrate_Energy	3.27	Point_Breath	3.48	Resp_Flow	4.18
Singing_Sutras_Mantras	3.24	Labeling	3.44	Pause_Breath	4.04
Visualize_Thoughts_Silence	3.10	Singing_Sutras_Mantras	3.38	Lying_Relaxing	4.00
Point_Breath	3.01	Meditative_Movement	3.38	Breath_Visualization	3.85

Meditative_Movement	2.97	Contemplate_Condition	3.37	Walking_Senses	3.79
Listen_Sounds	2.89	Contemplate_Death	3.36	Contemplate_Question	3.71
Repeat_Words_Breath	2.79	Visualize_Thoughts_Silence	3.29	Count_Breath	3.64
Walking_Labeling	2.69	Breath_Visualization	3.20	Concentrate_Energy	3.59
Contemplate_Death	2.67	Contemplate_Question	3.14	Focus_Object	3.52
Channel_Energy	2.58	Visualize_Expanding	3.01	Visualize_Thoughts_Silence	3.49
Singing_Together	2.57	Repeat_Affirmation	3.01	Read_Text	3.45
Manipulate_Breath	2.53	Channel_Energy	2.96	Listen_Sounds	3.36
Opening_Up	2.44	Manipulate_Breath	2.95	Point_Breath	3.27
Breath_Visualization	2.43	Opening_Up	2.89	Meditative_Movement	3.26
Contradiction	2.42	Repeat_Words_Breath	2.82	Labeling	3.22
Labeling	2.42	Singing_Together	2.81	Singing_Together	3.21
Contemplate_Condition	2.37	Feel_Heartbeat	2.80	Intention_Mantra	3.14
Fixate_Object	2.34	Visualize_Heart_Opening	2.74	Fixate_Object	3.10
Read_Text	2.33	Listen_Sounds	2.67	Visualize_Expanding	3.08
Visualize_Expanding	2.29	Recite_Mantra	2.61	Mantra_Bodypoints	3.08
Internal_Sounds	2.29	Sitting_Do_Nothing	2.56	Visualize_Light_Fire	3.08
Mantra_Mnemonic	2.28	Read_Text	2.52	Repeat_Words_Breath	3.04
Recite_Mantra	2.25	Fixate_Object	2.49	Channel_Energy	3.00
Feel_Heartbeat	2.24	Mantra_Mnemonic	2.48	Manipulate_Breath	2.99
Repeat_Affirmation	2.17	Move_Smoothly	2.39	Visualize_Heart_Opening	2.90
Move_Smoothly	2.15	Internal_Sounds	2.30	Feel_Heartbeat	2.86
Intention_Mantra	1.93	Intention_Mantra	2.20	Walking_Labeling	2.66
Humming	1.87	Visualize_Light_Fire	2.10	Visualize_Decay	2.63
Visualize_Heart_Opening	1.86	Visualize_Decay	2.07	Sitting_Do_Nothing	2.59
Mantra_Bodypoints	1.82	Humming	2.06	Internal_Sounds	2.55
Visualize_Light_Fire	1.78	Mantra_Bodypoints	2.06	Move_Smoothly	2.44
Visualize_Decay	1.66	Deity_Merging	1.92	Repeat_Affirmation	2.42
Deity_Merging	1.56	Focus_Object	1.82	Contradiction	2.21
Focus_Object	1.56	Contradiction	1.62	Humming	2.12
Spinning	1.36	Spinning	1.56	Spinning	1.67

Part II

Sivananda, Kundalini and Other Yoga Meditators

Sivananda Yoga	M	Kundalini Yoga	M	Yoga (other)	M
Abdomen_Breath	5.26	Singing_Sutras_Mantras	5.89	Scan_Body	5.41
Scan_Body	5.23	Intention_Mantra	5.74	Abdomen_Breath	5.08
Singing_Sutras_Mantras	5.11	Meditative_Movement	5.56	Resp_Flow	4.97
Manipulate_Breath	4.91	Lying_Relaxing	5.52	Release_Tensions	4.97
Concentrate_Energy	4.90	Manipulate_Breath	5.52	Concentrate_Energy	4.95
Channel_Energy	4.88	Recite_Mantra	5.52	Observe_Thoughts	4.85
Lying_Relaxing	4.82	Mantra_Bodypoints	5.52	Lying_Relaxing	4.82
Resp_Flow	4.76	Abdomen_Breath	5.41	Channel_Energy	4.67
Repeat_Words_Breath	4.76	Singing_Together	5.37	Manipulate_Breath	4.67
Singing_Together	4.76	Concentrate_Energy	5.30	Observe_Body	4.64
Release_Tensions	4.75	Channel_Energy	5.18	Singing_Sutras_Mantras	4.64
Visualize_Expanding	4.66	Resp_Flow	5.04	Observe_Emotions	4.33
Breath_Visualization	4.57	Repeat_Words_Breath	5.00	Compassion	4.33
Recite_Mantra	4.56	Opening_Up	5.00	Pause_Breath	4.33
Nose_Breath	4.49	Scan_Body	4.93	Point_Breath	4.33
Pause_Breath	4.48	Observe_Thoughts	4.89	Nose_Breath	4.26
Repeat_Affirmation	4.44	Humming	4.74	Singing_Together	4.26
Point_Breath	4.42	Observe_Body	4.67	Visualize_Expanding	4.26
Observe_Thoughts	4.40	Count_Breath	4.67	Meditative_Movement	4.23
Compassion	4.38	Pause_Breath	4.67	Breath_Visualization	4.15
Observe_Body	4.34	Compassion	4.63	Visualize_Light_Fire	4.15
Mantra_Bodypoints	4.23	Release_Tensions	4.59	Repeat_Affirmation	4.13
Fixate_Object	4.08	Nose_Breath	4.59	Recite_Mantra	4.08
Opening_Up	4.07	Point_Breath	4.59	Count_Breath	3.97
Mantra_Mnemonic	3.98	Breath_Visualization	4.48	Intention_Mantra	3.92
Listen_Sounds	3.95	Listen_Sounds	4.44	Repeat_Words_Breath	3.87
Count_Breath	3.93	Visualize_Expanding	4.44	Walking_Senses	3.85

Visualize_Light_Fire	3.81	Internal_Sounds	4.44	Mantra_Bodypoints	3.82
Visualize_Heart_Opening	3.78	Walking_Senses	4.41	Fixate_Object	3.79
Meditative_Movement	3.75	Observe_Emotions	4.33	Listen_Sounds	3.64
Observe_Emotions	3.64	Feel_Heartbeat	4.11	Mantra_Mnemonic	3.59
Feel_Heartbeat	3.62	Visualize_Heart_Opening	3.96	Visualize_Heart_Opening	3.56
Intention_Mantra	3.47	Repeat_Affirmation	3.93	Visualize_Thoughts_Silence	3.49
Walking_Senses	3.40	Visualize_Light_Fire	3.74	Contemplate_Question	3.46
Internal_Sounds	3.38	Visualize_Thoughts_Silence	3.63	Opening_Up	3.44
Visualize_Thoughts_Silence	3.36	Mantra_Mnemonic	3.48	Feel_Heartbeat	3.21
Contemplate_Question	3.35	Move_Smoothly	3.41	Humming	3.13
Move_Smoothly	3.28	Fixate_Object	3.33	Focus_Object	3.08
Humming	3.16	Read_Text	3.30	Move_Smoothly	3.00
Focus_Object	3.16	Contemplate_Question	3.11	Labeling	2.85
Labeling	2.74	Focus_Object	2.89	Internal_Sounds	2.77
Walking_Labeling	2.66	Labeling	2.85	Walking_Labeling	2.72
Deity_Merging	2.56	Sitting_Do_Nothing	2.78	Contemplate_Death	2.38
Read_Text	2.50	Spinning	2.78	Contemplate_Condition	2.38
Contemplate_Condition	2.47	Walking_Labeling	2.74	Read_Text	2.38
Contemplate_Death	2.24	Contemplate_Condition	2.67	Deity_Merging	2.31
Sitting_Do_Nothing	2.21	Contemplate_Death	2.56	Sitting_Do_Nothing	2.21
Spinning	2.10	Contradiction	2.48	Spinning	2.00
Contradiction	1.91	Deity_Merging	2.11	Contradiction	1.95
Visualize_Decay	1.26	Visualize_Decay	1.70	Visualize_Decay	1.28

Part III

Hindu, Osho and MBSR Meditators

Hindu (other)	M	Osho	M	MBSR	M
Singing_Sutras_Mantras	4.86	Observe_Thoughts	4.88	Observe_Thoughts	5.33
Singing_Together	4.76	Resp_Flow	4.88	Scan_Body	5.33
Recite_Mantra	4.36	Abdomen_Breath	4.62	Abdomen_Breath	5.22
Concentrate_Energy	4.26	Observe_Body	4.62	Resp_Flow	5.22
Opening_Up	4.20	Release_Tensions	4.50	Release_Tensions	5.22
Abdomen_Breath	4.08	Observe_Emotions	4.44	Observe_Body	4.78
Focus_Object	4.08	Lying_Relaxing	4.38	Nose_Breath	4.78
Scan_Body	4.06	Singing_Sutras_Mantras	4.31	Walking_Senses	4.67
Compassion	4.06	Singing_Together	4.31	Compassion	4.67
Repeat_Words_Breath	4.03	Scan_Body	4.25	Lying_Relaxing	4.67
Mantra_Mnemonic	4.01	Move_Smoothly	4.25	Pause_Breath	4.44
Lying_Relaxing	3.86	Concentrate_Energy	4.19	Observe_Emotions	4.11
Mantra_Bodypoints	3.86	Visualize_Expanding	4.19	Channel_Energy	4.11
Resp_Flow	3.85	Meditative_Movement	4.12	Count_Breath	3.78
Release_Tensions	3.85	Compassion	4.06	Manipulate_Breath	3.78
Fixate_Object	3.85	Pause_Breath	4.06	Concentrate_Energy	3.67
Observe_Thoughts	3.83	Nose_Breath	3.94	Meditative_Movement	3.67
Manipulate_Breath	3.79	Walking_Senses	3.81	Walking_Labeling	3.67
Breath_Visualization	3.76	Channel_Energy	3.75	Point_Breath	3.56
Repeat_Affirmation	3.74	Humming	3.75	Listen_Sounds	3.22
Channel_Energy	3.68	Manipulate_Breath	3.69	Breath_Visualization	3.22
Point_Breath	3.59	Visualize_Heart_Opening	3.69	Labeling	3.11
Visualize_Heart_Opening	3.58	Visualize_Thoughts_Silence	3.62	Visualize_Thoughts_Silence	3.00
Visualize_Expanding	3.56	Contemplate_Question	3.56	Repeat_Words_Breath	3.00
Pause_Breath	3.52	Point_Breath	3.56	Singing_Together	3.00
Observe_Emotions	3.44	Recite_Mantra	3.56	Contemplate_Condition	3.00
Nose_Breath	3.39	Breath_Visualization	3.50	Repeat_Affirmation	3.00

Read_Text	3.30	Opening_Up	3.38	Move_Smoothly	3.00
Visualize_Thoughts_Silence	3.24	Feel_Heartbeat	3.31	Feel_Heartbeat	2.89
Contemplate_Question	3.17	Listen_Sounds	3.25	Visualize_Heart_Opening	2.89
Intention_Mantra	3.15	Contemplate_Death	3.25	Fixate_Object	2.67
Count_Breath	3.12	Fixate_Object	3.06	Visualize_Expanding	2.67
Observe_Body	3.09	Internal_Sounds	3.00	Contemplate_Question	2.56
Listen_Sounds	3.08	Repeat_Affirmation	3.00	Mantra_Bodypoints	2.56
Meditative_Movement	3.04	Visualize_Light_Fire	3.00	Singing_Sutras_Mantras	2.44
Feel_Heartbeat	2.92	Mantra_Mnemonic	2.94	Visualize_Light_Fire	2.44
Visualize_Light_Fire	2.88	Walking_Labeling	2.88	Contemplate_Death	2.33
Walking_Senses	2.68	Labeling	2.88	Opening_Up	2.33
Move_Smoothly	2.58	Contemplate_Condition	2.88	Mantra_Mnemonic	2.33
Labeling	2.48	Sitting_Do_Nothing	2.81	Recite_Mantra	2.33
Internal_Sounds	2.44	Count_Breath	2.81	Focus_Object	2.33
Deity_Merging	2.38	Repeat_Words_Breath	2.81	Sitting_Do_Nothing	2.22
Contemplate_Death	2.30	Intention_Mantra	2.50	Humming	2.11
Humming	2.23	Mantra_Bodypoints	2.50	Deity_Merging	2.00
Contemplate_Condition	2.14	Focus_Object	2.50	Internal_Sounds	1.89
Walking_Labeling	1.97	Spinning	2.50	Intention_Mantra	1.89
Sitting_Do_Nothing	1.70	Contradiction	2.25	Read_Text	1.67
Contradiction	1.68	Deity_Merging	2.25	Contradiction	1.56
Spinning	1.67	Read_Text	2.19	Spinning	1.56
Visualize_Decay	1.32	Visualize_Decay	1.94	Visualize_Decay	1.22

Part IV

Christian, Sufi and Qigong/ Tai Chi Meditators

Christian	M	Sufi	M	Qigong/ Tai Chi	M
Resp_Flow	5.08	Recite_Mantra	4.62	Walking_Senses	5.80
Scan_Body	5.08	Concentrate_Energy	4.58	Scan_Body	5.60
Walking_Senses	4.50	Manipulate_Breath	4.58	Abdomen_Breath	5.40
Repeat_Words_Breath	4.42	Singing_Together	4.50	Observe_Emotions	5.40
Abdomen_Breath	4.33	Resp_Flow	4.42	Observe_Thoughts	5.20
Release_Tensions	4.25	Scan_Body	4.42	Observe_Body	5.20
Opening_Up	4.25	Compassion	4.42	Concentrate_Energy	5.20
Pause_Breath	4.17	Repeat_Words_Breath	4.42	Visualize_Thoughts_Silence	5.20
Nose_Breath	4.00	Observe_Emotions	4.38	Breath_Visualization	5.00
Repeat_Affirmation	4.00	Mantra_Mnemonic	4.38	Contemplate_Question	4.80
Observe_Body	3.92	Opening_Up	4.33	Release_Tensions	4.60
Concentrate_Energy	3.83	Pause_Breath	4.29	Compassion	4.60
Observe_Thoughts	3.75	Breath_Visualization	4.29	Meditative_Movement	4.60
Channel_Energy	3.75	Observe_Thoughts	4.25	Channel_Energy	4.60
Recite_Mantra	3.67	Visualize_Heart_Opening	4.21	Sitting_Do_Nothing	4.40
Lying_Relaxing	3.58	Singing_Sutras_Mantras	4.04	Resp_Flow	4.40
Contemplate_Question	3.58	Observe_Body	4.00	Pause_Breath	4.40
Point_Breath	3.58	Release_Tensions	4.00	Lying_Relaxing	4.40
Contemplate_Death	3.58	Visualize_Thoughts_Silence	3.96	Listen_Sounds	4.40
Observe_Emotions	3.50	Visualize_Light_Fire	3.92	Nose_Breath	4.20
Meditative_Movement	3.50	Lying_Relaxing	3.88	Point_Breath	4.20
Compassion	3.25	Count_Breath	3.83	Read_Text	4.00
Breath_Visualization	3.25	Channel_Energy	3.83	Move_Smoothly	4.00
Count_Breath	3.17	Point_Breath	3.79	Labeling	3.80
Visualize_Thoughts_Silence	3.17	Visualize_Expanding	3.75	Count_Breath	3.60
Contemplate_Condition	3.17	Abdomen_Breath	3.67	Contemplate_Death	3.40
Feel_Heartbeat	3.17	Feel_Heartbeat	3.67	Manipulate_Breath	3.40

Internal_Sounds	3.08	Walking_Senses	3.62	Visualize_Expanding	3.40
Walking_Labeling	3.00	Nose_Breath	3.58	Repeat_Words_Breath	3.20
Read_Text	3.00	Mantra_Bodypoints	3.54	Singing_Together	3.20
Mantra_Mnemonic	3.00	Contemplate_Question	3.46	Opening_Up	3.20
Intention_Mantra	3.00	Meditative_Movement	3.42	Humming	3.20
Fixate_Object	2.83	Internal_Sounds	3.17	Singing_Sutras_Mantras	3.00
Sitting_Do_Nothing	2.75	Listen_Sounds	3.12	Visualize_Heart_Opening	3.00
Listen_Sounds	2.75	Intention_Mantra	3.08	Fixate_Object	2.80
Manipulate_Breath	2.75	Fixate_Object	3.04	Internal_Sounds	2.80
Mantra_Bodypoints	2.75	Read_Text	3.04	Feel_Heartbeat	2.80
Singing_Together	2.58	Contemplate_Death	3.00	Repeat_Affirmation	2.60
Visualize_Expanding	2.58	Labeling	3.00	Walking_Labeling	2.20
Move_Smoothly	2.58	Humming	3.00	Contemplate_Condition	2.20
Visualize_Light_Fire	2.50	Move_Smoothly	2.88	Recite_Mantra	2.20
Focus_Object	2.42	Focus_Object	2.79	Spinning	2.20
Singing_Sutras_Mantras	2.33	Repeat_Affirmation	2.71	Contradiction	2.00
Labeling	2.33	Deity_Merging	2.71	Visualize_Light_Fire	2.00
Humming	2.17	Spinning	2.62	Intention_Mantra	1.60
Visualize_Heart_Opening	1.92	Sitting_Do_Nothing	2.50	Mantra_Mnemonic	1.40
Contradiction	1.67	Walking_Labeling	2.50	Mantra_Bodypoints	1.40
Deity_Merging	1.58	Contemplate_Condition	2.46	Focus_Object	1.40
Spinning	1.33	Contradiction	2.17	Visualize_Decay	1.20
Visualize_Decay	1.17	Visualize_Decay	1.75	Deity_Merging	1.00

APPENDIX D – STUDY MATERIALS DESCRIBED IN CHAPTER 5

Table D1

Variables Gathered in the Study with the Respective Measurement Instruments and Times

Variable	Instrument	Authors	Measurement Time
Emotional Experience	Affective Grid	Russel, Weiss & Mendelsohn (1989)	Daily
Practice Experience	Experiences during meditation, yoga and ethical practices	Own creation	Daily
Wellbeing	WHO-5 Wellbeing Scale	World Health Organization (1998)	Daily
Body Awareness	Adapted Body Awareness Questionnaire	Adapted from MAIA, Mehling et al. (2012); PBCS, Miller et al. (1981); and BAQ, Shields et al. (1989)	Twice weekly
Mind-Wandering	Mind-Wandering Questionnaire (MWQ)	Mrazek et al. (2013)	Twice weekly
Sustained Attention	Sustained Attention to Response Task (SART)	Robertson et al. (1997)	Twice weekly
Attention Network	Attention Network Test (ANT)	Fan et al. (2002)	Weekly
Decentering	Experiences Questionnaire Decentering (EQ-D)	Fresco et al. (2007)	Weekly
Emotion Regulation	Difficulties in Emotion Regulation Scale (DERS)	Gratz & Roemer (2003)	Weekly
Motivation	Situational Motivation Scale (SIMS)	Deci & Ryan (1985)	Weekly
Reflection of Concrete Changes	Result-oriented Problem- and Self-Reflection (RoPS-CC)	Greif & Berg (2011)	Weekly
Stress	Perceived Stress Scale (PSS-10)	Cohen & Williamson (1983)	Weekly
Absorption	Tellegen Absorption Scale (TAS)	Tellegen & Atkinson (1974)	Pretest

Big Five	Big Five Inventory (BFI-K)	Rammstedt & John (2007)	Pretest
Need for Cognition	Need for Cognition Short Form (NFC-SF)	Cacioppo, Petty, & Kao (1984)	Pretest
Distress Tolerance	Distress Tolerance Scale (DTS)	Simons & Gaher (2005)	Pre/Posttest
Life Satisfaction	Satisfaction with Life Scale (SWL)	Diener et al. (1985)	Pre/Posttest
Self-Compassion	Self-Compassion-Scale (SCS)	Neff (2003)	Pre/Posttest
Spirituality	Aspects of Spirituality (ASP)	Büssing, Ostermann, & Matthiessen (2007)	Pre/Posttest
Trait Anxiety	State-Trait-Anxiety Inventory (STAI)	Laux et al. (1981)	Pre/Posttest
Adverse Events	Adverse Events Questionnaire	Own creation	Posttest
Course Satisfaction	Client Satisfaction Questionnaire (CSQ-8)	Attkinsson & Zwick (1982)	Posttest

Table D2*List of Traditional Mantras from Different Spiritual Traditions*

Tradition	Mantra
Christian	Mein Gott und mein Alles/ My God and my everything Kyrie Eleison Jesus/ Lord Jesus Christ Ave Maria
Buddhist	Om Mani Padme Hum Om Namo Butsaya
Hindu	Om Namah Shivaya Om Sri Ram Jay Ram Jay Jay Ram Rama Om Prema Om Shanti So Ham Am Am Am Atmashakti Avaham
Jewish	Baruch Atah Adonai Ribono Shel Olam Shalom
Indian	O Wakan Tanka
Bija mantras (seed syllables)	Om Hessraim Ram Ham Aim Hrim Krim Klim Gam

Table D3*List of Symptom Clusters with Their Corresponding Symptoms*

Cluster	Symptoms
Neurological symptoms	Numbness in parts of the body Twitching in parts of the body Shaking of the body Drowsiness Dizziness Fainting Involuntary body movements Involuntary laughing or crying
Somatic symptoms	Diarrhea Nausea Salivation Muscle cramps Coughing Blocked nose Running nose Tinnitus Redness of skin Itching Pronounced sweating Shortness of breath Palpitations Itching in the eye Heavy head Exhaustion Feeling unwell/ill Feeling hot or cold Experiencing strong chills or flushing
Pain	Headache Stomachache Chest pain Muscular pains Joint pains
Cognitive symptoms	Mental confusion Increased self-criticism Increased criticism of others Increased awareness of negative features/traits Feeling superior to others Impression that only people who meditate are valuable

	Remembrance of negative experiences
Emotional symptoms	Inner tension Tearfulness Irritability Boredom Pronounced emotional pain Pronounced fear/anxiety Frightening thoughts Strong negative emotions during meditation Strong positive emotions during meditation
Motivational symptoms	Lack of interest in one's surroundings Lack of interest in others Lack of interest in people's conversations Impression of being bored by others Less motivation in life
Changes in necessities	Changed sleep Changed appetite Changed sexuality
Compulsive meditation	Need for continuous meditation Feeling that the time not spent meditating is wasted Restlessness/anxiety when not practicing formal meditation
Difficulties in life	Lack of orientation in life Difficulty in feeling comfortable in the world Impression that something is missing in life Hypersensitivity/rejection of urban life Difficulties in participating in everyday life or continuing to work
Altered states of consciousness	Hallucinations/visions/illusions Changed perceptions of time and space Feelings of strong energy flows/currents during meditation Sense of inner emptiness or vastness Sense of blurring or dissolving of self-world boundaries Feeling of oneness with all that is

APPENDIX E – ADDITIONAL TABLES FOR CHAPTER 5

Table E1

Mean Well-Being Scores With Standard Deviations for Baseline (A) and Treatment (B) Phases, and Tau-U Estimates With Respective Significance Levels and Type of Tau-U for Each Participant

Case	Mean A	Mean B	SD A	SD B	Tau-U	Tau-U Significance	Tau-U Type
1	4.68	5.02	0.90	0.83	0.246	p = .190	A vs. B
2	3.54	3.85	0.81	1.13	-0.112	p = .181	A vs. B - Trend A + Trend B
3	3.71	2.91	0.65	0.57	-0.458	p = .000	A vs. B + Trend B
4	5.63	4.32	0.39	0.78	-0.511	p = .000	A vs. B + Trend B
5	4.16	4.46	0.65	0.69	0.237	p = .220	A vs. B
6	3.87	3.85	0.40	0.62	0.125	p = .120	A vs. B + Trend B
7	3.80	3.58	0.47	0.61	-0.163	p = .068	A vs. B - Trend A + Trend B
8	2.90	3.19	0.73	0.89	0.158	p = .523	A vs. B
9	3.58	3.69	1.31	1.04	0.063	p = .687	A vs. B
10	4.83	4.90	0.77	0.75	0.070	p = .686	A vs. B
11	3.20	3.18	0.70	0.54	0.212	p = .011	A vs. B - Trend A + Trend B
12	3.14	3.89	0.74	0.49	0.359	p = .000	A vs. B + Trend B
13	3.34	3.56	0.92	0.72	0.143	p = .442	A vs. B
14	4.53	5.17	0.50	0.81	0.450	p = .000	A vs. B + Trend B
15	5.16	5.62	0.32	0.32	0.463	p = .000	A vs. B + Trend B
16	4.08	4.65	0.77	0.73	0.308	p = .016	A vs. B - Trend A
17	3.90	3.78	0.43	0.41	-0.154	p = .301	A vs. B
18	4.10	4.81	0.97	0.94	0.362	p = .000	A vs. B - Trend A + Trend B
19	4.28	4.10	0.59	1.16	0.061	p = .699	A vs. B + Trend B
20	4.24	4.51	0.82	0.60	0.143	p = .541	A vs. B
21	3.48	3.90	0.68	0.85	0.298	p = .139	A vs. B

22	3.21	3.76	0.49	0.53	0.426	p = .000	A vs. B + Trend B
23	4.34	4.42	1.20	0.77	-0.002	p = .992	A vs. B
24	4.15	4.04	0.55	0.45	-0.142	p = .370	A vs. B
25	4.20	4.37	0.63	0.36	0.154	p = .121	A vs. B + Trend B
26	3.38	3.90	0.68	0.91	0.273	p = .004	A vs. B + Trend B
27	4.47	5.08	0.89	0.53	0.252	p = .002	A vs. B + Trend B
28	3.40	3.65	0.77	0.70	0.221	p = .010	A vs. B + Trend B
29	3.48	3.24	1.00	0.54	-0.141	p = .589	A vs. B
30	4.75	4.59	0.85	0.69	-0.135	p = .434	A vs. B
31	4.77	4.81	0.80	0.59	0.091	p = .258	A vs. B + Trend B
32	3.36	3.98	1.19	0.85	0.332	p = .060	A vs. B
33	4.52	4.49	0.87	1.05	0.189	p = .047	A vs. B + Trend B
34	3.38	3.83	0.58	0.77	0.338	p = .098	A vs. B
35	4.03	4.17	0.39	0.77	0.232	p = .365	A vs. B
36	4.32	5.07	1.16	0.65	0.373	p = .014	A vs. B
37	3.96	4.39	0.84	0.66	0.249	p = .170	A vs. B
38	4.35	4.04	0.45	0.58	-0.304	p = .039	A vs. B
39	3.76	4.10	0.90	1.22	0.236	p = .177	A vs. B
40	5.10	5.06	0.40	0.38	-0.087	p = .617	A vs. B
41	3.86	4.20	1.06	0.82	0.186	p = .427	A vs. B
42	3.29	3.36	1.09	0.68	-0.042	p = .788	A vs. B

Note. Effect sizes significant on $\alpha < 0.05$ level or greater 0.20 were printed in bold type.

Table E2

Regression Model for Tau-U Well-Being Estimates as Dependent Variable and Condition, Age, Gender, and Baseline Length as Predictors (df = 35)

	<i>b</i>	β	<i>SE</i>	<i>t</i>	<i>p</i>
(Intercept)	-0.14	0.00	0.07	-1.95	.059
ME condition	0.25	0.48	0.10	2.49	.009
MY condition	0.13	0.24	0.10	1.29	.103
MYE condition	0.17	0.32	0.10	1.68	.051
Age	-0.01	-0.21	0.00	-1.35	.186
Gender	0.03	0.05	0.09	0.31	.763
Baseline length	0.00	-0.06	0.01	-0.36	.719

Table E3

Multilevel Regression Estimates for Well-Being Scores as Dependent Variable and Time, Conditions, Age, Gender, and Baseline Length as Predictors

	β	<i>SE</i>	<i>df</i>	<i>t</i>	<i>p</i>
Time	0.08	0.03	2492	2.64	.004
ME condition	0.07	0.13	35	0.57	.575
MY condition	0.07	0.12	35	0.55	.584
MYE condition	0.07	0.12	35	0.60	.549
Age	-0.03	0.09	35	-0.36	.718
Gender	0.09	0.10	35	0.91	.367
Baseline Length	-0.02	0.10	35	-0.16	.874
Time * ME condition	0.13	0.04	2492	3.11	.001
Time * MY condition	0.09	0.04	2492	2.27	.012
Time * MYE condition	0.09	0.04	2492	2.29	.011

Table E4*Full Multi-Level Estimation Procedure for Well-Being*

	Fixed effects					
	Model 0	Model 1	Model 1b	Model 2	Modell 3	Modell 4
	<i>b</i> (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
Intercept	4.14 (0.09)	0.0	0.0	0.0	0.0	0.0
Level 1						
Time		0.09*** (0.02)	0.08** (0.03)	0.08** (0.03)	0.08** (0.03)	0.08** (0.03)
Level 2						
Ethical education				0.01 (0.09)	0.07 (0.10)	0.04 (0.10)
Physical yoga				0.01 (0.09)	0.04 (0.10)	0.04 (0.10)
Age						-0.03 (0.09)
Gender						0.09 (0.10)
Baseline Length						-0.02 (0.10)
Interactions						
Time * Ethics					0.07* (0.03)	0.07* (0.03)
Time * Yoga					0.03 (0.03)	0.03 (0.03)
	Random effects					
	Model 0	Modell 1	Model 1b	Model 2	Model 3	Model 4
Level 1						
Residual (σ^2_e)	0.58	0.61	0.57	0.57	0.57	0.57
Slope (σ^2_{u1})			0.04	0.04	0.04	0.04
Level 2						
Intercept (σ^2_{u0})	0.34	0.37	0.36	0.37	0.37	0.39
Deviance	5922.9	6091.3	6002.0	6002.1	5997.0	5996.3
Marginal R ²	0.01	0.01	0.01	0.01	.02	.03
Conditional R ²	0.38	0.38	0.41	0.42	.43	.44
ICC	0.38					
N	42	42	42	42	42	42
Observations	2538	2538	2538	2538	2538	2538

Note. Model 0 was the intercept-only model; Model 1 included time; Model 1b modelled random slopes for time; Model 2 included components, Model 3 modelled cross-level interactions; Model 4 included age, gender, and baseline length.

b = unstandardized regression coefficient; β = standardized regression coefficient; *SE* = standard error.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table E5

Mean Stress Scores With Standard Deviations for Baseline (A) and Treatment (B) Phases, and Tau-U Estimates With Respective Significance Levels and Type of Tau-U for Each Participant

Case	Mean A	Mean B	SD A	SD B	Tau-U	Tau-U Significance	Tau-U Type
1	1.75	1.86	0.64	0.67	0.067	p = .884	Tau-U A vs. B - Trend A
2	2.60	2.43	0.28	0.48	-0.118	p = .795	Tau-U A vs. B - Trend A
3	2.90	3.24	0.57	0.30	0.294	p = .511	Tau-U A vs. B - Trend A
4	2.30	2.66	n.d.	0.50	0.267	p = .444	Tau-U A vs. B + Trend B
5	2.20	2.67	0.00	0.47	0.370	p = .206	Tau-U A vs. B + Trend B
6	2.73	2.68	0.29	0.18	-0.222	p = .541	Tau-U A vs. B - Trend A + Trend B
7	2.90	2.95	n.d.	0.36	0.028	p = .914	Tau-U A vs. B - Trend A
8	3.50	3.55	n.d.	0.13	0.300	p = .448	Tau-U A vs. B + Trend B
9	4.07	3.34	0.35	0.53	-0.527	p = .023	Tau-U A vs. B - Trend A + Trend B
10	1.40	1.84	0.28	0.49	0.588	p = .191	Tau-U A vs. B - Trend A
11	2.50	2.39	n.d.	0.34	0.378	p = .125	Tau-U A vs. B + Trend B
12	2.40	2.29	n.d.	0.21	-0.393	p = .170	Tau-U A vs. B + Trend B
13	2.90	3.00	0.14	0.63	0.200	p = .534	Tau-U A vs. B + Trend B
14	2.40	1.91	n.d.	0.36	-0.733	p = .003	Tau-U A vs. B + Trend B
15	1.40	1.34	0.28	0.27	-0.235	p = .596	Tau-U A vs. B - Trend A
16	2.17	1.90	0.32	0.27	-0.292	p = .427	Tau-U A vs. B - Trend A
17	2.73	2.84	0.25	0.23	0.148	p = .684	Tau-U A vs. B - Trend A
18	1.73	1.91	0.55	0.54	-0.145	p = .529	Tau-U A vs. B - Trend A + Trend B
19	2.40	2.39	0.28	0.78	0.267	p = .281	Tau-U A vs. B - Trend A + Trend B
20	2.50	2.03	n.d.	0.23	-0.714	p = .012	Tau-U A vs. B + Trend B
21	3.10	2.63	0.00	0.32	-0.333	p = .435	Tau-U A vs. B + Trend B
22	3.50	2.84	0.14	0.32	-0.743	p = .006	Tau-U A vs. B + Trend B
23	2.50	2.03	n.d.	0.41	-0.444	p = .069	Tau-U A vs. B + Trend B
24	2.80	3.06	0.42	0.38	0.294	p = .513	Tau-U A vs. B - Trend A
25	3.03	3.02	0.06	0.26	-0.214	p = .451	Tau-U A vs. B - Trend A + Trend B
26	2.40	1.76	0.28	0.28	-0.694	p = .009	Tau-U A vs. B - Trend A + Trend B

27	2.65	2.51	0.07	0.55	-0.389	p = .098	Tau-U A vs. B + Trend B
28	3.00	2.34	n.d.	0.44	-0.607	p = .030	Tau-U A vs. B + Trend B
29	2.90	3.03	n.d.	0.36	0.400	p = .327	Tau-U A vs. B + Trend B
30	2.25	2.52	0.64	0.52	0.345	p = .133	Tau-U A vs. B - Trend A + Trend B
31	2.00	1.89	0.26	0.42	-0.409	p = .061	Tau-U A vs. B - Trend A + Trend B
32	3.30	3.13	0.57	0.45	0.250	p = .345	Tau-U A vs. B - Trend A + Trend B
33	3.20	3.01	n.d.	0.95	-0.107	p = .708	Tau-U A vs. B + Trend B
34	2.40	2.77	n.d.	0.06	0.833	p = .071	Tau-U A vs. B + Trend B
35	2.60	2.43	n.d.	0.39	0.333	p = .293	Tau-U A vs. B + Trend B
36	3.10	2.43	0.53	0.63	-0.625	p = .094	Tau-U A vs. B - Trend A
37	2.65	2.57	0.35	0.35	-0.250	p = .345	Tau-U A vs. B - Trend A + Trend B
38	1.63	2.73	0.21	0.41	0.867	p = .018	Tau-U A vs. B - Trend A
39	3.05	3.12	0.92	0.42	0.091	p = .849	Tau-U A vs. B - Trend A
40	1.55	1.45	0.07	0.15	-0.412	p = .346	Tau-U A vs. B - Trend A
41	2.60	1.80	n.d.	0.19	-1.000	p = .114	Tau-U A vs. B - Trend A
42	3.33	2.84	0.21	0.79	-0.167	p = .654	Tau-U A vs. B - Trend A

Note. Effect sizes significant on $\alpha < 0.05$ level or greater 0.20 were printed in bold type; n.d. = not defined (because there was only one measurement in phase A).

Table E6

Regression Model for Tau-U Stress Estimates as Dependent Variable and Condition, Age, Gender, and Baseline Length as Predictors (df = 35)

	<i>b</i>	β	<i>SE</i>	<i>t</i>	<i>p</i>
(Intercept)	0.19	0.00	0.14	1.35	0.185
ME condition	-0.30	-0.30	0.20	-1.49	0.072
MY condition	-0.35	-0.33	0.20	-1.72	0.047
MYE condition	-0.13	-0.13	0.20	-0.64	0.263
Age	0.00	0.01	0.01	0.06	0.956
Gender	0.00	0.07	0.01	0.41	0.686
Baseline length	0.24	0.20	0.19	1.25	0.218

Table E7

Multilevel Regression Estimates for Stress Scores as Dependent Variable and Time, Conditions, Age, Gender, and Baseline Length as Predictors

	β	<i>SE</i>	<i>df</i>	<i>t</i>	<i>p</i>
Time	-0.06	0.05	331	-1.29	.099
ME condition	-0.28	0.16	35	-1.81	.079
MY condition	-0.11	0.15	35	-0.71	.484
MYE condition	-0.08	0.15	35	-0.52	.609
Age	-0.03	0.12	35	-0.26	.797
Gender	-0.07	0.13	35	-0.58	.568
Baseline Length	0.11	0.12	35	0.88	.382
Time * ME condition	-0.06	0.06	331	-0.95	.172
Time * MY condition	-0.09	0.06	331	-1.62	.053
Time * MYE condition	-0.03	0.06	331	-0.51	.305

Table E8*Full Multi-Level Estimation Procedure for Stress*

	Fixed effects					
	Model 0	Model 1	Model 1b	Model 2	Modell 3	Modell 4
	<i>b</i> (SE)	β (SE)	β (SE)	β (SE)	β (SE)	β (SE)
Intercept	2.52 (0.08)	0.0	0.0	0.0	0.0	0.0
Level 1						
Time		-0.06* (0.04)	-0.06 (0.05)	-0.06 (0.05)	-0.06 (0.05)	-0.06 (0.05)
Level 2						
Ethical education				-0.15 (0.12)	-0.15 (0.12)	-0.14 (0.13)
Physical yoga				0.07 (0.12)	0.07 (0.12)	0.06 (0.12)
Age						-0.03 (0.12)
Gender						-0.09 (0.13)
Baseline Length						0.11 (0.13)
Interactions						
Time * Ethics					0.01 (0.05)	0.01 (0.05)
Time * Yoga					-0.04 (0.05)	-0.04 (0.05)
	Random effects					
	Model 0	Modell 1	Model 1b	Model 2	Model 3	Model 4
Level 1						
Residual (σ^2_e)	0.20	0.44	0.40	0.40	0.40	0.40
Slope (σ^2_{u1})			0.04	0.04	0.04	0.04
Level 2						
Intercept (σ^2_{u0})	0.26	0.56	0.56	0.56	0.56	0.59
Deviance	569.6	860.7	852.2	850.4	849.7	848.6
Marginal R ²	0.00	0.00	0.00	0.03	.03	.05
Conditional R ²	0.56	0.56	0.60	0.61	.61	.63
ICC	0.56					
N	42	42	42	42	42	42
Observations	377	377	377	377	377	377

Note. Model 0 was the intercept-only model; Model 1 included time; Model 1b modelled random slopes for time; Model 2 included components, Model 3 modelled cross-level interactions; Model 4 included age, gender, and baseline length.

b = unstandardized regression coefficient; β = standardized regression coefficient; *SE* = standard error.

* $p < .05$; ** $p < .01$; *** $p < .001$.

Table E9

Multilevel Regression Estimates for Well-Being Scores as Dependent Variable and Time, Effective Component, Age, Gender, Baseline Length, and Meditation Practice Variables as Predictors

	β	<i>SE</i>	<i>df</i>	<i>t</i>	<i>p</i>
Time	-0.12	0.06	1472	-1.98	.024
Ethical education (y/n)	0.06	0.26	36	0.24	.815
Physical yoga (y/n)	-0.23	0.25	36	-0.91	.370
Age	-0.01	0.01	36	-0.79	.434
Gender	0.24	0.27	36	0.89	.380
Baseline length	0.00	0.02	36	0.24	.815
Meditation practice duration	0.00	0.00	1472	-1.26	.206
Meditation ease	0.06	0.02	1472	2.38	.017
Meditation wakefulness	0.22	0.02	1472	14.01	.000
Meditation relaxation	0.16	0.02	1472	7.41	.000
Time * Ethical education	0.04	0.07	1472	0.51	.304
Time * Physical yoga	0.12	0.07	1472	1.75	.040

Table E10

Multilevel Regression Estimates for Stress Scores as Dependent Variable and Time, Effective Component, Age, Gender, Baseline Length, and Meditation Practice Variables as Predictors

	β	<i>SE</i>	<i>df</i>	<i>t</i>	<i>p</i>
Time	-0.04	0.08	185	-0.53	.299
Ethical education (y/n)	-0.50	0.30	36	-1.64	.109
Physical yoga (y/n)	0.24	0.30	36	0.79	.434
Age	0.00	0.01	36	-0.12	.906
Gender	-0.11	0.23	36	-0.47	.639
Baseline length	0.02	0.02	36	1.17	.250
Meditation practice duration	-0.01	0.01	185	-1.79	.075
Meditation ease	0.02	0.04	185	0.55	.583
Meditation wakefulness	-0.03	0.03	185	-1.11	.269
Meditation relaxation	-0.07	0.04	185	-1.93	.055
Time * Ethical education	0.09	0.09	185	1.04	.150
Time * Physical yoga	-0.07	0.09	185	-0.76	.223

Table E11

Multilevel Regression Estimates for Well-Being Scores as Dependent Variable and Time, Effective Component, Age, Gender, Baseline Length, Meditation Practice and Meditation Time Variables as Predictors

	β	<i>SE</i>	<i>df</i>	<i>t</i>	<i>p</i>
Time	-0.14	0.06	1420	-2.30	.011
Ethical education (y/n)	0.00	0.26	36	0.01	.996
Physical yoga (y/n)	-0.24	0.26	36	-0.92	.363
Age	-0.01	0.01	36	-0.85	.402
Gender	0.23	0.27	36	0.85	.402
Baseline length	0.00	0.02	36	0.22	.831
Meditation practice duration	-0.01	0.00	1420	-2.58	.010
Meditation ease	0.06	0.02	1420	2.72	.007
Meditation wakefulness	0.23	0.02	1420	13.96	.000
Meditation relaxation	0.16	0.02	1420	7.33	.000
Meditation time (5-11 am)	0.11	0.05	1420	2.16	.031
Meditation time (11-3 pm)	0.09	0.05	1420	1.74	.083
Meditation time (3-6 pm)	0.00	0.06	1420	-0.06	.954
Time * Ethical education	0.06	0.07	1420	0.85	.199
Time * Physical yoga	0.12	0.07	1420	1.78	.038

Table E12

Multilevel Regression Estimates for Stress Scores as Dependent Variable and Time, Effective Component, Age, Gender, Baseline Length, Meditation Practice and Meditation Time Variables as Predictors

	β	<i>SE</i>	<i>df</i>	<i>t</i>	<i>p</i>
Time	-0.04	0.08	177	-0.51	.307
Ethical education (y/n)	-0.53	0.30	36	-1.75	.089
Physical yoga (y/n)	0.25	0.30	36	0.83	.410
Age	0.00	0.01	36	-0.05	.964
Gender	-0.13	0.23	36	-0.54	.591
Baseline length	0.02	0.02	36	1.07	.290
Meditation practice duration	-0.01	0.01	177	-2.11	.036
Meditation ease	0.02	0.04	177	0.47	.638
Meditation wakefulness	-0.04	0.03	177	-1.26	.210
Meditation relaxation	-0.08	0.04	177	-2.00	.047
Meditation time (5-11 am)	0.10	0.09	177	1.11	.268
Meditation time (11-3 pm)	0.03	0.10	177	0.27	.784
Meditation time (3-6 pm)	0.02	0.10	177	0.21	.831
Time * Ethical education	0.11	0.09	177	1.22	.113
Time * Physical yoga	-0.08	0.09	177	-0.84	.200

APPENDIX F – ADDITIONAL FIGURES FOR CHAPTER 5

Figure F1

Smoothed Loess Trend Lines of the Average Number of Minutes Spent Practicing Meditation Each Day in Four Conditions

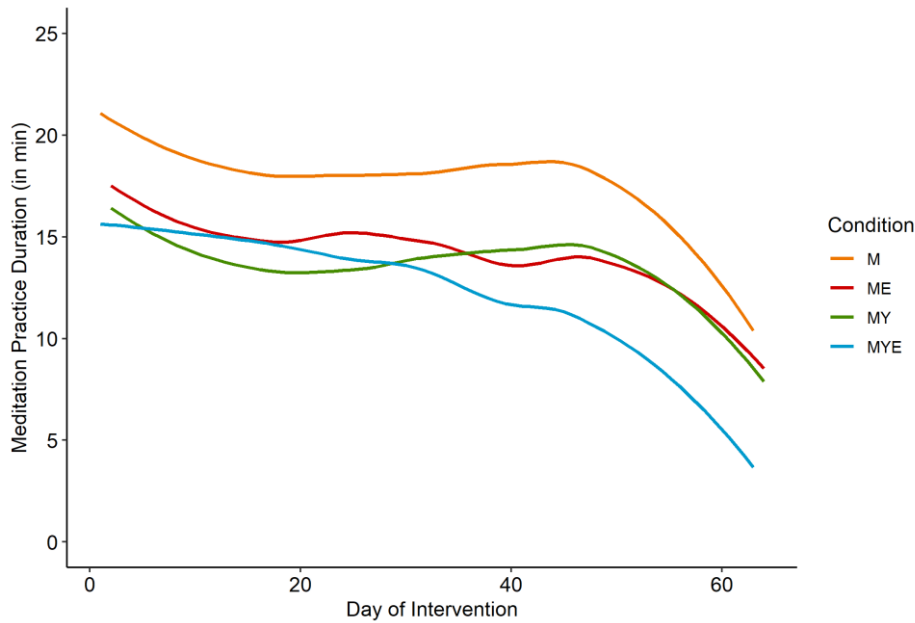


Figure F2

Smoothed Loess Trend Lines of the Average Number of Minutes Spent Practicing Yoga Exercises Each Day in Two Conditions

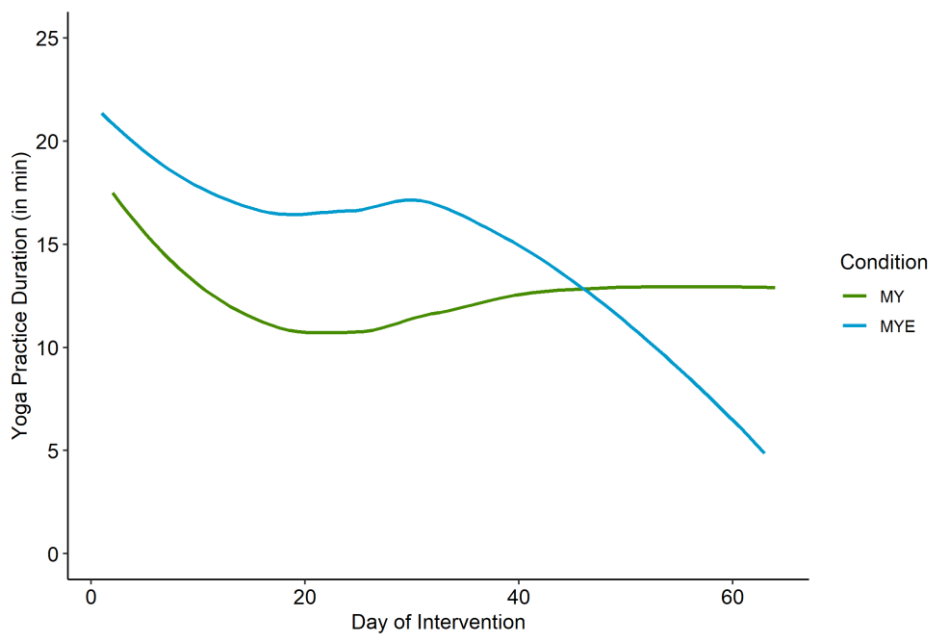


Figure F3

Smoothed Loess Trend Lines of the Proportion of Participants Engaging in Ethical Practice Each Day in Two Conditions

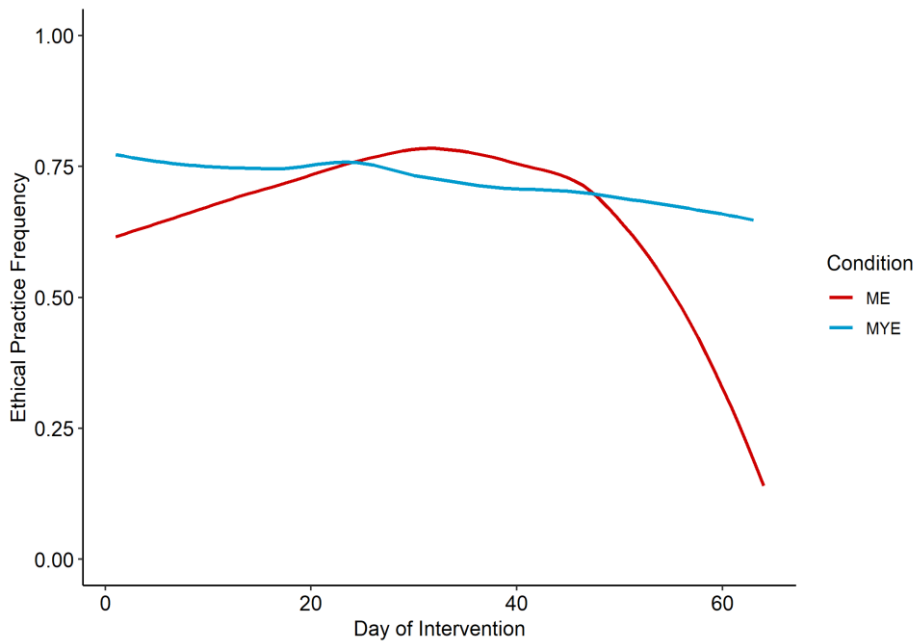
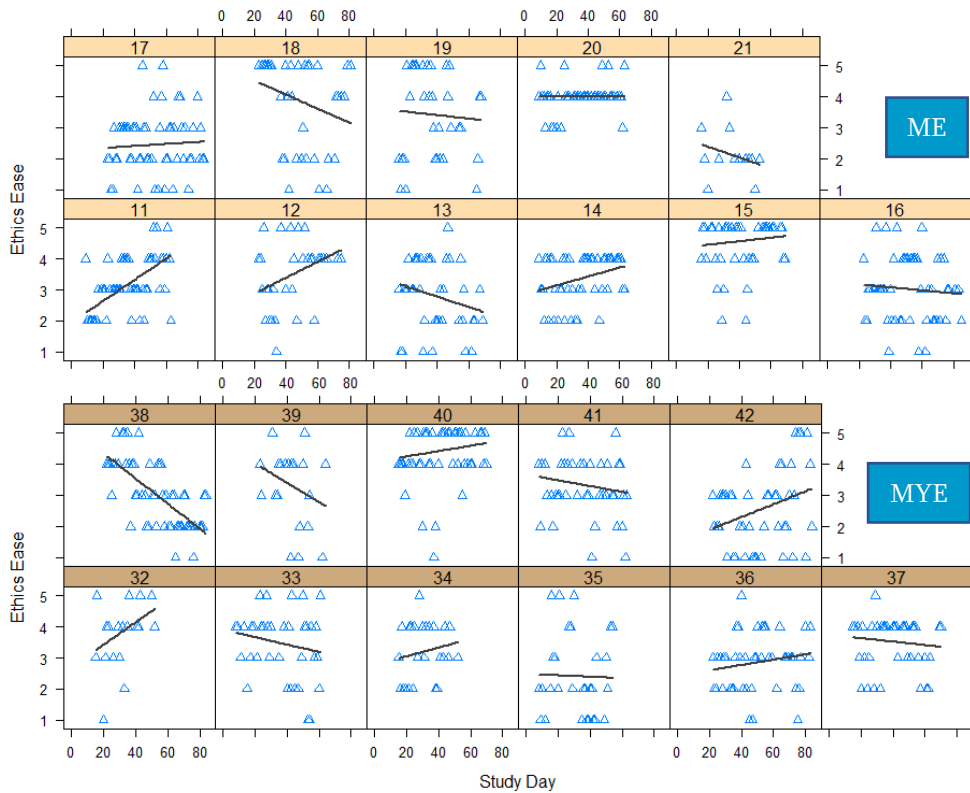


Figure F4

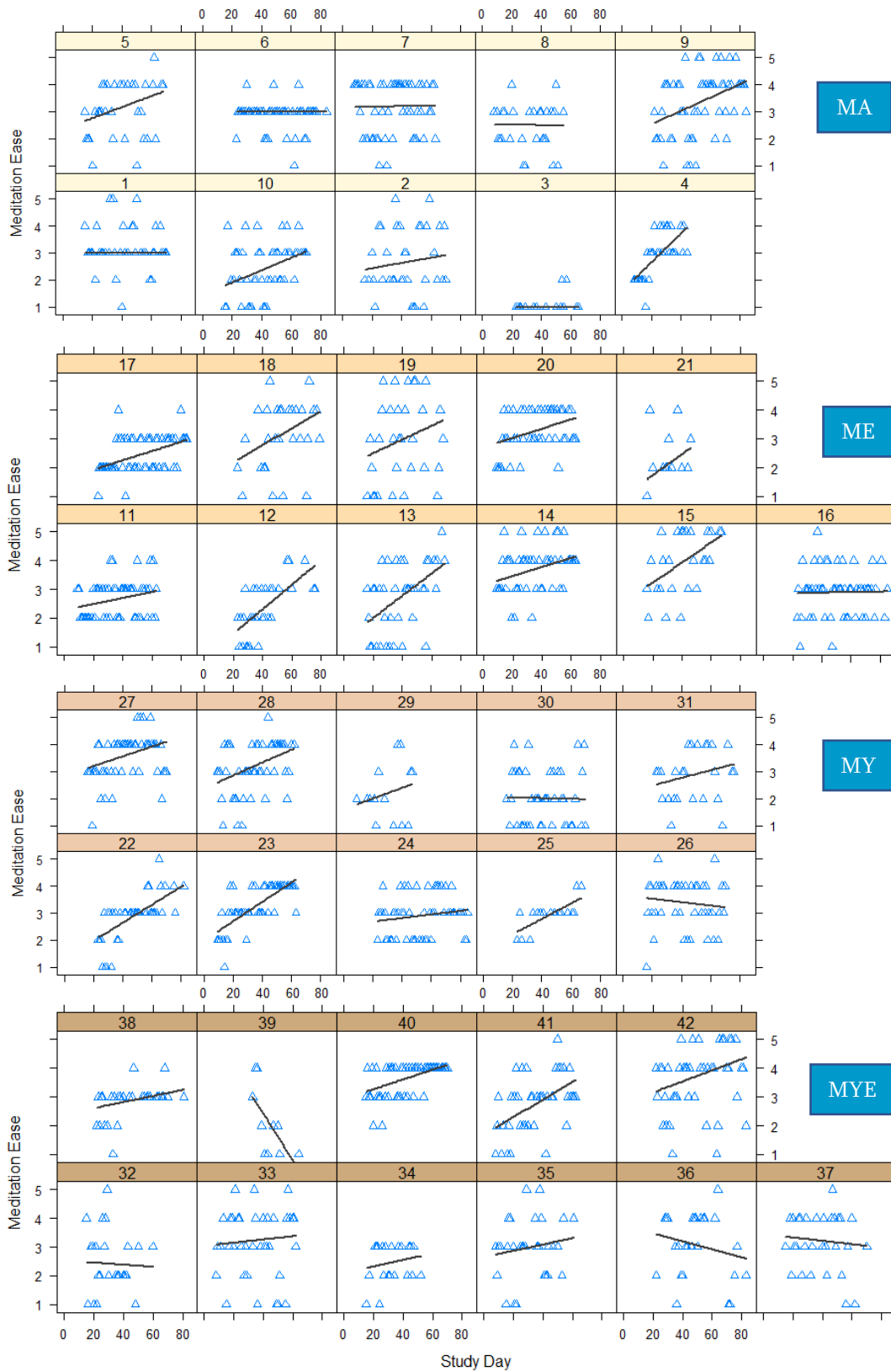
Ratings of Perceived Ease of Ethical Practice for Each Participant with Corresponding Regression Lines



Note. ME = meditation and ethical education, MYE = meditation, physical yoga and ethical education

Figure F5

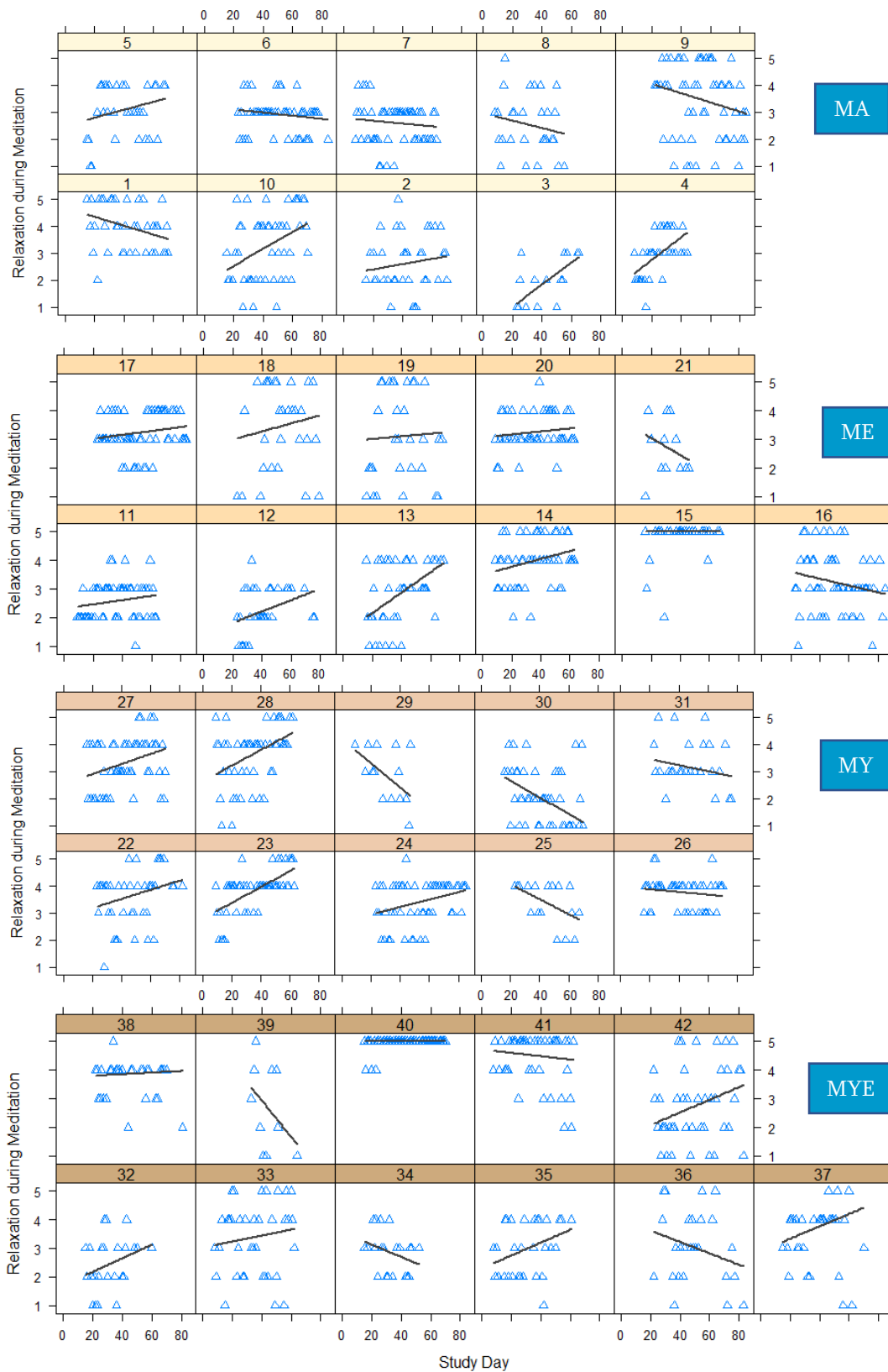
Ratings of Perceived Meditation Ease for Each Participant with Corresponding Regression Lines



Note. MA = mantra meditation only, ME = meditation and ethical education, MY = meditation and physical yoga, MYE = meditation, physical yoga and ethical education

Figure F6

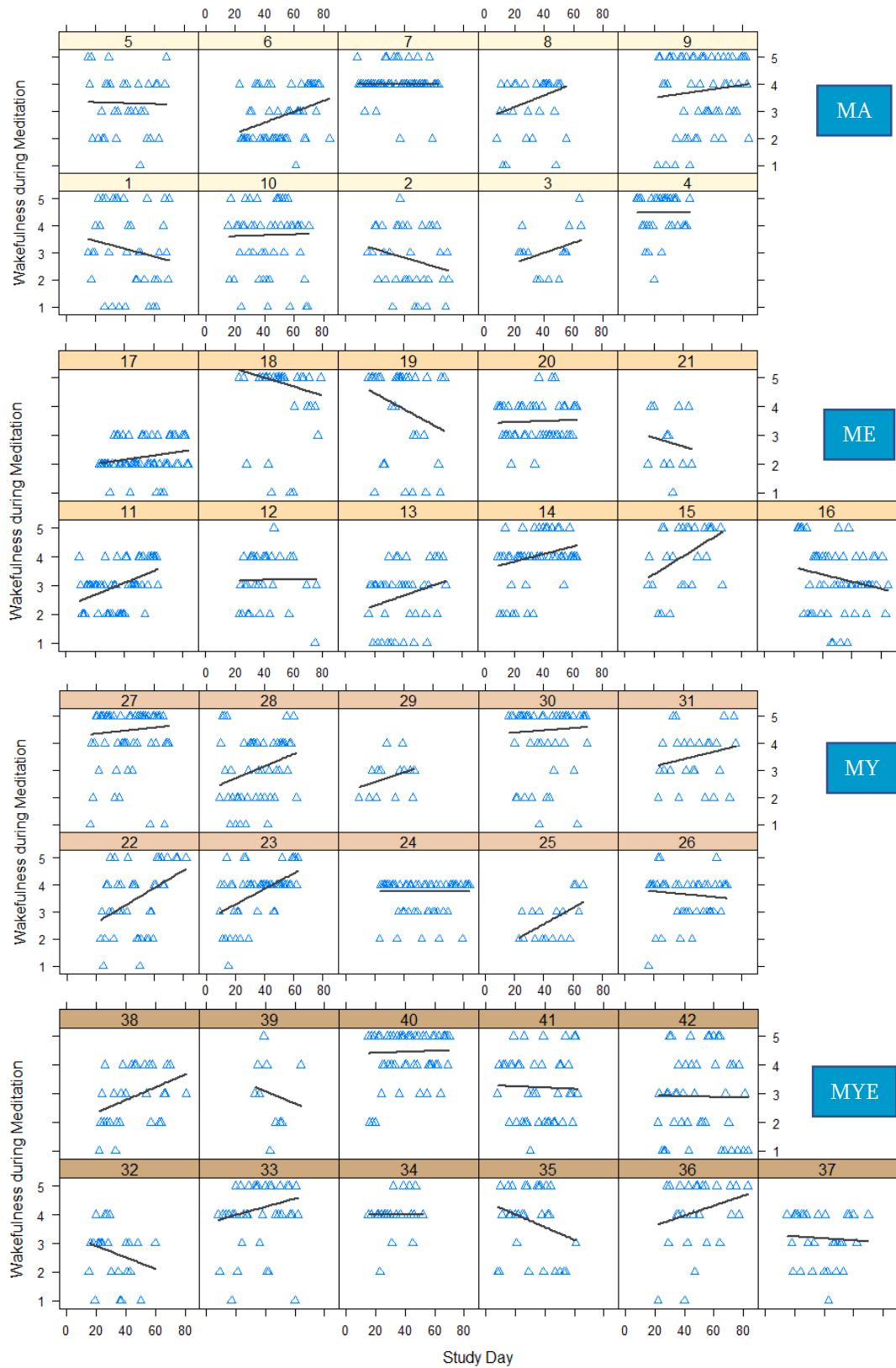
Ratings of Relaxation During Meditation for Each Participant with Corresponding Regression Lines



Note. MA = mantra meditation only, ME = meditation and ethical education, MY = meditation and physical yoga, MYE = meditation, physical yoga and ethical education

Figure F7

Ratings of Wakefulness During Meditation for Each Participant with Corresponding Regression Lines



Note. MA = mantra meditation only, ME = meditation and ethical education, MY = meditation and physical yoga, MYE = meditation, physical yoga and ethical education

Figure F8

Ratings of Perceived Yoga Ease for Each Participant with Corresponding Regression Lines

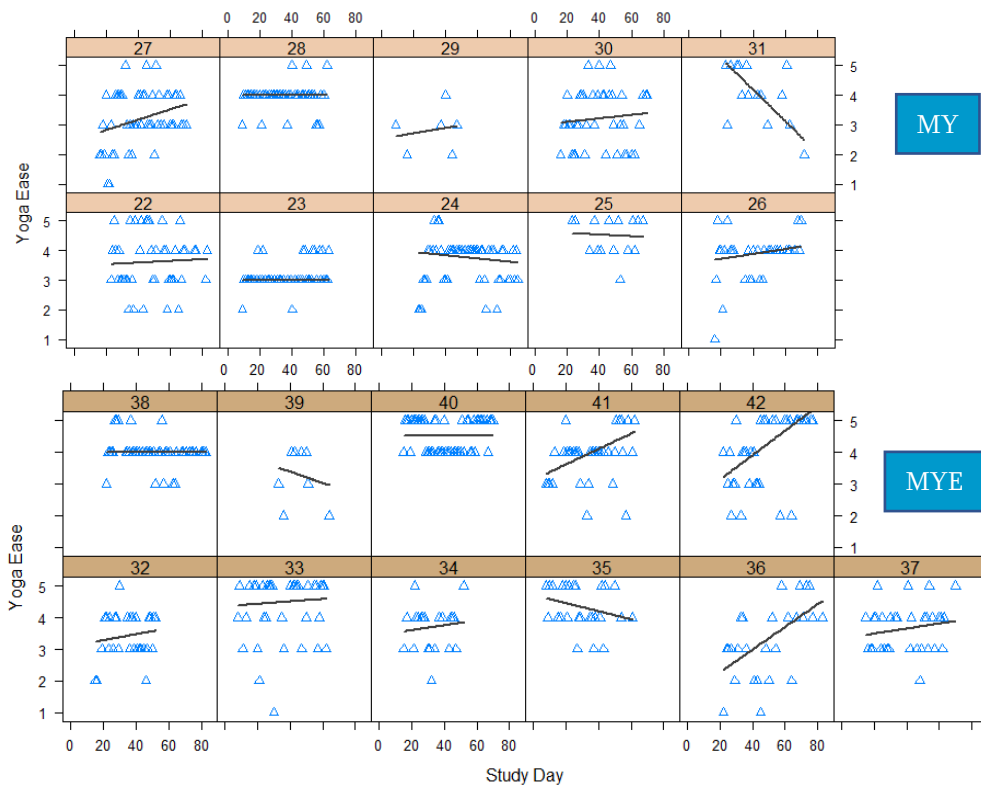
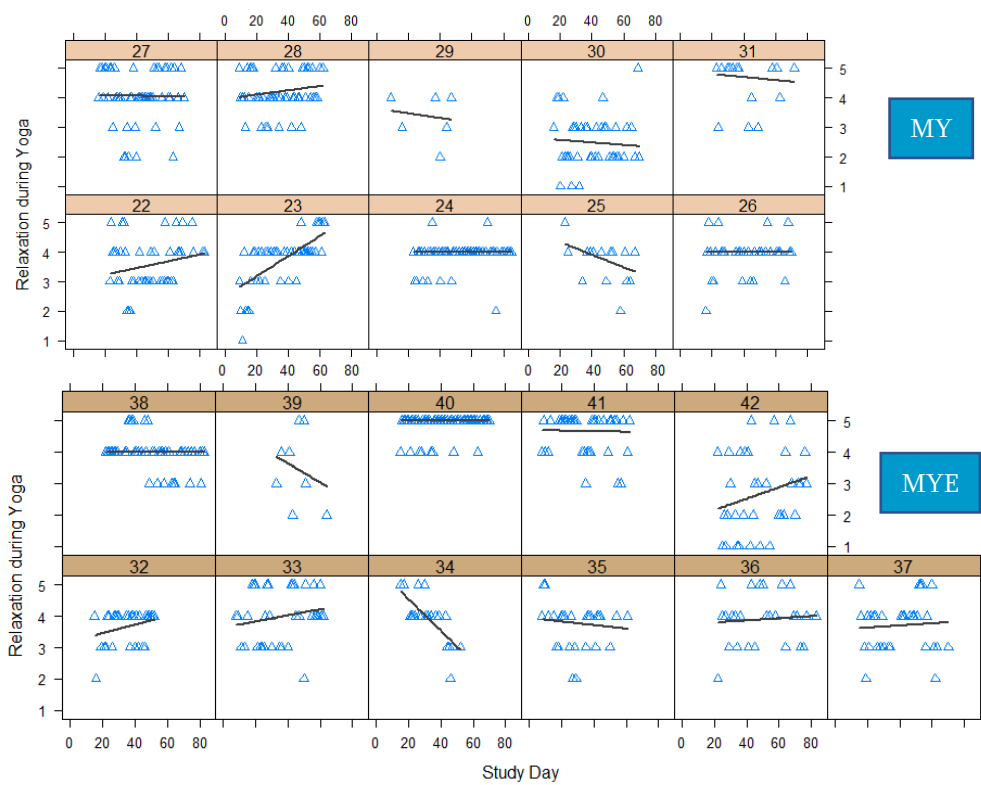


Figure F9

Ratings of Relaxation During Yoga for Each Participant with Correspond. Regression Lines



Note. MY = meditation and physical yoga, MYE = meditation, physical yoga and ethical education

Figure F10

Ratings of Wakefulness During Yoga for Each Participant with Correspond. Regression Lines

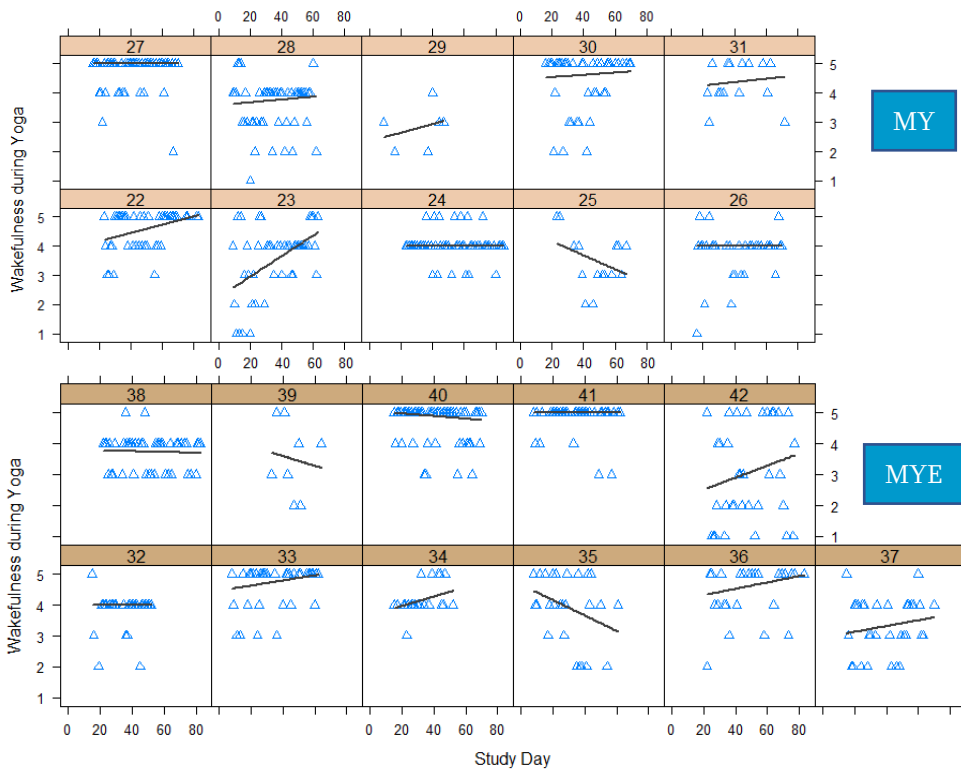
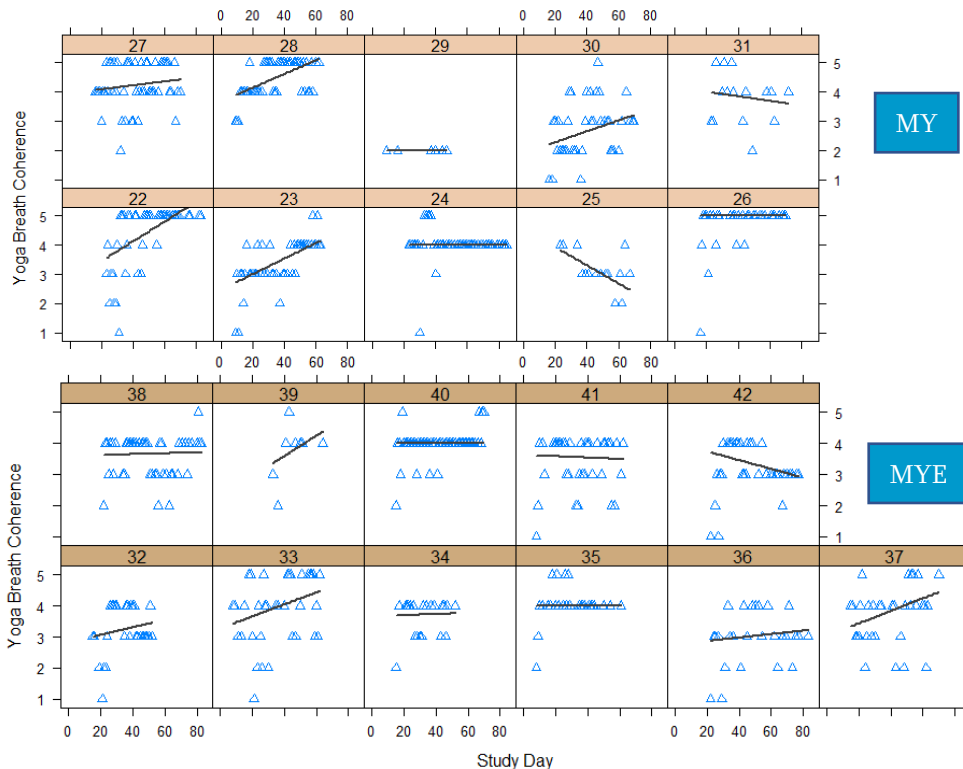


Figure F11

Ratings of Perceived Coherence of Yoga Exercises with Breathing for Each Participant with Corresponding Regression Lines



Note. MY = meditation and physical yoga, MYE = meditation, physical yoga and ethical education

ZUSAMMENFASSUNG

Diese Dissertation beschäftigt sich mit der Vielfalt an meditativen Praktiken, die in vielen spirituellen Traditionen gelehrt und praktiziert werden. Das wissenschaftliche Interesse an diesem Themengebiet nimmt seit Jahren stetig zu. Dennoch blieben viele Fragen bisher unbeantwortet und es fehlt an einer umfassenden Theorie der Meditation. Viele Studien haben die positive Wirkung der Meditation untermauert. Die Mechanismen, die dieser positiven Wirkung zugrunde liegen, sind jedoch unbekannt. Zudem gibt es viele Faktoren, die die Wirkung beeinflussen, aber bisher nur unzureichend erforscht wurden. Einer dieser Faktoren ist die Vielzahl an Meditationstechniken, die unterschiedliche Effekte auf verschiedene Menschen haben können. Darüber hinaus war Meditation ursprünglich häufig nur ein Element von vielen in zum Teil sehr elaborierten spirituellen Pfaden und Systemen. Diese enthielten auch andere Elemente wie Körper- und Atemübungen oder ethische und philosophische Unterweisungen. Diese zusätzlichen Elemente und ihre Wechselwirkung mit Meditationstechniken sind Faktoren, die noch genauer erforscht werden sollten. Ferner wurden in der aktuellen Forschungslandschaft individuelle Faktoren wie Persönlichkeitsunterschiede zwischen den Meditierenden nur unzureichend berücksichtigt. In meiner Dissertation untersuche ich einige dieser offenen Fragen und Faktoren.

Nachdem ich im ersten Kapitel meine Forschungsfragen herleite und darlege, berichte ich in den folgenden vier Kapiteln über vier wissenschaftliche Arbeiten, die ich im Rahmen meiner Dissertation durchgeführt habe. Jedes Kapitel ist ein eigenständiger wissenschaftlicher Artikel. Ein Artikel wurde bereits publiziert, während die anderen drei zur Publikation in Fachzeitschriften eingereicht wurden.

Im zweiten Kapitel beschäftige ich mich mit der Frage „Was tun Meditierende, wenn sie meditieren?“ Um diese Frage zu beantworten führte ich zwei Studien durch mit dem Ziel einen umfassenden Überblick über alle Meditationstechniken in verschiedenen Traditionen zu gewinnen. In der ersten, qualitativen Studie sammelte ich 309 Meditationstechniken, indem ich 20 Meditationsexpert*innen interviewte und eine umfangreiche Literaturrecherche durchführte. Im Anschluss reduzierte ich diese Sammlung auf 50 grundlegende Meditationstechniken. In der zweiten, quantitativen Studie gaben 635 erfahrene Meditierende aus verschiedensten Meditationstraditionen an, wie viel Erfahrung sie mit jeder dieser 50 Techniken hatten. Ihre Antworten legten nahe, dass die Auswahl an Meditationstechniken angemessen war und zwei Techniken hinzugefügt werden mussten. Die weiterführende statistische Analyse illustrierte traditionsübergreifende und –spezifische Präferenzen für verschiedene Meditationstechniken, sowie Cluster von Techniken, die häufig gemeinsam praktiziert wurden. Die Gruppe

der körperbezogenen Techniken war besonders relevant für alle Meditierenden. Diese Ergebnisse bilden eine erstaunliche Vielfalt an Meditationstechniken ab, die näher untersucht werden sollte.

Im dritten Kapitel vertiefe ich die Fragestellung des vorherigen Kapitels und stelle ein neues empirisches Klassifikationssystem für Meditationstechniken vor. Ich identifizierte die 20 beliebtesten Meditationstechniken anhand der vorhergehenden Studie und führte eine weitere Umfragestudie durch. In dieser Studie bat ich 100 Meditationsexpert*innen darum, die 20 Meditationstechniken nach ihrer wahrgenommenen Ähnlichkeit zu beurteilen. Mit diesen Ähnlichkeitsurteilen führte ich eine Multidimensionale Skalierung durch und fand zwei Dimensionen anhand derer die Meditationstechniken klassifiziert werden konnten: *Aktivierung* und *Ausmaß der Körperorientierung*. Diese Einteilung betont die Relevanz von „embodied cognition“ (verkörperter Kognition) in der Meditation. Innerhalb der beiden Dimensionen traten sieben Cluster ähnlicher Techniken hervor: Achtsames Beobachten, körperzentrierte Meditation, visuelle Konzentration, Kontemplation, affektzentrierte Meditation, Mantra Meditation, und Meditation in Bewegung. Aus diesen Ergebnissen schlussfolgerte ich, dass es keine Meditation als solche, sondern dass es unterschiedliche Arten der Meditation gibt, die unterschiedliche Effekte haben können. Diese Arten hinterfragen die beliebte und verbreitete Unterteilung in „fokussierte Aufmerksamkeit“ und „offenes Gewahrsein“.

Im dritten Kapitel erweitere ich den Fokus und beschäftige mich eingehend mit einem elaborierten Meditationssystem—dem achtfachen Yogapfad. Ich rezensiere die vorhandenen Nachweise von Effekten der Hauptkomponenten des Yogapfades, zu denen sowohl Körper-, Atem- und Meditationsübungen als auch ethische Unterweisungen gehören. Zahlreiche Studien und Meta-Analysen haben die Wirksamkeit von Yoga demonstriert. Allerdings ist bisher nur wenig darüber bekannt, wie die verschiedenen Komponenten von Yoga zu seiner generellen Wirksamkeit beitragen. Daher evaluiere ich in diesem Kapitel 18 Vergleichsstudien und 16 Meta-Analysen, die entsprechende Subgruppen-Analysen durchgeführt haben. Diese Studien und Meta-Analysen untersuchten verschiedene Variablen und variierten stark bezüglich der Studienpopulation, dem Studiendesign und den untersuchten Yogakomponenten. Nichtsdestotrotz übertrafen komplexe Interventionen, die verschiedene Yogakomponenten kombinierten, einfachere Interventionen. Das Hinzufügen von Atem- und/oder Meditationsübungen war in dieser Hinsicht besonders hilfreich. Dennoch waren spezifische Komponenten oder Kombinationen effektiver bezüglich mancher Variablen oder klinischer Konditionen als andere. Dies weist darauf hin, dass Interventionen maßgeschneidert werden sollten. Ähnlich komplexe Interventionen, wie Yoga und Achtsamkeitsbasierte Stressreduktion waren häufig ähnlich effektiv. Viele Ergebnisse bleiben jedoch vorläufig und es besteht der Bedarf nach weiteren methodisch hochwertigen Studien. Besonders die ethische Komponente von Yoga wurde bisher noch kaum erforscht.

Das fünfte Kapitel beschreibt eine Interventionsstudie, die sich mit den Effekten verschiedener Kombinationen von Yogakomponenten befasste. Mit Hilfe eines experimentellen Einzelfalldesigns untersuchte ich die inkrementelle Wirkung ethischer Unterweisung und körperlichem Yoga auf Mantra Meditation. Zweiundvierzig Proband*innen wurden zufällig auf vier Konditionen aufgeteilt—Meditation alleine, Meditation plus körperlichem Yoga, Meditation plus ethischer Unterweisung, und Meditation plus Yoga und Ethik. Alle Interventionen dauerten acht Wochen. Während der Baseline- und Treatmentphase beantworteten die Teilnehmer*innen täglich einen Fragebogen. Fast alle Teilnehmer*innen erlebten eine Steigerung ihres Wohlbefindens, außer denjenigen, die nur meditiert hatten. Diese Steigerung war am höchsten bei Teilnehmer*innen, die ethische Unterweisungen erhalten hatten. Alle Interventionen tendierten dazu, Stress zu reduzieren. Dabei reduzierte körperliches Yoga Stress am effektivsten. Die Ergebnisse betonen die inkrementellen und differenziellen Wirkungen die entstehen, wenn Meditation in Kombination mit anderen Praktiken des achtfachen Yogapfades praktiziert wird. Darüber hinaus beobachtete ich eine starke interindividuelle Variabilität in den Reaktionen auf die Interventionen, welche ich in diesem Kapitel diskutiere und zu erklären versuche.

Im letzten Kapitel ordne ich die Ergebnisse meiner Studien in die allgemeine Forschungslandschaft ein. Alle Studien tragen zu einem tieferen Verständnis von Meditation in ihrer ganzen Vielfalt bei. Die grundlegenden Meditationstechniken (Kapitel 2) und das empirische Klassifikationssystem (Kapitel 3) erweitern den Horizont der bisherigen Meditationsforschung und können als Basis für weiterführende empirische Vergleichsstudien genutzt werden. Das Praktizieren von Meditation in einem seiner ursprünglichen Kontexte (Kapitel 4 und 5) kann die Effektivität deutlich erhöhen und sollte tiefergehend exploriert werden. Weitere Faktoren wie die Persönlichkeit und Motivation der Meditierenden, sowie das Setting und der Einfluss der Lehrenden sollten ebenfalls untersucht werden.

Eidesstattliche Erklärung

Hiermit erkläre ich, dass ich die vorliegende Arbeit selbständig verfasst und keine anderen als die angegebenen Hilfsmittel verwendet habe.

Dresden,

Karin Matko

KARIN MATKO

Dedicated young researcher in the field of contemplative psychology with extensive experience in research and meditation practices eager to make a significant contribution to her field

EXPERIENCE

Chemnitz University of Technology – Ph.D. Student and Research Assistant, 2015-present

- Responsible for the project “What is Meditation? Differential Effects of Basic Meditation Techniques”; Collaborating on the project “Meditation Based Lifestyle Modification – Development and Evaluation of a Mind-Body Program Based on Integral Principles of Yoga”
- Teaching research methods and statistics in psychology to undergraduate students

Yogi-Ma Dresden – Freelance Yoga Teacher, 2014-present

Palucca University of Dance Dresden – Research Assistant, 2014-2015

Internships during my studies, 2010-2012

- Research intern at the University of Nottingham, Human Development and Learning Group, UK
- Journalist intern at the MDR Culture Radio of Middle Germany, Halle/Saale
- Clinical intern at the University Clinic Dresden, Clinic for Psychiatry and Psychotherapy

EDUCATION

Chemnitz University of Technology – Ph.D. student, Stipend of the Chemnitz University of Technology

Yoga Vidya Dresden – Yoga teacher (730 h training)

Dresden University of Technology – M.Sc., Educational and Clinical Psychology, Stipend of the German Academic Scholarship Foundation

SKILLS

Language Skills – German native speaker. Fluent in English and Russian. Very good French. Basic Slovak.

Computer Skills – R. SPSS. Soscisurvey. Image, sound and video editing. Content management systems.

INTERESTS

Meditation. Dancing. Singing. Improv. Blogging. Sustainability. Urban gardening.

SELECTED PUBLICATIONS

Matko, K., Ott, U., & Sedlmeier, P. (2021). What do meditators do when they meditate? Proposing a novel basis for future meditation research. *Mindfulness*, *12*(7), 1791-1811. <https://doi.org/10.1007/s12671-021-01641-5>

Matko, K., Sedlmeier, P., & Bringmann, H. C. (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. *Frontiers in Psychology*, *12*. <https://doi.org/10.3389/fpsyg.2021.672301>

Matko, K., & Sedlmeier, P. (2019). What is meditation? Proposing an empirically derived classification system. *Frontiers in Psychology*, *10*, Article 2276. <https://doi.org/10.3389/fpsyg.2019.02276>