

Affective Regulation and Mindfulness-Based Interventions

Emotion-Related Targets Engaged by Mindfulness-Based Interventions:

A Systematic Review and Evidence Map

and

Meditation, Mindfulness, and Health Training: Framework and Pilot Data
for a Mindfulness-Based Intervention Designed for College Students

By

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Thesis

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VITA

In 2015, Hannah J. Kimmel received her Bachelor of Arts Degree in Linguistics from the Department of Cognitive, Linguistic, and Psychological Sciences of Brown University. As an undergraduate at Brown, she studied French and French linguistics while at the l'Université de Paris IV (La Sorbonne). Her undergraduate studies were supported through a QuestBridge Scholarship. She returned to Brown University in September 2015 to pursue her Master of Public Health with a focus on Epidemiology. While at the School of Public Health, she worked in the Center for Population Health & Clinical Epidemiology as a Research Assistant in the Mindfulness and Cardiovascular Health Lab on the Mindfulness-Based Blood Pressure Reduction study. Additionally, she worked in the Center for Evidence-Synthesis in Health on data extraction, and she held the position of Clinical Research Assistant in the Department of Emergency Medicine at Rhode Island Hospital with Megan Ranney MD, MPH, FACEP.

Outside of academics, Hannah sat on the Graduate Council as the first-ever Master candidate representative and was a member of the School of Public Health Graduate Student Council. She volunteered at Hope Hospice & Palliative Care of Rhode Island and at the Rhode Island Free Clinic. Hannah is a member of the American Public Health Association, American Public Health Association of Rhode Island, and the Society of Behavioral Medicine, and she looks forward to using her epidemiologic problem-solving skills to impact health outcomes in her areas of interest: primary care and prevention, complementary medicine, and racial and geographic health disparities, to name a few.

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DEDICATION

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TABLE OF CONTENTS

EMOTION-RELATED TARGETS ENGAGED BY MINDFULNESS-BASED INTERVENTIONS: A SYSTEMATIC REVIEW AND EVIDENCE MAP	1
STRUCTURED SUMMARY	2
INTRODUCTION	4
STATEMENT OF PURPOSE	7
METHODS	7
<i>Study selection</i>	11
<i>Data collection process</i>	12
RESULTS	16
<i>Study selection</i>	16
<i>Study characteristics</i>	17
<i>Risk of bias within studies</i>	19
<i>Synthesized results</i>	20
<i>Construct distribution in MBSR and MBCT trials</i>	21
<i>Measurement type distribution in MBSR and MBCT trials</i>	22
<i>Assay distribution in MBSR and MBCT trials</i>	23
<i>Effects of the repeatedly used assays in MBSR trials</i>	24
<i>Effects of the repeatedly used assays in MBCT trials</i>	28
<i>Effects of singularly used assays</i>	30
<i>Effects on non-clinical populations</i>	32
<i>Risk of bias across studies</i>	33
DISCUSSION	34
<i>Summary of evidence</i>	34
<i>Limitations</i>	39
<i>Conclusion</i>	40
FUNDING	41
GLOSSARY OF AFFECTIVE REGULATION ACRONYMS	42
REFERENCES	90
MEDITATION, MINDFULNESS, AND HEALTH TRAINING: FRAMEWORK AND PILOT DATA FOR A MINDFULNESS-BASED INTERVENTION DESIGNED FOR COLLEGE STUDENTS	104
ABSTRACT	105
BACKGROUND	107
OBJECTIVE	112
METHODS	112
PARTICIPANTS	113
OUTCOME VARIABLES	117
RESULTS	122
PARTICIPANTS	122
DISCUSSION	126
<i>Summary of findings</i>	126
<i>Mechanisms</i>	133
<i>Strengths and limitations</i>	135
<i>Population Health Implications</i>	137
CONCLUSION	138
REFERENCES	145
APPENDIX	153

LIST OF TABLES

EMOTION-RELATED TARGETS ENGAGED BY MINDFULNESS-BASED INTERVENTIONS: A SYSTEMATIC REVIEW AND EVIDENCE MAP	1
TABLE 1: Study Characteristics	46
TABLE 2: Major Findings	56
TABLE 3: Study Quality	87
 <i>MEDITATION, MINDFULNESS, AND HEALTH TRAINING: FRAMEWORK AND PILOT DATA FOR A MINDFULNESS-BASED INTERVENTION DESIGNED FOR COLLEGE STUDENTS</i>	 104
TABLE 1: Demographics of MMHT Participants	140
TABLE 2: Paired Results of on Emotion Outcomes	141
TABLE 3: Paired Results of MMHT on General Health Outcomes	142
TABLE 4: Paired Results of MMHT on Cognitive Performance Outcomes	143
TABLE 5: Paired Results of MMHT on Mindfulness	144

LIST OF FIGURES

EMOTION-RELATED TARGETS ENGAGED BY MINDFULNESS-BASED INTERVENTIONS: A SYSTEMATIC REVIEW AND EVIDENCE MAP	1
FIGURE 1: Study inclusion PRISMA flow diagram	44
FIGURE 2: Evidence map of assays across affective regulation constructs	45
 <i>MEDITATION, MINDFULNESS, AND HEALTH TRAINING: FRAMEWORK AND PILOT DATA FOR A MINDFULNESS-BASED INTERVENTION DESIGNED FOR COLLEGE STUDENTS</i>	 104
FIGURE 1: Format and practices of each MMHT session	139

**Emotion-Related Targets Engaged by Mindfulness-Based Interventions: A
Systematic Review and Evidence Map**

Structured Summary

Context: Self-regulation, comprised of affective regulation, cognitive processing, and self-related processing, is increasingly researched as potentially influencing medical regimen adherence. Mindfulness-based interventions (MBIs) have been implemented to improve self-regulation, the most established and prominent of which are Mindfulness-Based Stress Reduction (MBSR) and Mindfulness-Based Cognitive Therapy (MBCT). The degree to which MBIs engage specific affect regulation measures have not been systematically reviewed.

Objective: The present study examined which types and instruments associated with emotion-related processes are repeatedly used in trials of MBSR and MBCT. Efficacy of the affective targets and instruments repeatedly engaged in MBSR and MBCT will be assessed in a forthcoming meta-analysis.

Data sources: Four databases were searched: PubMed, CINAHL, PsychInfo, and ERIC with restrictions limiting the search for adult participants (over the age of 18 years old), English-only publications, and human-only trials. Additional inclusion criteria were randomized trials with at least one control group, a minimum of 10 participants in the intervention group, and standardized MBSR and MBCT interventions.

Study selection: Of 10,595 studies retrieved and double-screened by a six-person review team, 1,771 full-texts were retrieved and additionally screened for inclusion. Data from 87 studies were extracted (MBSR $n = 59$, MBCT $n = 28$), and 54 unique trials with 5,082 participants (MBSR $n = 36$, MBCT $n = 18$, from 70 total separate publications) reported an outcome in the affective regulation domain and were included here for qualitative synthesis.

Data synthesis: Most trials examined the effects of MBSR or MBCT on clinical populations (47 trials) with limited racial and sex diversity. There were 57 separate assays found across 15 different constructs of affect regulation, with the most frequently used assays encompassed in the depression and anxiety constructs. All 36 trials of MBSR

utilized a self-report type of measurement across several constructs, as did 16 of the 18 MBCT trials. The risk of bias among these trials was primarily driven by a lack of participant blinding and concealment information not reported.

Conclusions: The primary areas of affect regulation currently assessed by MBIs falls within depression and anxiety. Trials have not generally incorporated objective measures such as peripheral biological assays or clinical assessments.

Keywords: mindfulness, affect regulation, emotion

Introduction

As the population impacted by chronic conditions increases in the United States,¹ complementary and integrative therapies have gained traction from the medical sphere in the possible benefits on health outcomes,^{2,3} possibly though the mechanisms of self-regulation.⁴⁻⁷ Mind-body interventions are well-suited to strengthen several aspects of self-regulation, comprising mechanisms of regulating affective, cognitive, and self-related processes.⁵⁻⁷ These domains of affective, cognitive, and self-related processes of self-regulation together refer to the ability to manage intrapersonal resources, i.e., self-regulate, and coordinate personal behaviors, thoughts, and actions with personal goals and values.⁸ Viewing self-regulation in these three domains provides additional granularity to the areas wherein targets within any of the three broader domains may be engaged. Self-regulation necessitates both an initiation and maintenance of a change.⁹ Improved understanding of the precise components of self-regulation that are engaged and responsive to induced changes will facilitate optimizing interventions to effect lasting behavior change. Affective regulation, encompassing both emotion-related processes and affective states, refers to an individual's capacity to alter the magnitude and/or duration of an emotional response to stimuli or the presence of emotional states.¹⁰⁻¹² Well-established and functional affective-regulation supports one's self-regulatory behaviors that interface with medical regimen adherence and may improve health outcomes.¹³⁻¹⁵ For example, enhanced emotional abilities to cope with stressful situations may increase one's ability to sustain healthy dietary behaviors under stressful conditions.¹⁶ Additionally, psychological distress has been shown to be associated with health

behaviors and adherence to smoking cessation,¹⁷ weight loss,¹⁸ and breast cancer screening and treatment.¹⁹

Mindfulness, defined as the ability to attend nonjudgmentally to the present moment,²⁰ may be further operationally defined as a combination of two components: the self-regulation of attention focused on present moment experiences and the metacognitive experience of becoming aware of the workings of one's mind in a nonjudgmental manner.²⁰ Mindfulness-based interventions (MBIs) have been implemented in a multitude of settings, including prisons,^{21,22} schools,^{23–25} military,^{26,27} workplace,^{28,29} and among a variety of clinical and nonclinical persons,³⁰ to enhance self-regulation. However, the field lacks consensus on which mechanisms and processes these interventions reliably employ. Two standardized, established, and widespread MBIs are Mindfulness-Based Stress Reduction (MBSR)³¹ and Mindfulness-Based Cognitive Therapy (MBCT).³² MBSR, the first mindfulness-based intervention originally designed for chronic pain and stress reduction, is typically comprised of 8 weeks of 2.5 hour sessions with an accompanying all-day (~7 hour) retreat later in the course. MBCT was adapted from MBSR to target depressive symptoms and risk factors for recurrence by combining MBSR with elements of cognitive behavioral therapy. MBSR and MBCT in particular have been utilized and examined in relation to several conditions related to the affective regulation component of self-regulation, such as depression, anxiety, and the stress response. These multidimensional interventions incorporate formal and informal meditation training, guided practices, investigative inquiry, social support, and didactic components.

Although the impacts of the two aforementioned MBIs in participant emotion-related processes have been studied, methodological concerns such as small sample sizes, lack of randomization, and lack of a control group restrict the external validity of the findings.³³ Positive publication bias or selectively reporting findings may also impact the generalizability of the published literature. Modifications of the standard interventions also present a potential issue. While there is an accumulation of mindfulness programs further adapted from these two standard iterations for specific populations or problems, such alterations to MBSR and MBCT have often been developed without a systematic and unanimous decision on which permeations of mechanisms, targets, or processes are efficacious. Numerous other MBIs have been developed, largely based on variations of MBSR to target specific conditions including affect-related conditions. This review will focus on MBSR and MBCT because they are the most studied and most widely used standardized MBIs to date.^{33,34}

Broadly, the present study is a part of a project that is a multidimensional approach to investigating the ways in which MBIs impact self-regulation (in the three sub-categories of emotional, cognitive, and self-related processing) in order to improve medical regimen adherence. The present review examines studies in which standard MBSR or MBCT were employed in rigorous study designs, to assess which targets and related instruments of affective regulation are repeatedly engaged. A forthcoming meta-analysis will further investigate the degree to which these targets and instruments are reliable in eliciting meaningful effect sizes.

Statement of purpose

Affective regulation is a mechanism hypothesized to be in part responsible for the effects of MBIs on mental and physical health.^{5,35,36} Understanding whether emotion regulation is affected by MBIs will not only clarify etiologic processes, but could also identify responsive assays through which mindfulness-based interventions can be evaluated to fairly quickly determine effects, consistent with experimental medicine and Science of Behavior Change methodological approaches.^{34,37} However, to date, a systematic review has not yet been performed to understand which, if any, affective measures may be influenced by mindfulness-based interventions and which instruments have been most utilized. The meta-analysis will assess the effect sizes and the degree of influence the MBIs have on specific emotion-related instruments. The present study therefore aims to address these two questions:

1. Which, if any, targets of emotion-related processes of self-regulation are repeatedly influenced and have been investigated in relation to MBSR and MBCT?
2. Which assays of emotion regulation measurement (e.g., self-report, behavior, peripheral biology, other) are most and least represented in MBSR and MBCT research to date?

Methods

An evidence map was developed and provides an overview of the current literature on MBCT and MBSR, using methods consistent with those performed elsewhere³⁸ that

depict the number of studies evaluating associations of specific MBIs with particular affective regulation measures. This approach provides a scoping overview of the state of the field in terms of what is known, and not known, about impacts of MBIs on established domains of affective regulation. Established methodologies outlined by the Cochrane Handbook of Systematic Reviews³⁹ and the Agency for Healthcare Research and Quality's *Methods Guide for Comparative Effectiveness Reviews*⁴⁰ were used to conduct this review. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines were followed for the reporting of this systematic review.⁴¹ The evidence map was created using STATA statistical software (StataCorp, College Station, TX).

Protocol and registration

On 12/09/16, a PROSPERO review registration for the protocol for this systematic review was submitted. The review documents were reviewed and documentation was processed on 12/16/16 (PROSPERO 2016:CRD42016051765). The posted protocol is available online from www.crd.york.ac.uk/PROSPERO/display_record.asp?ID=CRD42016051765.

Eligibility criteria

Six reviewers assessed study titles and abstracts for inclusion using Abstrackr.⁴² Included studies were required to have a sample size of at least 10 participants in the mindfulness intervention arm; participants all over the age of 18. Both clinical and healthy adult populations, meeting the aforementioned criteria, were included. Only randomized

controlled trials with one or more control condition (i.e., active, passive, etc.) were included.

Captured practices included Integrative Body-Mind Training (IBMT), adapted Mindfulness-Based Interventions (MBIs), Mindfulness-Based Cognitive Training (MBCT), Mindfulness-Based Stress Reduction (MBSR), Vipassana, and zen. Due to the large number of studies found, and in order to make the current review manageable and focused, studies that evaluated a meditative or mindfulness practice that was not standardized MBSR or MBCT were excluded, including: IBMT; adapted MBIs; Vipassana; zen; ACT; DBT; metta compassion training; mantra meditation; relaxation response; clinically standardized meditation; yoga; tai chi; qigong; visualization; prana(yama); controlled/diaphragmatic breathing; energy; qi; chi; kundalini; scripture-based meditation; prayer. To be considered a standardized intervention of MBSR or MBCT, the intervention content must have been delivered in person, in a group setting, over eight weeks. The interventions are comprised of weekly classes that are 2.5 hours and with an accompanying all-day (~7 hour) retreat, following the respective manuals for the interventions. Individual format interventions were excluded because the group process (discussion, inquiry, and dyads) takes up a large proportion of the class content.

Studies containing an outcome or instrument engaged in an affective process were included in this review. These include emotion-related processes, such as variables that may be measured by sympathetic hyperarousal and responses to stressful situations or stimuli, as well as self-report questionnaires and clinician-administered

interviews. Studies with outcomes such as relapse rates and hazard ratios were not included in the present review, as measures of proportions of treatment responders were not of interest to the research question of repeated affect assays.

Information sources

This systematic review utilized the following four electronic databases: CINAHL, ERIC, PsycINFO, and PubMed. The search was completed on March 25, 2016.

Search

The search design and implementation of this study was created with guidance from a research librarian at the Center for Evidence Synthesis in Health at Brown University (Providence, RI). The AND operator was used to connect terms designed to find mindfulness studies to terms that relate to the domains of self-regulation. The Medical Subject Heading (MeSH) terms of Mindfulness and Meditation were used in addition to the terms related to each of the three self-regulation domains (see Appendix for full search terms). Terms were truncated with an asterisk (*) to capture all possible endings for the designated root of the specified word. Filters were used to restrict the retrieved citations to English-only, human-only, and adult-only (age over 18 years old) publications.

The included assays were selected through a collaborative and iterative process among the 11 PhD-level researchers involved in this project. These investigators initially proposed assays using their content expertise, then discussed the options and voted

among the suggested terms in order to create the final list of terms for each domain of the broader project. This process took place over the course of 6 months. The affective regulation-specific search terms were designed to capture the following domain terms decided upon through deliberation among the co-investigators: emotional/stress reactivity, affect/affect regulation/affectivity, anger, anxiety, avoidance, compassion, coping, decentering, depression, distress tolerance, emotion/emotion identification/emotion regulation, empathy, equanimity, experiential avoidance, exposure, expression, fear/fear extinction, habituation, intention, mood, neuroticism, non-attachment, non-judgment, non-reactivity, pain, positive psychology, reconsolidation, resilience, re-perceiving, suppression, and amygdala activity. Upon completion of the search, these same terms were rearranged into meaningful constructs for reporting in the present study by clinical scientists who are leaders in the field for affect research, specifically with regard to mindfulness programs.

Study selection

The review team for this systematic review consisted of three graduate-level public health students and three bachelor's level research assistants, advised by 11 PhD-level researchers including two with systematic review expertise, a reference librarian specializing in systematic reviews, and directly supervised by 3 PhD-level researchers. The Center for Evidence Synthesis in Health (CESH) at the Brown University School of Public Health, which specializes in systematic reviews and meta-analyses was consulted as needed for extraction processes.

Citations from the various databases were consolidated in EndNote, de-duplicated twice: once using the de-duplication functionality in EndNote; once by hand by two of the Master's-level reviewers to assure completeness and accuracy. Titles and abstracts were double screened by reviewers using Abstrackr, where reviewers rated each title and abstract ("yes" meaning *include*, "no" meaning *exclude*, or "maybe" meaning *the PhD-level researchers' opinion was necessary*). Each citation for which the two randomly-allocated reviewers did not meet consensus on the inclusion or exclusion status was later determined to be included or excluded by discussion among the three graduate students. Final rulings on inclusion and exclusion status among these studies was decided on by the PI (Britton). Citations presented in Abstrackr with only a title and no abstract were included for full text review.

Data collection process

Before full text articles were extracted, the 13-member review team completed a training in using SRDR by a member of CESH specializing in utilization of the tool. Several practice extractions were completed and reviewing in weekly meetings. Practice extractions were completed both as a group to ensure familiarity and agreement in the process and as individuals extracting the same articles to test retention of the training information and consensus among members. To minimize differences in coding, thorough extraction instructions for each data field of the SRDR form was created, and weekly meetings were held during the initial live extraction of articles in order to review any withstanding points of confusion. Once extraction of the included studies began, each study was entered in SRDR by one member of the review team, and upon completion,

each study was assessed for completion and errors by a second experienced member of the review team completing master's degree graduate programs. Errors in the extractions were corrected as needed by the reviewers, then re-assessed by the experienced member of the team.

Studies meeting all above criteria were extracted, and data were entered and saved in custom-designed forms on The Systematic Review Data Repository (SRDR) online system (<http://srd.ahrq.gov>). This custom form, created with assistance from CESH, included information to be extracted for the purposes of this review, is publically available with the capacity to read, download, and comment on data from this study.

Data items

The basic design of the SRDR form included elements that address population characteristics; descriptions of the interventions, exposures, and comparators analyzed; outcome definitions; effect modifiers; enrolled and analyzed sample sizes; study design features; funding source; results; and risk of bias questions. Specific mindfulness intervention-related questions included the duration of class sessions; number of class sessions; number of hours for the all-day retreat; assigned home practice; reported home practice amount; instructor qualifications; program fidelity.

Risk of bias in individual studies

The methodological quality of each study was assessed by reviewers based on predefined criteria, using the Cochrane risk of bias tool

([http://handbook.cochrane.org/chapter 8/table 8 5 d criteria for judging risk of bias in the risk of.htm](http://handbook.cochrane.org/chapter_8/table_8_5_d_criteria_for_judging_risk_of_bias_in_the_risk_of.htm)). This tool asks about risk of selection bias, performance bias, detection bias, attrition bias, reporting bias, and other potential biases. The methodological quality was also assessed with MBCT and MBSR specific quality indices, which included teacher training/qualifications, class attendance, treatment fidelity, and adverse event monitoring. Ratings of high-risk and low-risk of bias were dependent on the question.

Summary measures

As an exploratory, sweeping review, no specific summary measures were predetermined before data collection. Hazard ratios for clinical diagnoses were not recorded, however means, standard deviations, F-statistics, medians, ranges, confidence intervals, p-values, and effect sizes such as Cohen's *d* were extracted for qualitative analysis.

Synthesis of results

Unique trials were used as the unit of analysis, and for studies using the same participant pool but reporting different outcomes in sequential publications, the results of publications beyond the primary (temporally first) study were entered in the primary study SRDR form. Only supplementary outcomes not present in the primary study reporting were added to the extraction form. Repeated outcomes of interest therefore were not entered again to avoid double-counting outcomes. If the studies reported unique outcomes from the same trial, but used different participants, these studies were kept separate in their SRDR forms and marked as linked publications.

The exported SRDR extraction form was utilized for the qualitative analysis presented here. For any necessary additional clarification, the full text of the publication was reviewed. Study characteristics and descriptive information for each sample are summarized for all publications included in this review, including study duration, sample size, and population characteristics such as race and ethnicity distribution, sex distribution, mean participant age, and the diagnostic criteria of the participant population organized by citation information (author, year, study title, associated publications if applicable) (**Table 1**). For publication reporting values for each intervention arm of the study, those values are reported here; otherwise, the study total values are utilized. Variables that are not reported by the study are recorded as such. These characteristics across studies were analyzed using a quantitative tally approach in order to describe study-level trends.

The type of intervention (MBSR or MBCT), a description of the control group, and the specific affective assays of interest were reported alongside a summary of the major study findings with effect sizes when available (Cohen's d effect sizes⁴³) (**Table 2**).

Results from individual studies from intent-to-treat analyses were prioritized in capturing the data; when a study provided both intent-to-treat and completer analyses, the results from the intent-to-treat analysis was extracted. The primary aim of the study was stated in conjunction with a determination of whether the primary aim was related to an emotion or affective process. The findings were categorized by within-arm or between-arm statistics, reporting here primarily on effect size and statistical significance, not on the

means and standard deviations at various timepoints for the studies. Only the affective-related findings are reported here. Statistical significance referred to a p-value less than 0.05. A meta-analysis expanding upon the results presented here is currently underway.

Quality ratings for each study were reported here (**Table 3**). Quantitative tallies and general trends were reported for each of the 11 Cochrane Risk of Bias questions. The objective responses to those questions were incorporated to determine a qualitative rating of high-, medium-, or low-risk of bias assessed by the study authors through discussion of principal concerns to study generalizability and validity in the field. Measures of potential bias introduced to the studies, such as unblinded assessors and high loss-to-follow up, are among those factors utilized to assess study quality.

Results

Study selection

The initial search returned 8,312 citations identified through searching PubMed. 4,772 citations were returned through searching Cinahl, PsychInfo, and ERIC, and after deduplication, the number of unique citations identified was 10,595. All 10,595 citations were screened using Abstrackr in order to exclude irrelevant studies based on title and abstracts alone. 8,824 exclusions made for studies not meeting inclusion criteria using Abstrackr, leaving 1,771 citations for full-text retrieval and full-text screening.

Upon assessing the full-text, 1,684 studies were excluded. The reasons for exclusion were 1) nonrandomized controlled interventions (n = 750); 2) not standard MBSR or MBCT

interventions, meaning that the time, content, or duration of the intervention were altered to be less than the standard amounts and practices (per manualized intervention recommendations) (n = 548); 3) the results of the study were either not presented, not available, or not extractable as defined by the consulting team at CESH (for example, results only presented graphically) (n = 49); 4) the study was one of the aforementioned excluded publication types, such as a letter to the editor (n = 43); 5) data not relevant to the study question (n = 42); 6) the number of participants in the intervention (MBSR/MBCT) arm less than 10 individuals (n = 33); 7) participants under 18 years old (n = 25); 8) associated publication reporting results of the same trial (n = 24); study presenting neuroimaging results which the present extraction form was not suited to capture (n = 12); 9) a duplicate study that was not previously removed (n = 2).

Of the 87 studies with data extracted (MBSR n = 59, MBCT n = 28), 54 unique trials with 5,082 participants (MBSR n = 36, MBCT n = 18, from 70 total separate publications) reported an outcome in the affective regulation domain and were included here for qualitative synthesis. (See **Figure 1**).

Study characteristics

All included trials were published after the year 2000, ranging from 2005 to 2016. Most trials had a sample size at or under 200 participants, with 6 trials having greater than 200 participants (up to 341) (**Table 1**). The number of participants in the meditation intervention groups ranged from 14 to 168 participants. One trial did not report the number of individuals specifically in the intervention group, though there were 42 total

reported participants among the two groups.⁴⁴ Follow-up periods varied, with 13 trials only completing immediate post-intervention follow-up assessments and several trials continuing follow-up for at least one year (n = 14). The longest follow-up period was two years.

The sample characteristics of the study populations exhibited fairly low diversity. Among trials reporting race or ethnicity, participants were most often White or Caucasian (53% - 100% identifying as either White or Caucasian), but most (57%, 31 trials) did not report the racial distribution of the participants. Ten of the trials reporting race did not describe the racial distribution by group allocation, but rather reported the race of the study population as a whole. For studies reporting the distribution by group (13 trials), there were only three trials of MBCT (69% White, 80.7% White, 98% White). The ten trials of MBSR reporting racial distribution were predominantly among White/Caucasian populations (71%-100%) with one trial below 50% White (41.9%).

The trials were primarily conducted with majority female populations, with 10 trials conducted on 100% female populations (7 trials of MBSR). Two trials (one MBSR, one MBCT) did not report sex distribution of participants. Twenty-nine trials of MBSR reported the distribution of sex by group allocation, of which two trials included no females. Other than the trials with no females, the distribution of sex among MBSR trials ranged from 11.5%-100% female. Seventeen studies of MBCT also reported the sex distribution by group, with all trials including a minimum female study population of 70% (ranging from 70%-100%).

Trials were among participants aged 18-75 years old. Mean age of participants in each arm was not reported in three trials, and approximately one-third of the studies (18 trials) only reported mean age for the total study population undifferentiated by intervention or control arms. Among the remaining studies reporting mean ages by participant group (33 trials), majority (18 trials) were among individuals in their 40s. In the 9 MBCT trials among participants in their 40s, mean ages of the intervention arm ranged from 43.99 years to 49.75 years old; for the 9 MBSR trials, the intervention arm ages ranged from 42.07 to 48.40 years old.

The majority of participants among the 54 trials were selected for a clinical condition (46), almost half targeted populations with an emotion-related diagnosis (21). The most frequent clinical conditions were various types of depression (13), and other affective clinical groups included those with diagnoses or symptoms of types of anxiety disorders (4), post-traumatic stress disorder (2), or symptoms of distress (2). Although some clinical populations were not explicitly emotion-domain related (ie, solid organ transplants, type 2 diabetes), the primary outcomes of the study were symptoms of depression or anxiety among a certain clinical population.

Risk of bias within studies

The quality of each individual study, assessed by the Cochrane Risk of Bias tool, is shown in Table 3. Most studies (40 of the 54 studies) adequately explained the method of randomization generation, although two studies did not and 12 studies did not provide

information on their randomization methodology. One trial did not conceal allocation prior to allocation, and 19 trials did not provide information regarding concealment of treatment allocation. Participants were blinded as to which treatment group they were placed in less than a quarter of the trials (13). The majority of studies did not blind participants (26), and data was not presented on participant blinding for over one-quarter of the studies (15). Outcome assessors were blinded to participant treatment allocation in about half of the trials (23), and the same number of trials did not present any data regarding blinding of outcome assessors. Bias introduced through the amount, nature, or handling of incomplete outcome data was an issue in 9 trials, and bias introduced through a difference of attrition rates between arms greater than 20% was present in three trials. Data on attrition rate differences between arms were not provided in four trials, as these trials tended to report study characteristics by total participants rather than by group allocation. Four trials showed evidence of selective outcome reporting. Intention-to-treat analyses were conducted in slightly over half of the trials (59%, 32 trials). Group similarity at baseline was present in the majority of trials (42), while the remaining 12 trials may have additional bias due to a lack of similarity between intervention arms. Data were not available regarding compliance with the intervention among 12 trials, and seven trials were found to have incomplete intervention compliance between groups.

Synthesized results

Outcomes of individual studies are presented in Table 2. The evidence map of the distribution of assays, constructs, and measurement types across MBSR and MBCT trials

is presented in Figure 2. Among the two interventions, 57 separate assays were utilized to investigate the effects of MBSR and MBCT across the 15 different constructs of affect regulation, mostly among clinical populations. The assays were organized into constructs for presentation in the current review by clinical researchers through a combination of the operationalization described by the study authors in using the assay in addition to the content knowledge of the clinical experts. Full instruments were inspected in order to categorize the assays in the most meaningful constructs in consideration of the psychometric validation of the instrument.

Construct distribution in MBSR and MBCT trials

Depression (including suicide ideation) and anxiety were the most repeatedly engaged constructs among the MBSR and MBCT trials. A larger proportion of the MBCT trials included an outcome within the depression construct than did MBSR trials, although over half of the MBSR trials did as well (23 of 36 MBSR studies versus 18 of 18 MBCT studies). MBSR trials included a measure within the construct of anxiety more often than MBCT trials (18 versus 8 trials). Attitudes about emotions was examined in 1 trial of MBCT, whereas this construct was included in 4 trials of MBSR. Current mood states were similarly examined in 1 trial of MBCT, and 6 of MBSR. The construct of stress coping was incorporated more frequently in MBSR trials (11) than those of MBCT (0). Global mental health, encompassing satisfaction, wellbeing, and quality of life if explicitly stated as a psychological metric, were outcomes in 12 trials of MBSR and 2 of MBCT. Sympathetic arousal was included in 4 MBSR trials and no trials of MBCT, an occurrence that also was found in the relational construct (2 MBSR trials, none MBCT).

Reaction to provocation was included in 5 MBSR trials and none of MBCT. Constructs examined in 1 trial of MBSR include: adrenal response (not provoked), disability attributable to emotional problems, post-traumatic stress disorder, and work attitudes and emotional exhaustion.

Measurement type distribution in MBSR and MBCT trials

The types of measurements used to gather information on their respective constructs were categorized as either self-report, clinical assessment, or peripheral biological. The clinical assessment and the peripheral biological types of measurements were considered objective in nature whereas self-report instruments were considered subjective.

Overall, subjective self-report measurements were the most broadly utilized among all trials. All 36 trials of MBSR utilized a self-report type of measurement across several constructs, as did 16 of the 18 included MBCT trials. Clinical assessments were used in half of the MBCT trials (9), primarily as measures for depression (utilizing the Hamilton Depression Rating Scale [HAM-D]) with one MBCT trial also using clinical assessment for anxiety measurement (utilizing the Hamilton Anxiety Rating Scale [HAM-A]).

Clinical assessments were used in three trials of MBSR, measuring anxiety (Liebowitz Social Anxiety Scale [LSAS]), depression (HAM-D), global mental health (Clinical Global Impression [CGI]), and PTSD (CAPS PTSD). Peripheral biology measurements were included in seven trials of MBSR, for the constructs of adrenal response, sympathetic arousal, and reaction to provocation. No trials of MBCT trials used peripheral biology measurements for affect regulation outcomes. Due to the homogeneity

of results such that the majority of measurements were conducted using self-report, the distinction between self-report, peripheral biological, and clinical assessment measurement types is not illustrated in the evidence map.

Assay distribution in MBSR and MBCT trials

The distribution of the assays across the affective regulation constructs is illustrated in the evidence map (**Figure 1**), where heavy clustering is visible. The most frequently utilized assays among MBSR interventions were the SCL-90R (utilized in 11 trials), the Perceived Stress Scale (PSS) (11 trials), the Center for Epidemiologic Studies Depression Scale (CES-D) (7 trials). There were 27 assays that were each only used by 1 MBSR trial. Ten assays (17.5%) total were not utilized by any MBSR trial, although at least 1 MBCT trial did use them. Two trials used validated scales in other languages (Perceived Stress Scale [PSS] and State-Trait Anxiety Inventory [STAI] in Chinese, Symptom Checklist-90-Revised [SCL-90R] in Danish).

Over 60% of the assays reported here were not utilized in any trial of MBCT (36 assays, 63.2%). The most repeatedly used assay among the MBCT trials were the Beck Depression Inventory - II (BDI-II) and the HAM-D (8 trials each). The Beck Depression Inventory (BDI) was also among the most frequently used, with 6 trials utilizing this assay. The Beck Anxiety Inventory (BAI) (3 trials) and the Penn State Worry Questionnaire (PSWQ) and STAI (2 trials each) complete the list of MBCT assays utilized repeatedly. Among the remaining assays (18), majority were used in one MBCT trial each (12 assays used once in 8 unique trials).

Effects of the repeatedly used assays in MBSR trials

Twelve assays were used more than once among the 36 trials of MBSR. Nine of these assays did not report between-arm comparisons, though each of these 9 provided within-arm comparisons. The assays with data available were generally within the depression and anxiety constructs, as previously mentioned.

Symptom Checklist-90-Revised (SCL-90R)

Results of the 11 trials utilizing the SCL-90R for global mental health were reported across the distress, anxiety, and depression subscales of the assay in addition to a global score. The effects of MBSR on the SCL-90R across the subscales over time were significant in 5 of the 6 trials compared to the control conditions of varying levels (waitlist, treatment as usual [TAU], active control) at the 8-week timepoint. The sixth trial only showed significant group differences at post-treatment timepoints rather than at 8-week follow-up.

Perceived Stress Scale (PSS)

Similarly, 11 trials employed the PSS, though the versions utilized were split among the 10-item (5) or the 14-item (5) scale, and with 1 trial using the 4-item version of the PSS. Two of these 11 trials using the PSS did not report between-arm comparisons for the assay. Not considering the 2 trials without between-arm PSS effects reported, the effect of MBSR on the PSS was split similarly to the manner in which the trials used the different lengths of the instrument; 5 trials reported significant reductions in PSS immediately after the intervention compared to the controls, 5 did not find significant

reductions compared to controls, and the 1 remaining trial showed an immediate significant decrease at the end of the intervention with the significance of that decrease losing significance by the 20-week follow-up. The trials using the 14-item version showed a significant decrease more than the 10-item version.

Center for Epidemiologic Studies Depression Scale (CES-D)

For 4 of the 7 trials using the CES-D, results were significant at 8 weeks in the MBSR group compared to controls. One trial did not report the between-arm comparisons for the CES-D. For 3 of the trials using the assay, results were not significant at either the 8-week timepoint (1) or a follow-up time point (2). Effect sizes for the CES-D were medium to large across the 7 trials.

Patient Health Questionnaire (PHQ)

Five MBSR trials used the PHQ, with the versions of this assay either being the PHQ-8 or the PHQ-9. Results of the PHQ were mixed, with 8-week results significant in 2 of the trials, and 2 of the trials showing significance at later timepoints.

Speilberger State-Trait Anxiety Inventory (STAI)

The STAI was used in 6 trials of MBSR, with significant effects more often found in assessing state anxiety (STAI-Y1) than trait anxiety (STAI-Y2) when results were differentiated in such a manner. Two trials were significant and did not separate the scores of the state versus the trait scales of the STAI. One trial did not separate the scores and was not significant for the total score.

Beck Anxiety Inventory (BAI)

Four trials of MBSR used the BAI, and significant effects were demonstrated in 1 trial at 9 months and two trials at 8 weeks. The remaining trial did not report the p-value of the BAI, rather stating it was not significant. Reported effect sizes of the BAI in the MBSR arm of the trials were quite large ($d = .88, .82$).

Beck Depression Inventory (BDI/BDI-II)

The trials of MBSR utilized the BDI-II (5 trials) more than the BDI (2 trials). The between-group significance of the BDI/BDI-II for these trials was significant in 4 of the 7 total trials. The effect sizes within the MBSR arms were larger than their respective controls, ranging from .69 to 1.03 for the MBSR arm and between .02 and .58, with the exception of 1 active control condition which outperformed the MBSR arm ($d = .79$ versus .67).

Penn State Worry Questionnaire (PSWQ)

Among the 3 trials which used the PSWQ, the only trial with an active control condition did not report a between-arm comparison of the effects of the intervention on the outcome. Compared to the 2 waitlist conditions among the other two trials, the MBSR group was significantly different from the control group

Positive and Negative Affect Schedule (PANAS)

Two trials used the 10-item PANAS, both comparing MBSR to a waitlist control group. In one of the trials, the effects of MBSR on the PANAS positive affect score were not significant ($p = .42$) with a small within-MBSR group effect size (.13). For the other trial, the PANAS score was reported as a total that was not significant when comparing the two groups ($p > 0.05$). The trial without significant findings did not report within group effects for the PANAS.

Blood Pressure (BP)

Three trials used BP as an outcome measure of sympathetic arousal, with all 3 reporting comparisons between the MBSR group and the waitlist (2 trials) or TAU (1 trial). One trial did not find a significant difference between the MBSR group and the control for systolic BP at either assessment period (8 week or 1 year), however the other two trials found significant reductions at both 8-weeks and at follow-up timepoints ($p < 0.05$, $p < 0.001$) in the MBI compared to controls. Findings for reductions in diastolic BP were significant in 2 of the 3 trials, although 1 of these trials found a significant reduction for diastolic BP at the 1 year timepoint, but not at 8 weeks, when comparing MBSR to the control condition.

Provoked salivary cortisol

Two trials used salivary cortisol as a measure of reaction to provocation. One is described in non-clinical populations below, and the other did not report between-arm comparison statistics. Within the MBSR group, results were not significant ($p = 0.396$).

Parenting Stress Index (PSI)

Two trials used the PSI, 1 finding significant results when comparing the MBSR arm to the waitlist control, and 1 trial not finding a significant effect when comparing MBR to an active control condition.

Effects of the repeatedly used assays in MBCT trials

Beck Depression Inventory (BDI/BDI-II)

The BDI was used in six trials of MBCT, and in 5 of the 6, results comparing MBCT to the control conditions (waitlist or TAU) were significant, although 1 of these trials found the significant effect at 3-months ($p = 0.003$) and not 8-weeks ($p = 0.31$). One trial using the BDI and comparing MBCT to an active control condition did not report a between-arm comparison, but the within-arm effect was significant ($p = 0.04$). The BDI-II was used in 8 MBCT trials, each of which reported between-arm comparisons. The effects were significant in 5 of the trials (p-values ranging from < 0.001 to 0.027), including 1 trial with an active control condition while the rest were waitlist or TAU. For the remaining 3 trials, comparisons against active control conditions yielded results that were not significant in favor of MBCT (p-values ranging from 0.12 to 0.914).

Hamilton Depression Rating Scale (HAM-D)

Eight trials used the HAM-D, with one using the 24-item version while the others utilized the HAM-D 17. Half of these trials used an active control condition, and all but 2 reported between-arm comparisons. Five of the 8 trials reported significant effects of MBCT on HAM-D scores, with time by treatment or treatment p-values ranging from

less than 0.001 to 0.002. One of the trials without significant between-arm results reported a significant within-group difference for the MBCT arm and not for the waitlist control. The within-arm results of the 2 trials without reported between-arm comparisons were mixed; in 1 trial, MBCT did not show a significantly stronger effect than TAU ($d = .29$), and the other showed a significant 8-week mean percent reduction of HAM-D scores among the MBCT group ($p = 0.01$).

Beck Anxiety Inventory (BAI)

Three trials used the BAI, 2 using a waitlist control group to compare against MBCT and showing significant results ($p < 0.01$, $p = 0.022$), although the comparison of MBCT against an active control was not significant ($p = 0.29$). The 1 trial reporting the mean difference within the MBCT group for BAI scores was significant (8-week versus baseline mean difference -1.95 , $p = .014$).

Speilberger State-Trait Anxiety Inventory (STAI)

The STAI was used in 2 trials, both comparing MBCT to waitlist conditions. One trial did not find a significant group by time interaction for the STAI-Y2 ($p = 0.083$), however the STAI-Y1 was significant ($p = 0.048$). The total STAI was significant in a time by treatment comparison in the other trial ($p < 0.05$).

Penn State Worry Questionnaire (PSWQ)

Both of the 2 trials using the PSWQ found significant effects of MBCT compared to the controls (waitlist, TAU, $p < 0.001$ for both). One trial additionally reported a significant within-MBCT group reduction of the PSWQ score ($p < 0.05$).

Effects of singularly used assays

Twenty-seven assays were only utilized in one of the MBSR trials described in this review. Three trials did not report between-arm comparisons. Of these, significant effects were found in 16 of the assays and in favor of the MBSR arm: Affect Control Scale (ACS, $p = 0.007$); heart rate ($p < 0.01$); Brunel Mood Scale (BRUMS, all < 0.05 except Anger [0.191] and Vitality [$p = 0.639$] subscales); Lazarus' Coping Strategies Methods (WOQC, $p < 0.01$); Depression, Anxiety Stress Scale (DASS, $p < 0.001$); Difficulties in Emotion Regulation Scale (DERS, $p < 0.009$); Interleukin-8 (IL-8, $p < 0.01$); Interpersonal Reactivity Index (IRI, $p < 0.05$); LSAS-SR (group main effect $p < 0.001$); adrenal response salivary cortisol ($p = 0.02$); Social Interaction Anxiety Scale Straightforward (SIAS-S, $p < 0.001$); Spielberger Anger Expression Scale (SAES, anger in $p = 0.001$; anger out $p = 0.005$); tumor necrosis factor-alpha ($p < 0.01$).

One trial used a factor analysis by creating a total score for emotional change through compiling the PANAS, BDI, BAI, Anxiety Sensitivity Index (ASI), Novaco Anger Inventory, Anger Rumination Scale, Rumination Scale of RSQ, PSWQ, though none of these assays were reported independently. The factor analysis found changes in mindfulness predicted changes in emotional well-being ($p < 0.001$) within the MBSR group alone, and between-arm comparisons were not reported. In another trial comparing

the effects of MBSR and an active control on current mood states, using the Clinical Global Impression (CGI) assay, the results were significantly in favor of the control condition ($p = 0.005$). Similarly, in an active control comparison, the Generalized Anxiety Disorder Scale (GAD-2) was found to be significant when for the control versus MBSR arm ($p < 0.05$), but not MBSR to usual care ($p > 0.05$).

Other mixed and/or non-significant results include the MBI ($p = 0.05$ at 8 weeks, 3 months NR); Psychological General Well Being Index (PGWI, $p = 0.02$ at 6 months but $p = 0.14$ at 8 weeks); Clinician-Administered Posttraumatic Stress Disorder Scale (CAPS, 9 weeks net mean difference = 2.35, $p = 0.37$, but 17 weeks net mean difference = 7.89, $p = 0.004$); capsaicin-induced flare size (8 week $p = 0.004$, 4 months $p = 0.29$); Courtland Emotional Control Scale (CEC, 4 months $p > 0.05$ on anxiety, unhappiness; 2-year $p < 0.05$ on anxiety, unhappiness, cognitive coping); Global Mood Scale (GMS, positive affect $p = 0.06$, negative affect = 0.189); Liebowitz Social Anxiety Scale (LSAS, fear subscale $p = 0.09$; avoidance $p = 0.009$).

Nine assays were utilized in one trial of MBCT each, with each reported between-arm comparisons and 2 additionally reported within-arm comparisons. Significant effects of MBCT were found in the Suicidal Cognitions Scale (SCS, $p = 0.02$); Dysfunctional Attitudes Scale (DAS, $p < 0.01$); Depression, Anxiety Stress Scale (DASS, $p < 0.01$); Automatic Thoughts Questionnaire-Negative (ATQ-N, $p < 0.01$); Experience Sampling Method (ESM, $p < 0.001$); PGWI ($p = 0.01$). The Beck Suicide Ideation Scale (BSS) time by treatment effect was not significant ($p = 0.50$), nor was the SCL-92 (anxiety $p = 0.21$;

depression $p = 0.54$). The Profile of Mood States (POMS) across subscales was also significant ($p < 0.05$, though Tired, Powerful, and Tense subscales $p > 0.05$).

Effects on non-clinical populations

Of the 54 included trials, only 7 trials (6 MBSR, 1 MBCT) were among healthy, non-clinical populations. These populations included 2 trials of healthy adults, with no other stipulations on their inclusion criteria, and the rest were among physicians, nurses, undergraduate students, adults over the age of 65 years old, and familial caregivers of individuals with dementia. The sample sizes of these trials varied from a total of 25 to 200 participants, with the MBI arms varying from 12 participants to 100. Participants in these trials were primarily female and of the three reporting the racial distribution, the participants were primarily Caucasian. The ages varied from a mean age of 20.5 years old up to a mean of 72.0 in the MBI arms. Among these seven trials, the effects of the MBI were mostly significant across for the constructs of anxiety and depression, dependent on the time measured, and results in work attitudes and emotional exhaustion were mixed. These trials compared the MBIs to a waitlist (3) or an active control condition (3), and one of the trials did not adequately describe the control group employed.

Between-arm comparisons were significant for the MBCT trial on ATQ-N, the BAI, BDI, DAS (all $p < 0.01$). The intervention and time interaction for depression among the MBSR non-clinical trials was significant ($p = 0.01$), but the active control HEP in the same trial performed better ($p = 0.002$). Another trial used CES-D and the HAM-D to create a combined depression severity score (alpha .89) that had significant group by

baseline severity ($p = 0.02$) and by group by severity by age ($p = 0.05$) results. The final of the non-clinical trials to investigate the effects of MBSR on depression did not provide a between-arm comparison, though the effects within the MBSR arm were not significant ($p = 0.16$). Work attitudes and emotional exhaustion was also not significantly different after MBSR. The only 1 of these trials to use the PANAS did not show significant effects (time by treatment $p = 0.42$, $d = .13$). One trial used the PSS and showed significant results at 8weeks and at six months, with around medium effect sizes.

Reaction to provocation, one of the constructs with solely objective peripheral biological assays, showed significant effects at 8-weeks for capsaicin-induced flare size, IL-8, and tumor necrosis factor-alpha, but not for provoked salivary cortisol. At 4-months, significant effects were found on IL-8 and provoked salivary cortisol, however tumor necrosis factor alpha was no longer significant. Another of the non-clinical trials used heart rate as a peripheral biological assay of sympathetic arousal, finding a significant decrease in the MBSR arm ($p < 0.001$). The results from the waitlist for this assay were not reported.

Risk of bias across studies

In assessing inter-rater reliability, 13 pairs of extractors-reviewers were created so that all reviewers were able to edit each extractors' data entry. Differences between extractors and reviewers were resolved by consensus. Mean extractor-reviewer agreement was 94.3% (range = 86.4% – 100%). Overall inter-rater agreement was very high (kappa = .933; range = .851 – .990).

Discussion

Summary of evidence

This review examined which affect-regulation related assays and constructs have been studied in trials of MBSR and MBCT to date. Results for the affect regulation assays were quite mixed, with significance varying depending on the timepoint of the assessment. Compared to the Goyal et al. systematic review and meta-analysis of meditation programs for psychological stress and wellbeing,³³ the present review included a comparable, though slightly larger, number of trials (41 trials with 2,993 participants compared to the present study of 54 trials with 5,082 participants). As similarly-focused and comparably-sized reviews, it is worth noting the similarities and differences in the findings of the two. While the Goyal review was broader in the types of interventions able to be included, a similar limitation of the included studies was noted in the variability in the types of controls. In meta-analysis, Goyal et al. found heterogeneity in clinical and intervention characteristics, found only 10 of the included studies to be of low-risk of bias, and generally found significant, moderate effects of the interventions on anxiety (effect size [ES], 0.40; CI, 0.08 to 0.71 at 8 weeks; ES, 0.22; CI, 0.02 to 0.43 at 3–6 months) and depression (ES, 0.32; CI, 0.01 to 0.66 at 8 weeks; ES, 0.23; CI, 0.05 to 0.42 at 3–6 months). These results were qualitatively found in the present review as well.

Elements of the original search term list of affective-related keywords that returned no publications in the present review include equanimity, habituation, intention, neuroticism, non-attachment, resilience, re-perceiving, and suppression. These constructs and assays

may be investigated in studies which are not 1) standard MBSR or MBCT; 2) randomized trials; 3) trials that are in progress and were not published before the search data of the present review. Other terms, such as rumination and amygdala activity will be described elsewhere in forthcoming publications. The extracted information for the measures of mindfulness in the studies may also include assays of affective-related data. Quality of life and wellbeing were constructs partially included in the affect-regulation domain, however a more nuanced examination of these targets is necessary as the quality of life or wellbeing rating associated with physical compared to emotional status may be conflated. For this reason, these assays were not included in the present study if a distinction of measuring psychological wellbeing alone was clearly determined adequate through co-investigator assessment of the instruments themselves.

Of the 38 MBSR trials included in this review, the primary aim of the study was affect-related in the majority of the trials (21). This was most often a study objective of a reduction of depressive symptoms or symptoms of anxiety or distress. Similarly, among the 18 MBCT trials, 14 had an affective-related primary aim. The remaining 19 trials of MBSR and MBCT did not have explicit affect-related primary aims, though some primary aims were to reduce symptoms of various conditions or states, for example, a reduction of symptoms of back pain, insomnia, fibromyalgia, Inflammatory Bowel Disease, and distress associated with positive HIV diagnoses. Other included studies aimed to increase mindfulness, attentional control, or overall quality of life.

Additionally, over three-quarters of the total trials (42) were among clinical samples (MBSR 29, MBCT 13). Of the non-clinical populations, between-arm comparisons mixed and assays were not used repeatedly. Variability between the samples (among participant characteristics, sample size, and control condition, in particular) make it such that generalizations for non-clinical samples is more limited than those of the clinical populations. These clinical populations were generally of large sample sizes, with the largest sample sizes among MBSR. Most MBCT trials had around 40 participants in the MBI arm. Two areas of participant characteristics that seemed to be consistently underreported or under-representative of the broader source population for the study were racial distribution and sex distribution of the participants. Both separately and together, these characteristics indicate a lack of diversity among these trials that should be noted.

Both MBSR and MBCT trials, however, more frequently used subjective self-report assays rather than objective peripheral biological or clinical assessment assays. Few of the objective assays were repeatedly used (3), although the HAM-D was administered in 9 total trials (8 MBCT). As objective measures may be considered more reliable and less susceptible to biases compared to self-report instruments, the field would benefit through an increased utilization of these types of assays. While the overall distribution of constructs, assays, and measurement types included in MBI trials shows select clustering around assays such as the BDI/BDI-II, numerous sparse and infrequently examined construct/assay combinations were also apparent. As mindfulness research is a relatively new field of study (all included trials in the last 15 years), perhaps this occurrence is related to the exploratory nature of current study questions.

While the overall quality ratings of the trials included predominantly marks of “low risk of bias,” an additional consideration in assessing the internal and external validity of independent study findings is the method of recruitment of study participants, which was generally either not described in the studies or was described as a process of self-selection from the source population. The bias introduced through the self-selection of participants may overestimate the results in the general population as these individuals may be more receptive to emotional and psychological changes initiated through the interventions. Another issue to consider in the individual findings is the variation of the control conditions to which the MBI is being compared. About one-third of the included trials (19, 35%) utilized an active control condition in the study design. These active controls were frequently pharmacological or psychoeducation control groups, though there were a small number of active control conditions matched to MBSR or MBCT without the mindfulness component. Most of these active controls occurred in MBSR trials (13) compared to MBCT (6), although 7 of these trials with an active control condition did not report between-arm comparisons. Active control conditions enhance clinical utility through the ability to assess the intervention against a comparison wherein only one element (in the present trials, the component of mindfulness) differs between the conditions. By neglecting to report the comparisons between the active control and mindfulness intervention conditions, the findings reported in these 19 trials more similarly reflected findings a less rigorous study design, perhaps with a single-arm or inactive control condition rather than an active control comparison. In less than half of these trials with an active condition (8 trials, 6 MBSR, 2 MBCT) there was an additional

comparator group, such as a waitlist or treatment as usual control. The majority (63%) of trials were comparisons against waitlist (22 trials, 14 MBSR, 8 MBCT) or treatment as usual (12 trials, 8 MBSR, 4 MBCT). These findings suggest that even among trials of MBSR or MBCT, the control comparator and the method of recruitment should be more carefully considered and rigorously structured in order to make accurate and meaningful assessments of MBIs. Furthermore, the number of “not reported” values in the present review illustrates another disparity in the field -- an unbalanced system of guidelines under which all studies of MBIs should report certain elements of the design as well as their findings.

Moreover, inconsistencies appeared between interventions that classify themselves as standardized and the actual design of the intervention in the study itself. Although all 54 studies were classified as standard interventions, additionally stating the use of a standardized manual or protocol was followed, 23 trials met all of the criteria for a completely standardized intervention once the details of the intervention were more thoroughly reviewed. In regard to duration of the intervention without consideration of the retreat session, there were 27 trials that differed in the amount of time by up to 25% of what is considered standard class duration (such that standard duration is 8 weeks of 2.5 hours per week for 20 total hours of the intervention), meaning that the 27 trials were lacking 5 hours of intervention content. These alterations of intervention duration were typically made so that the intervention was tolerable for the specific study populations, such as elderly with chronic pain who needed an extended break during the intervention sessions that culminated in shorter actual intervention sessions. An additional

inconsistency appeared with 3 trials which stated that the standard protocol was followed for the intervention delivery, yet the class sessions were 1.5 hours in length and full-day retreats were not mentioned in their intervention descriptions. Exceptions were made for these cases and these trials were included in the present review as the rationale behind the time modification was made explicit and elements of the core curriculum were maintained.

Limitations

The present review has the following limitations that impact the results presented here. First, the strict criteria of inclusion for this review excludes a number of studies that have potential assays of interest. The review is also limited by the specific search term and databases used. Secondly, the field of mindfulness research is in need of data on dose effects of the interventions on various outcomes. However, specific dosing studies were not found in the literature search, and brief intervention studies were excluded in order to maximize generalizability to standardized MBIs. Thirdly, the classification of outcomes within this domain and in others deserves more detailed and thoughtful approaches. As previously mentioned, quality of life and well-being scales were not assessed here due to the inability of these measures to decouple the mental and physical scores consistently and accurately. Additionally, while information regarding treatment fidelity, instructor credentials, and treatment compliance were recorded in more detail in the extraction process, the reported results here are not presented within that context. The forthcoming meta-analysis will, however, take these factors into account in created pooled summary statistics for the efficacy of each included assay while using those factors to provide

perspective of a dose-response gradient effect of the MBIs on the targets. Adverse effects of the interventions as well as sub-analyses or mediation analyses will also be considered in more depth in the meta-analysis, as the discussion of those elements of the included interventions was not considered in the present, more general and scoping review.

Conclusion

The affective regulation constructs of depression and anxiety have been focused on the most in standardized interventions of MBSR and MBCT thus far. Randomized control studies of MBSR and MBCT exhibited low-bias on average, although the areas of randomization generation, allocation concealment, and blinding of outcome assessors were inadequately described. These constructs have been measured with assays that show mixed significance for the results, although effect sizes were frequently medium-to-large. Clinical populations compared to healthy study populations have been most studied under the effects of MBIs on affective regulation, and the general diversity of the populations were minimal. Future research on applications of MBIs in brief settings is both warranted and necessary to understand the mechanisms involved in self-regulation impacted through MBIs for more diverse populations. Additionally, trials of MBSR and MBCT generally lack objective measures such as peripheral biological responses and clinical assessments, as most of the outcomes captured here were measured through self-report instruments.

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GLOSSARY OF AFFECTIVE REGULATION ACRONYMS

BAI

Beck Anxiety Inventory

HADS

Hospital Anxiety and Depression Scale
(Anxiety, Depression)

HAM

Hamilton Depression Rating Scale
(Anxiety, Depression)

GSI

Global Severity Index

LSAS-SR

Liebowitz Social Anxiety Scale-Self-
Report

PSWQ

Penn State Worry Questionnaire

STAI

Spielberger State Trait Anxiety Inventory

LSAS

Liebowitz Social Anxiety Scale

DASS

Depression, Anxiety Stress Scale

GAD-2

Generalized Anxiety Disorder Scale

ACS

Affect Control Scale

ESM

Experience Sampling Method

CEC

Courtland Emotional Control Scale

SAES

Spielberger Anger Expression Scale

ASI

Anxiety Sensitivity Index

DERS

Difficulties in Emotion Regulation Scale

IRI

Interpersonal Reactivity Index

BDI(-II)

Beck Depression Inventory

CES-D

Center for Epidemiologic Studies
Depression Scale

DAS

Dysfunctional Attitudes Scale

PHQ

Patient Health Questionnaire

BSS

Beck Suicide Ideation Scale

SCS

Suicidal Cognitions Scale

CGI

Clinical Global Impression

SCL-90R

Symptom Checklist-90-Revised

SCL-92

Symptom Checklist-92

PGWI

Psychological General Wellbeing Index

PANAS

Positive and Negative Affect Schedule

BRUMS

Brunel Mood Scale

GMS

Global Mood Scale

POMS

Profile of Mood States

CAPS

Clinician-Administered PTSD Scale

NAI

Novaco Anger Inventory

CI-FS

Capsaicin-induced flare size

TN-FA

Tumor necrosis factor alpha

IL-8

Interleukin-8

SC-AR

Salivary Cortisol – Adrenal response

SC-P

Salivary cortisol – Provoked

SUDS

Subjective Units of Distress Scale

WOCQ

Lazarus' Coping Strategies Methods

PSS

Perceived Stress Scale

BP

Blood pressure

HR

Heart rate

MBI

Maslach Burnout Inventory

LSRDS

Liebowitz Self-Rated Disability Scale

PSI

Parenting Stress Index

FIGURE 1: STUDY INCLUSION PRISMA FLOW DIAGRAM

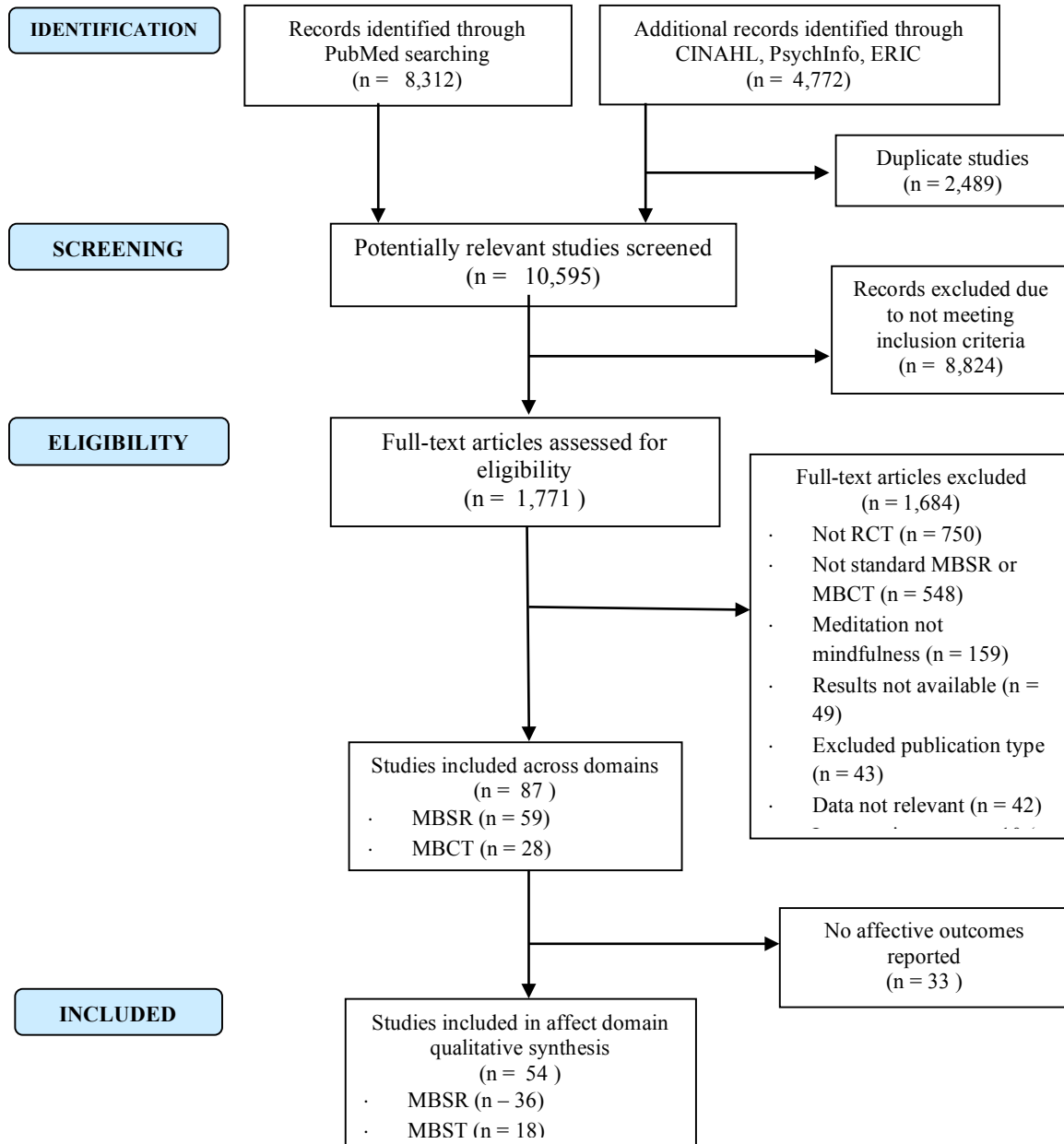
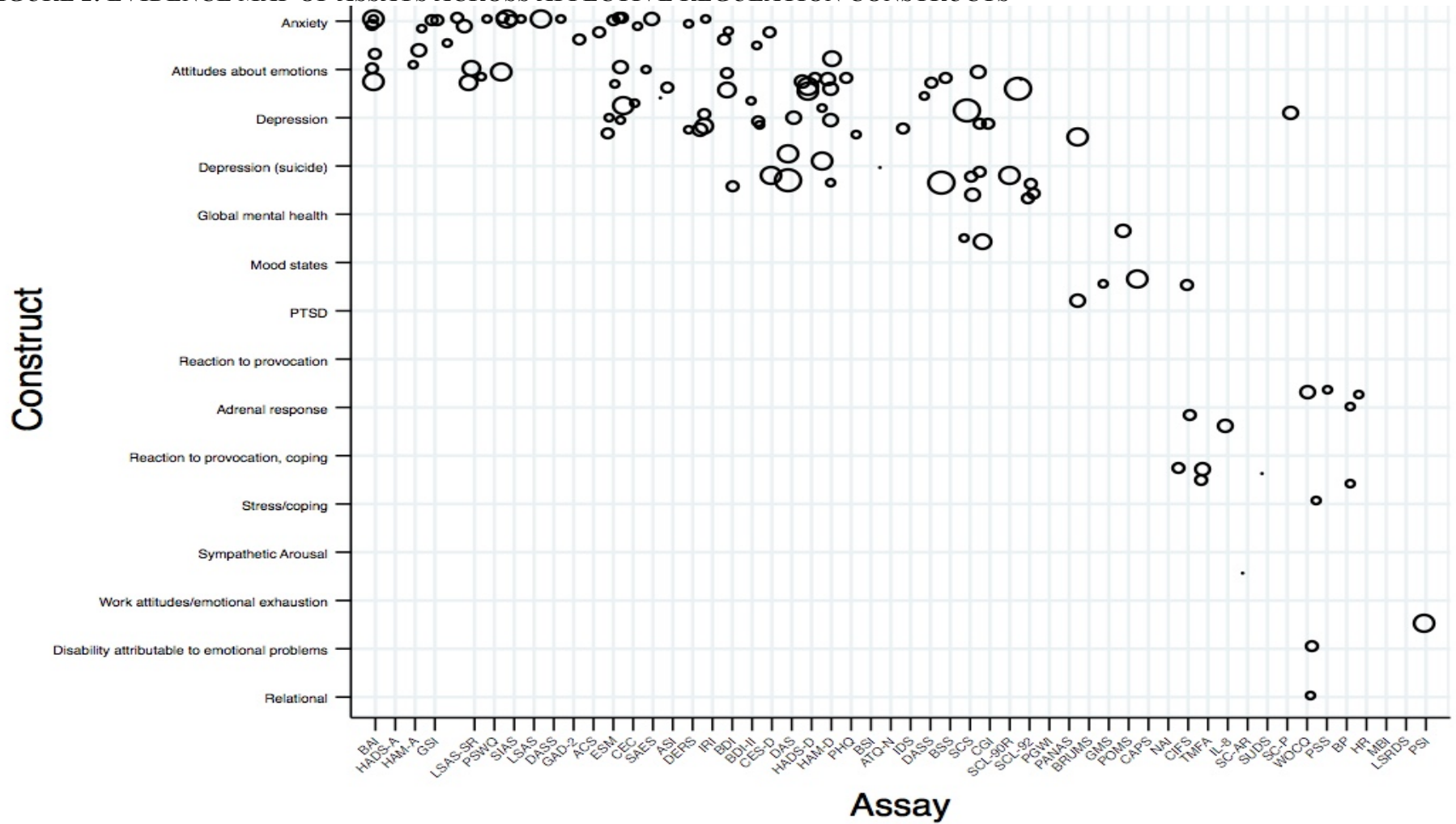


FIGURE 2: EVIDENCE MAP OF ASSAYS ACROSS AFFECTIVE REGULATION CONSTRUCTS



Area of the symbol proportional to the MBI arm sample size

TABLE 1: Study Characteristics

First author, Year	N (MBI arm)	Follow up	Female	Race	Age	Clinical Group
Amutio, 2015 ⁴⁵	42 (21)	12 months	MBSR 12 (57.1%)	NR	M = 47.31	Healthy (Physicians)
Anderson, 2007 ⁴⁶	72 (39)	8 weeks	NR	NR	MBSR M= 37.0 Control M = 41.7 (p=0.10)	Healthy
Barnhofer, 2009 ^{47,48}	28 (14)	8 weeks	MBSR 10 (71.4%) TAU 9 (64.3%)	NR	MBSR M = 42.07 TAU M = 41.7 (p=ns)	Chronic-recurrent depression
Britton, 2012 ⁴⁹	24 (14)	8 weeks	MBCT 11 (80%) Waitlist 8 (81.8%)	NR	MBCT M=47.9 Waitlist M=45.7	Recurrent depression and currently taking antidepressant medications (ADMs) with sleep complaints
Britton, 2012 ⁵⁰	45 (26)	8 weeks	MBCT 20 (76.3%) Waitlist 18 (94.7%)	NR	MBCT M=47.0 Waitlist M=47.83	Recurrent unipolar depression (in partial or full remission) with varying residual symptoms
Carmody, 2011 ⁵¹	110 (57)	20 weeks	MBSR 57 (100%) Waitlist 53 (100%)	White 99 (NR), Hispanic/Latina 1 (1%)	M=53	Late menopausal transition and early postmenopause experiencing an average of 5 or more moderate or severe hot flashes (including night sweats)/ day during the past week.
Cherkin, 2016 ⁵²	341 (116)	52 weeks	MBSR 71 (61.2%) Active control	White 278 (82.5%); asian 12 (3.9%); african american 11	M=49.3	Non-specific low back pain that persisted at least 3 months

			66 (58.9%) TAU 87 (77%)	(3.3%), other 35 (6.8%)		
Chiesa, 2015 ⁵³	43 (23)	26 weeks	MBCT 16 (70%) Control 15 (75%)	NR	MBCT M=50.91 Control M=46.7	Major depression who did not achieve remission after at least 8 weeks of adequate antidepressant treatment.
Cohen-Katz, 2005 ⁵⁴	25 (12)	3 months	MBSR 12 (100%) Waitlist 13 (100%)	Caucasian 96%	M=46	Healthy (Nurses)
Crane, 2008 ⁵⁵⁻⁵⁷	42 (19)	8 weeks	NR	Caucasian 100%	MBCT M = 49.75 Control M = 40.44 (p=0.003)	Recovered from Major Depression (MDD) who had experienced severe suicidal ideation or engaged in suicidal behavior when depressed
Duncan, 2012 ⁵⁸	76 (40)	6 months	MBSR 7 (17.5%) Waitlist 5 (13.9%)	European American 53%; black 20%; Hispanic 14%; Other 6 (15%)	MBSR M=47.9 Control M=48.2	HIV+ adult men and women on ART who reported distress associated with side effects from treatment
Dykens, 2014 ⁵⁹	243 (116)	6 months	Total 243 (100%)	White 69.6%	M=40.87	Mothers of children with disabilities
Eisendrath, 2016 ⁶⁰	173 (87)	52 weeks	MBCT 66 (75.9%) Control 66 (76.7%)	MBCT White 80.7%, Asian 4.8%, African-American 8.4%, Other 6.1%, Hispanic 8.3%; Control White 79.5%, Asian 6.4%, African American	MBCT M=47.1 Control M=45.2	Treatment-Resistant Depression

				7.7%, Other 5.3%, Hispanic 11.6%		
Foley, 2010 ⁶¹	115 (55)	3 months	MBCT 42 (76.4%) Control 47 (78.3%)	NR	MBCT M=54.82 Control M=55.52	Individuals with cancer diagnosis
Gallegos, 2013 ⁶²	200 (100)	6 months	MBSR 62 (62%) Waitlist 62 (62%)	NR	MBSR M=72.0 Control M=73.245	Healthy (aged ≥ 65 years old)
Geschwind, 2011 ^{63–65}	129 (63)	8 weeks	MBCT 50 (79%) Control 48 (73%)	NR	MBCT M=44.6 Control M=43.2	Residual depressive symptoms
Godfrin, 2010 ⁶⁶	106 (52)	56 weeks	MBCT 43 (82.7%) Control 43 (79.6%)	NR	MBCT M=44.9 Control M=46.4	Remitted/recovered depressed patients
Gross, 2011 ⁶⁷	137 (71)	12 months	MBSR 33 (46%) Active control	MBSR white 65 (91%), Black/African	MBSR M=55; Health Education M= 52; Waitlist	Chronic insomnia

			29 (44%) Waitlist NR	American, Asian or American Indian/Alaska Native 9 (8%); Health Education 62 (94%); Black/African American, Asian or American Indian/Alaska Native 9 (6%); Waitlist NR	NR	
Gross, 2010 ^{68,69}	30 (20)	5 months	MBSR 15 (75%) Control 7 (70%)	MBSR White 20 (100%); Control White 9 (90%)	MBSR M=47; Control M=53.5	Solid Organ Transplant Recipients
Hartmann, 2012 ⁷⁰	110 (53)	12 months	MBSR 13 (29.8%) Control 11 (19.3%)	NR	MBSR M=58.7 Control M=59.3	Type 2 diabetes with albuminuria
Henderson, 2012 ⁷¹	163 (53)	24 months	MBSR 53 (100%) Active control 52 (100%) TAU 58 (100%)	MBSR White 51 (96%); Active control 48 (92%); TAU 56 (97%)	M=49.8	Women with early-stage breast cancer
Jazaieri, 2012 ⁷²	85 (31)	3 months	MBSR 19 (61.3%) Control 10	MBSR Caucasian 13 (41.9%), Asian 14 (45.2%),	MBSR M=32.87 Control M=32.88 TAU M=32.34	Social anxiety disorder

			(40%) TAU 13 (44.8%)	Hispanic 3 (9.7%), Multiracial 1 (3.2%); Control Caucasian 10 (40%), Asian 11 (44%), Hispanic 1 (4%), Multiracial 3 (12%); TAU Caucaian 14 (48.3%), Asian 9 (31%), Hispanic 1 (4%), Multiracial 5 (17.2%)		
Jensen, 2012 ⁴⁴	47 (16)	8 weeks	Total 31 (66%)	NR	Total range 20-36	Healthy
Kaviani, 2011 ⁷³	45 (20)	6 months	MBCT 20 (100%) Waitlist 25 (100%)	NR	MBCT M=20.5 Control M=20.7	Healthy (college students)
Kearney, 2016 ⁷⁴	55 (26)	6 months	MBSR 3 (11.5%) TAU 5 (17.2%)	MBSR White 17 (72%), African American 2 (8%), Asian 1 (4%), Native American 0 (0%), Other 3 (12%); TAU White 17 (58.6%), Afriacn American 8 (27.6%), Asian 2 (6.9%), Native American 1 (3.5%),	MBSR M=51.3 TAU M=48.6	Veterans with Gulf War Illness

Other 1 (3.5%)						
Kolahkaj, 2015 ⁷⁵	48 (24)	4 months	MBSR 24 (100%) TAU 24 (100%)	NR	MBSR M=25.7 TAU M=24.85	Women With Multiple Sclerosis
Koszycki, 2007 ⁷⁶	53 (26)	MBSR 8 weeks, Control 12 weeks	MBSR 16 (61.5%) Control 12 (44.4%)	NR	MBSR M= 38.9 Control M=37.6	Generalized social anxiety disorder
Kuyken, 2008 ⁷⁷	123 (61)	15 months	MBCT 47 (77%) Control 47 (76%)	MBCT White 60 (98%); Control 62 (100%)	MBCT M=48.95 Control M=49.37	Recurrent Depression
MacCoon, 2012 ⁷⁸	63 (29)	4 months	MBSR 24 (80%) Control 23 (85.2%)	MBSR Caucasian 24 (80%), African American 1 (3.3%), Asian 2 (6.5%), Indian 2 (6.7%); Control Caucasian 23 (85.2%), African American 3 (11.1%), Asian 1 (3.7%), Indian 0 (0%)	MBSR M=44.5 Control M=47.5	Healthy
Michalak, 2015 ⁷⁹	106 (36)	8 weeks	MBCT 21 (58.3%) TAU 23 (65.7%) CBT 22 (62.9%)	NR	MBCT M=48.4 Active control M=50.2 Passive control M=54	current major depressive episode and had depressive symptoms for more than 2 years without remission

Neece, 2014 ⁸⁰	46 (21)	8 weeks	Total 36 (78.3%)	NR	MBSR M = 34.15 Control M=36.40	Healthy (Parents of Young Children with Developmental Delays)
Nejati, 2015 ^{81,82}	30 (15)	4 months	MBSR 6 (40%) Control 8 (53%)	NR	MBSR M=43.66 Control M=43.13	Hypertension
Nyklíček, 2008 ⁸³	57 (29)	8 weeks	Total 38 (49.1%)	NR	M=46.0	Symptoms of distress
Omidi, 2013 ⁸⁴	62 (31)	8 weeks	MBSR 0 (0%) TAU 0 (0%)	NR	Total range 39-59	Veterans with Post-Traumatic Stress Disorder
Parra- Delgado, 2013 ⁸⁵	33 (15)	3 months	MBCT 15 (100%) TAU 16 (100%)	NR	M=52.67	Fibromyalgia
Parswani, 2013 ⁸⁶	30 (15)	3 months	MBSR 0 (0%) TAU 0 (0%)	NR	MBSR M=47.27 Control M=50.60	Coronary heart disease
Polusny, 2015 ⁸⁷	116 (58)	17 weeks	MBSR 12 (21%) Control 6 (10%)	White 97 (84%), Black 9 (8%), Other 4 (3%), Mixed 6 (5%)	M=58.5	Veterans with Post-Traumatic Stress Disorder
Pradhan, 2007 ⁸⁸	62 (31)	6 months	MBSR 26 (84%) Waitlist 29 (91%)	MBSR White 22 (71%); Control white 25 (78%)	MBSR M=56 Control M=53	Rheumatoid Arthritis
Robins, 2012 ⁸⁹	41 (20)	4 months	MBSR 18 (90%) Waitlist 16 (76.2%)	MBSR White 95%, Hispanic 5%; Control White 85.7%, Hispanic 4.8%	M=46.25	Healthy

Rosenkranz, 2013 ⁹⁰	49 (NR)	4 months	Total 30 (61.2%)	NR	M=45.89	Healthy
Schoultz, 2015 ⁹¹	44 (22)	6 months	MBCT 16 (72.7%) Control 18 (81.8%)	NR	MBCT M=48.59 Control M=49.68	Inflammatory bowel disease
Sephton, 2007 ⁹²	91 (51)	4 months	MBSR 51 (100%) Waitlist 40 (100%)	MBSR White 94.1%, African American 3.9%, Native American 2.0%; Control White 92.5%, African American 5.0%, Native American 2.5%	MBSR M=48.4 Control M=47.6	Fibromyalgia
SeyedAlinaghi, 2012 ⁹³	171 (85)	12 months	MBSR 30 (35.3%) Active control 23 (26.7%)	NR	M=35.1	HIV+
Shallcross, 2015 ⁹⁴	92 (46)	60 weeks	MBCT 36 (76%) Control 35 (76%)	MBCT White 29 (69%); Control White 40 (87%)	MBCT =36.5 Control M=33	Remission from Major Depressive Disorder with residual depressive symptoms
Shapiro, 2011 ⁹⁵	30 (15)	12 months	Total 26 (86.7%)	Caucasian 25 (83.3%), Hispanic/Latino 3 (10%); Asian 2 (6.7%)	M=18.73	Healthy (Undergraduate students)
Skovbjerg, 2012 ^{96,97}	37 (17)	3 months	MBCT 17 (100%)	NR	M=51.6	Multiple chemical sensitivities

TAU 18 (90%)						
van Aalderen, 2012 ⁹⁸	205 (102)	8 weeks	MBCT 71 (70%) Control 74 (72%)	NR	MBCT=47.3 Control=47.7	Three or more previous depressive episodes according to DSM-IV
Vøllestad, 2011 ⁹⁹	76 (39)	8 months	MBSR 26 (66.7%) Waitlist 25 (67.6%)	NR	M=42.5	Anxiety disorder
Wells, 2014 ¹⁰⁰	19 (10)	4 months	MBSR 9 (90%) Control 8 (89%)	MBSR White 9 (90%), Black 1 (10%); Control White 8 (90%), Black 1 (10%)	MBSR M=45.9 Control M=45.2	Migraines
Whitebird, 2013 ^{101,102}	78 (38)	6 months	MBSR 33 (86.8%) Active control 36 (90%)	White 98.7%, American Indian 1.3%, Hispanic 1.3%	M=56.8	Healthy (family caregivers of people with dementia)
Williams, 2014 ¹⁰³	255 (99)	12 months	MBCT 70 (71%) Active control 76 (74%) TAU 37 (70%)	Caucasian 244 (96%)	MBCT M=43.99 Control M=43.86 TAU M=43.43	Currently in remission following at least 3 previous episodes of Major Depressive Disorder, of which two must have occurred within the last 5 years, and one within the last 2 years
Wong, 2016 ¹⁰⁴	182 (61)	11 months	MBCT 48 (78.7%) Active control 48 (78.7%) TAU 48 (80%)	NR	M=50.00	Generalized anxiety disorder

Würtzen, 2013 ¹⁰⁵	336 (168)	12 months	MBSR 168 (100%) TAU 168 (100%)	NR	Total range 18-75	Women who had been operated on for breast cancer (stage I–III)
Zhang, 2016 ¹⁰⁶	60 (30)	3 months	MBSR 30 (100%) TAU 30 (100%)	NR	M=46.10	Breast cancer survivors

Associated publications marked with references of appropriate additional studies

TABLE 2: Major Findings

Construct	Assay	Time	Within-arm comparisons	Between-arm comparisons	First author, Year	Intervention	Control(s)
Adrenal response	Salivary cortisol adrenal response	8 weeks	AUGG 8weeks vs baseline MBSR d=0.68, p=0.054; Active control d=0.27, p>0.1, Other control d=-.54, p>0.1	Salivary cortisol MBSR time by treatment adjusted for baseline salivary cortisol F(1, 23) = 7.50, p = .02, active control p > .5	Jensen, 2012	MBSR	Active control - nonmindfulness stress reduction; Other control (incentive and nonincentive groups)
	Salivary cortisol morning adrenal response	8 weeks	AUG1 8weeks vs baseline MBSR d=0.64, p<0.05; Active control d=0.09 p=0.59, Other control d=0.5, p>0.05	MBSR vs Other control group by time F(1, 24) = 3.76, p=0.064; MBSR vs Active control p>0.4	Jensen, 2012	MBSR	Active control - nonmindfulness stress reduction; Other control (incentive and nonincentive groups)
Anxiety	BAI	8 weeks	NR	Time by treatment F(2, 74)=1.27; d=0.002, p=0.29	Chiesa, 2015	MBCT	Active control - psychoeducaion group
	BAI	26 weeks	NR	Time by treatment (4, 148)=1.59, d=0.003, p=0.18	Chiesa, 2015	MBCT	Active control - psychoeducaion group
	BAI	8 weeks	MBCT 8 weeks vs baseline mean difference -1.95, p=.014	Time by treatment F(1, 41) = 5.63, p = .022	Crane, 2008	MBCT	Waitlist
	BAI	8 weeks	MBSR d = 0.88, control d= 0.44	Treatment and disability type MBSR vs PAD 8 weeks β = -0.20, p<0.05	Dyken, 2014	MBSR	Active control - Positive Adult Development

BAI	6 months	MBSR d = 0.88, control d= 0.44	Treatment and disability type MBSR vs PAD β = 0.01, $p>0.05$	Dykens, 2014	MBSR	Active control - Positive Adult Development
BAI	4 weeks	NR	n.s.	Henderson, 2012	MBSR	Active control - nutrition education group; TAU
BAI	12 weeks	NR	n.s.	Henderson, 2012	MBSR	Active control - nutrition education group; TAU
BAI	24 weeks	NR	n.s.	Henderson, 2012	MBSR	Active control - nutrition education group; TAU
BAI	6 months	NR	Time by treatment $F(4, 136)=4.09$, $p<0.01$	Kaviani, 2011	MBCT	Waitlist
BAI	8 weeks	MBSR 8 weeks vs baseline d = 0.82, Waitlist d = 0.26	Between group d=0.32, group $F(1, 74)=6.3$	Vøllestad, 2011	MBSR	Waitlist
BAI	8 weeks	MBCT 8 weeks vs baseline by time β = -5.05, active control β = -4.86, TAU NR	NR	Wong, 2016	MBSR	Active control - psychoeducaion group; TAU
BAI	9 months	NR	Time by treatment $F(4,148) = 5.10$, $p =$ 0.001	Wong, 2016	MBSR	Active control - psychoeducaion group; TAU
GAD-2	8 weeks	MBSR baseline vs 8 weeks mean difference -0.33 (-	MBSR vs UC $p > 0.05$	Cherkin, 2016	MBSR	Active control - CBT, TAU

0.56 to -0.10						
GAD-2	26 weeks	MBSR baseline to 26 weeks mean different 0.00 (-0.28 to 0.28)	CBT vs MBSR -0.49 (-0.85 to -0.12), $p < 0.05$	Cherkin, 2016	MBSR	Active control - CBT, TAU
GAD-2	52 weeks	MBSR baseline to 52 weeks -0.14 (-0.40 to 0.12)	NR	Cherkin, 2016	MBSR	Active control - CBT, TAU
HADS-A	9 weeks	MBSR baseline vs 9 weeks mean difference -3.05 (SE = .53) HADS-A Control baseline vs 9 weeks mean difference -.80 (SE = .54)	MBSR vs Control baseline to 9 weeks $p = 0.005$	Carmody, 2011	MBSR	Waitlist
HADS-A	20 weeks	MBSR 9 weeks vs 20 weeks mean difference .65 (SE = .51) Control 9 weeks vs 20 weeks mean difference .26 (SE = .50)	HADS-A MBSR vs Control 9 weeks to 20 weeks $p = 0.586$	Carmody, 2011	MBSR	Waitlist
HAM-A (14)	3 months	MBCT reduction 5.70 points, $d = 1.14$	Time by treatment $F(1, 115) = 10.25$, $p = .002$	Foley, 2010	MBCT	Waitlist
LSAS	8 weeks	LSAS CBGT $d = 1.66$, MBSR $d = 1.44$	LSAS- Fear subscale CBGT vs MBSR $F(1, 53) = 2.98$, $p = .09$	Koszycki, 2007	MBSR	Active control - CBT

			LSAS- Avoidance CBGT vs MBSR F(1,39)=7.30, p = .009			
LSAS-SR	8 weeks	MBSR 8 weeks vs baseline time F=64.32, p=0.001, np2=0.75; Active control F=16.43, p=0.001, np2=0.51; TAU F=12.02, p=0.001, np2=0.33	Group by time no significant interactions clinical ps > .16 measures. There were also no main effects of group for clinical ps > .11 measures. LSAS-SR main effects of time 8 weeks MBSR vs Active control F(1,37) = 67.37, p < .001, np2 = .64	Jazaieri, 2012	MBSR	Active control - aerobic exercise; TAU
LSAS-SR	3 months	NR	Main effects of time MBSR vs Active F(1,28)= 62.79, p < .001, np2 = .69	Jazaieri, 2012	MBSR	Active control - aerobic exercise; TAU
PSWQ	8 weeks	MBCT p<0.05, Waitlist p>0.05	PSWQ effect on PA- related variables time by treatment β = .19, p<0.001	Geschwind, 2011	MBCT	Waitlist
PSWQ	2 months	NR	MBSR vs Waitlist 8 weeks d=0.60, f=0.27, p=0.022, group β = - 0.25. 4 months d=0.56	Robins, 2011	MBSR	Waitlist
PSWQ	8 weeks	NR	PSWQ d=0.43, group F(1, 83.2)=17.5, mean difference = -5.1, p<0.001	van Aalderen, 2012	MBCT	TAU

PSWQ	8 weeks	MBSR 8 weeks vs baseline $d = 0.71$, Waitlist $d = 0.13$	PSWQ $d=0.55$, group $F(1, 74)=13.5$, $p<0.001$	Vollestad, 2011	MBSR	Waitlist
PSWQ	8 weeks	MBCT 8 weeks vs baseline by time $\beta = -1.99$, active control $\beta = -3.90$, TAU NR	NR	Wong, 2016	MBSR	Active control - psychoeducation group; TAU
SIAS-S	8 weeks	MBSR 8 weeks vs baseline time $F=10.27$, $p=0.006$, $np2=0.41$; Active control $F=19.18$, $p=0.002$, $np2=0.49$; TAU $F=0.11$, $p=0.01$, $np2=0.75$	Group by time no significant interactions clinical $ps > .16$ measures. There were also no main effects of group for clinical $ps > .11$ measures. SIAS-S MBSR vs active control main effects of time 8 weeks $F(1,32) = 36.45$, $p < .001$, $np2 = .55$	Jazaieri, 2012	MBSR	Active control - aerobic exercise; TAU
SIAS-S	3 months	NR	Group by time no significant interactions clinical $ps > .16$ measures. There were also no main effects of group for clinical $ps > .11$ measures. MBSR vs active control main effects of time 3 months $F(1, 19)=23.12$, $np2=0.55$, $p=0.001$	Jazaieri, 2012	MBSR	Active control - aerobic exercise; TAU
STAI	8 weeks	MBSR 8weeks vs baseline $p<0.001$,	Time by treatment $F(1,108) = 5.21$, $p=0.02$,	Gross, 2011	MBSR	Active control - Health education;

		HEP n.s. Waitlist NR	d=0.56			Waitlist
		MBSR				
STAI	1 year	MBSR 1 year p<0.01, Controls n.s. and NR	Time by treatment F(1,108) = 5.21, p=0.02, d=0.56	Gross, 2011	MBSR	Active control - Health education; Waitlist
STAI	8 weeks	MBSR 8weeks d=- 0.09, p>0.05 PCT 8 weeks d=0.02, p>0.05	NR	Gross, 2010	MBSR	Active control - pharmacotherapy
STAI	5 months	MBSR 5 months d=- 0.33, p>0.05 PCT 5 months d=- 0.14, p>0.05	NR	Gross, 2010	MBSR	Active control - pharmacotherapy
STAI	6 months	NR	STAY-Y1 group by time F(4, 84)=3.286, p=0.048 STAY-Y2 group by time F(4, 84)=2.809, p=0.083	Schoultz, 2014	MBCT	Waitlist
STAI	8 weeks	STAI-Y1 MBSR 8 weeks vs baseline d = 0.36, Waitlist d = - 0.41 STAI-Y1 MBSR 8 weeks vs baseline d = 0.70, Waitlist d = 0.15	STAI-Y1 8 weeks d=0.76, group F(1, 74)=13, p<0.05 STAI-Y2 8 weeks d=0.71, group F(1, 74)=16.5, p<0.001	Vøllestad, 2011	MBSR	Waitlist
STAI	2 months	NR	Net difference=-10.3, p=0.13	Wells, 2014	MBSR	TAU
STAI	4 months	NR	Net difference=-10.3, p=0.10	Wells, 2014	MBSR	TAU

Attitudes about emotions	STAI	2 months	NR	d=-0.59, time by treatment p=0.01	Whitebird, 2013	MBSR	Active control - Community Caregiver Education and Support
	STAI	6 months	NR	d=-0.52, time by treatment p =0.98	Whitebird, 2013	MBSR	Active control - Community Caregiver Education and Support
	STAI	3 months	NR	STAI- State time by treatment F(NR) = 15.24, p = .00, η^2 = .21 STAI- Trait time by treatment F(NR) = 2.02, p = .15, η^2 = .04	Zhang, 2016	MBSR	TAU
	STAI-YI (20 item)	8 weeks	STAI MBCT Time F(1,42)=13.57, p<0.005	STAI time by treatment F(1, 42) = 6.20, p < 0.05, η^2 = .13	Britton, 2012	MBCT	Waitlist
	ACS	8 weeks	MBSR group showed significantly greater decreases in fear of Depression β = .31, p=.002; Positive emotions β =0.23, p=.02	MBSR vs Waitlist 8 weeks d = 0.57, p=0.007, group β = -0.25	Robins, 2011	MBSR	Waitlist
	ACS	2 months	NR	MBSR vs Waitlist baseline vs 2 months d = 0.53, p=0.001	Robins, 2011	MBSR	Waitlist

CEC	4 months	NR	CEC MBSR vs Active control p>0.05 on anxiety, unhappiness	Henderson, 2012	MBSR	Active control – nutrition education group; TAU
CEC	2 years	NR	CEC MBSR vs Active p = 0.04 on active cognitive coping; p<0.05 on anxiety, unhappiness	Henderson, 2012	MBSR	Active control – nutrition education group; TAU
DERS	8 weeks	DERS MBSR significantly greater decrease on Strategies $\beta = .40$, p<.001; Impulses $\beta = .30$, p<.02; Clarity $\beta = .17$, p<.08; Awareness, Nonacceptance, Goals all p>.15	MBSR vs Waitlist d=0.69, f=0.20, p=0.009, group $\beta = -0.30$	Robins, 2011	MBSR	Waitlist
DERS	4 months	NR	MBSR vs Waitlist d=0.72	Robins, 2011	MBSR	Waitlist
ESM positive affect	8 weeks	MBCT p<0.05, Waitlist p>0.05	ESM MBCT $\beta = .40$, p<0.001	Geschwind, 2011	MBCT	Waitlist
Interpersonal reactivity index	4 months	MBSR 4 months vs baseline group by time interaction p=-0.07; Waitlist p=-0.07	Interpersonal reactivity – empathy d=0.02, p<0.02	Shapiro, 2011	MBSR	Waitlist

Depression	Interpersonal reactivity index	12 months	MBSR 12 months vs baseline group by time interaction $p = 0.13$, Waitlist $p = 0.05$	Interpersonal reactivity – empathy $d = 0.03$, $p < 0.05$	Shapiro, 2011	MBSR	Waitlist
	Spielberger anger expression scale	8 weeks	NR	ANX_IN 8 weeks $d = 0.50$, group $\beta = -0.39$, $f = 0.36$, $p = 0.001$ ANX_OUT 8 weeks $d = 0.37$, group $\beta = -0.28$, $f = 0.24$, $p = 0.005$	Robins, 2011	MBSR	Waitlist
	Spielberger anger expression scale	4 months	NR	ANX_IN group $d = 0.19$ ANX_OUT group $d = 0.20$	Robins, 2011	MBSR	Waitlist
	ATQ-N	6 months	NR	ATQ-N time by treatment $F(4, 136) = 3.44$, $p < 0.01$	Kaviani, 2011	MBCT	Waitlist
	BDI	8 weeks	BDI MBCT decrease 2.6 points (baseline 8.3+/-5.9, 8weeks 5.1+/-3.5) BDI control increase 3.2 points (baseline 11.8+/-7.2, 8weeks 14.4+/-10.2)	BDI time by treatment interaction $F(1, 22) = 3.6$, $p = 0.07$, $\eta^2 = 0.14$	Britton, 2012	MBCT	Waitlist
	BDI	8 weeks	NR	Depression $\beta = -.42$, $p < 0.01$	Britton, 2012 "Social stress"	MBCT	Waitlist

BDI	8 weeks	NR	BDI n.s.	Henderson, 2012	MBSR	Active control - nutrition education group; TAU
BDI	6 months	NR	BDI time by treatment F(4, 136)=5.50, p<0.01	Kaviani, 2011	MBCT	Waitlist
BDI	8 weeks	BDI MBCT =0.23, SE = 0.11, p = .04	NR	Michalak, 2015	MBCT	Active control - CBASP; TAU
BDI	8 weeks	MBCT 8 weeks vs baseline p<0.001, d = 0.82; TAU p>0.05, d=0.22	Group F(1,29)=1.04, p=0.31	Parra-Delgado, 2013	MBCT	TAU
BDI	3 months	NR	Group F(1,29)=5.24, p=0.03	Parra-Delgado, 2013	MBCT	TAU
BDI	8 weeks	NR	Group by time F(87)=12.02, p=0.001	Sephton, 2007	MBSR	Waitlist
BDI	4 months	NR	Group by time F(87)=10.20, p=0.002	Sephton, 2007	MBSR	Waitlist
BDI	8 weeks	NR	Group d=0.50, F(1, 44.8)=20.9, mean difference = -4.6, p<0.001	van Aalderen, 2012	MBCT	TAU
BDI-II	8 weeks	MBCT 8 weeks vs baseline group η^2 = 0.17, p <0.001	Time by treatment F (1, 29)= 5.74, p=0.02, η^2 = 0.17	Barnhofer, 2009	MBCT	TAU
BDI-II	8 weeks	NR	Time by treatment F(2, 74)=2.68, p=0.07, d=0.26	Chiesa, 2015	MBCT	Active control - psychoeducation group

BDI-II	26 weeks	NR	Time by treatment $F(4, 148) = 3.01, p = 0.02, d = 0.36$	Chiesa, 2015	MBCT	Active control - psychoeducation group
BDI-II	8 weeks	MBCT 8 weeks vs baseline mean difference -1.43, $p < 0.001$	BDI-II time by treatment $F(1, 38) = 10.14, p = .003, \eta^2 = .21$	Crane, 2008	MBCT	Waitlist
BDI-II	8 weeks	NR	BDI-II $p > 0.05$	Duncan, 2012	MBSR	Waitlist
BDI-II	8 weeks	BDI-II MBSR $d = 1.03$, control $d = 0.58$	Treatment and disability type MBSR vs PAD 8 weeks $\beta = -0.36, p < 0.01$	Dykens, 2014	MBSR	Active control - Positive Adult Development
BDI-II	6 months	NR	Treatment and disability type MBSR vs PAD 6 months $\beta = 0.04, p < 0.05$	Dykens, 2014	MBSR	Active control - Positive Adult Development
BDI-II	14 months	NR	BDI time by treatment $F(3, 210) = 9.41, p < 0.001, \eta^2 = .12$	Godfrin, 2010	MBCT	Waitlist
BDI-II	8 weeks	MBSR 8 weeks vs baseline time $F = 11.83, p = 0.003, \eta^2 = 0.43$; Active control $F = 4.28, p = 0.058, \eta^2 = 0.23$; TAU $F = 0.01, p = 0.92, \eta^2 = 0.01$	Group by time no significant interactions clinical $ps > .16$ measures. There were also no main effects of group for clinical $ps > .11$ measures. BDI-II MBSR vs active control 8 weeks $F(1, 30) = 15.54, p < .001, \eta^2 = .33$	Jazaieri, 2012	MBSR	Active control - aerobic exercise; TAU
BDI-II	3 months	NR	Group by time no significant interactions	Jazaieri, 2012	MBSR	Active control - aerobic exercise;

			clinical ps > .16 measures. There were also no main effects of group for clinical ps > .11 measures. BDI-II MBSR vs active control 3 months F(1, 25)=16.63, np2 = 0.40, p=0.001			TAU
BDI-II	8 weeks	BDI-II CBGT d=.79, MBSR d=.67	BDI-II CBGT F(1,53) = .04, p = .85	Koszycki, 2007	MBSR	Active control - CBT
BDI-II	15 months	NR	BDI-II MBCT time by treatment F(1, 114)=2.52, p= .12, np2 squared= .04	Kuyken, 2008	MBCT	Active control - pharmacotherapy
BDI-II	6 months	NR	Group by time F(4, 84)=3.975, p=0.027	Schoultz, 2014	MBCT	Waitlist
BDI-II	8 weeks	NR	p<0.01	Shallcross, 2015	MBCT	Active control - HEP
BDI-II	6 months	NR	p=0.295	Shallcross, 2015	MBCT	Active control - HEP

BDI-II	12 months	NR	p=0.914	Shallcross, 2015	MBCT	Active control - HEP
BDI-II	8 weeks	MBSR 8 weeks vs baseline d = 0.69, Waitlist d = 0.02	d=0.58, group F(1, 74)=12.7, p<0.001	Vøllestad, 2011	MBSR	Waitlist
BDI-II	8 weeks	NR	Time by treatment p >0.10	Williams, 2014	MBCT	Active control - CPE; TAU
CES-D	8 weeks	MBSR 8 weeks vs baseline p<0.01, HEP p<0.05, Waitlist NR	NR	Gross, 2010	MBSR	Active control - Health education; Waitlist
CES-D	1 year	MBSR 1 year p<0.001, HEP n.s. Waitlist NR	CES-D MBSR versus Health Education difference d = 0.41, p=0.08	Gross, 2010	MBSR	Active control - Health education; Waitlist
CES-D	8 weeks	MBSR d=-0.09, p > 0.05 PCT d=-0.39, p < 0.05	NR	Gross, 2011	MBSR	Active control - pharmacotherapy
CES-D	5 months	MBSR d = -0.26, p > 0.05 PCT d = -0.75, p > 0.05	NR	Gross, 2011	MBSR	Active control - pharmacotherapy

CES-D	2 months	NR	d=-0.66, p=0.005	Whitebird, 2013	MBSR	Active control - Community Caregiver Education and Support
CES-D	6 months	NR	d=-0.39, time by treatment p = 0.07	Whitebird, 2013	MBSR	Active control - Community Caregiver Education and Support
CES-D	8 weeks	MBCT 8 weeks vs baseline by time β = -1.99, active control β = -3.90, TAU NR	Group by time F(4,54) = 3.6, p = 0.08	Wong, 2016	MBSR	Active control - psychoeducation group; TAU
CES-D	2 months	NR	p=0.002	Würtzen, 2013	MBSR	TAU
CES-D	6 months	NR	p = 0.03	Würtzen, 2013	MBSR	TAU
CES-D	12 months	12 months vs baseline MBSR mean difference = -3.27, p = 0.22, d = 0.39; TAU mean difference = -1.85, d=0.21, p = NR	p=0.05	Würtzen, 2013	MBSR	TAU
CES-D	8 weeks	NR	MBSR vs Waitlist t=2.34, d=0.87, p<0.05	Neece, 2014	MBSR	Waitlist
DAS	6 months	NR	DAS F(4, 136)=8.230, p<0.01	Kaviani, 2011	MBCT	Waitlist
DASS	3 months	DASS MBCT	DASS time by treatment	Foley, 2010	MBCT	Waitlist

		reduction 6.31 points, d=0.60	F(1, 115) = 13.60, p = .001			
DASS-21	12 weeks	NR	DASS-21 time by treatment p < 0.001	Kolahkaj, 2015	MBSR	TAU
BSI	8 weeks	BSI MBSR 8 week p=0.25; Control p=0.16	NR	Cohen-Katz, 2005	MBSR	Waitlist
HADS	8 weeks	MBSR 8weeks p<0.001, TAU p>0.05; MBSR 5 months vs 8 weeks p>0.05, TAU p>0.05	HADS-A 8weeks t=-4.6,p=0.001; HADS-D 8 weeks t=-2.9,p<0.01, HADS-Distress 8weeks p=0.001	Parswani, 2013	MBSR	TAU
HADS	5 months	MBSR 5 months vs 8 weeks p>0.05, TAU p>0.05	NR	Parswani, 2013	MBSR	TAU
HAM-D	8 weeks	NR	Time time by treatment F(2, 80)=6.82, d=0.54, p = .002	Chiesa, 2015	MBCT	Active control - psychoeducation group
HAM-D	26 weeks	NR	Time by treatment F(4, 160) = 4.28, d=0.79, p = .002	Chiesa, 2015	MBCT	Active control - psychoeducation group
HAM-D (17)	8 weeks	MBCT p<0.05; Waitlist p>0.05	Group by time F = 0.487; p = 0.409; η^2 = 0.003	Geschwind, 2011	MBCT	Waitlist
HAM-D (17)	8 weeks	HAM-D MBCT 8 weeks mean percent reduction 36.6 vs. 25.3%; p = 0.01	NR	Eisendrath, 2016	MBCT	Active control - HEP
HAM-D (17)	14 months	NR	Time by treatment F(3, 215)=5.99, p<0.001, η^2	Godfrin, 2010	MBCT	Waitlist

= .07

HAM-D (17)	8 weeks	NR	d=0.53, group F(1, 202)=15.9, p<0.001	van Aalderen, 2012	MBCT	TAU
HAM-D (17)	3 months	HAM-D MBCT reduction 9.76 points, d=1.34	Time by treatment F(1, 166) = 18.78, p = .001	Foley, 2010	MBCT	Waitlist
HAM-D (21)	6 months	NR	Group by baseline depressive symptom severity $\beta = -.17$, p = .02, Group by baseline depressive symptom severity by age $\beta = -.14$, p = .05	Gallegos, 2013	MBSR	Waitlist
HAM-D (24)	8 weeks	HAM-D TAU significant mean changes between pre- and posttreatment MBCT did not show a significantly stronger effect than TAU d = .29 Active control vs MBCT trend control over MBCT estimate = 0.17, SE = 0.09, p = .06	NR	Michalak, 2015	MBCT	Active control - CBASP; TAU
HAM-D 17	15 months	NR	HAM-D MBCT time by treatment F(1,116)=5.8,p=.02,	Kuyken, 2008	MBCT	Active control - pharmacotherapy

$\eta^2=.06$

Inventory of Depressive Symptoms	8 weeks	MBCT mean difference 8weeks - 7.7 (SD = 8.8), $p < 0.05$ Waitlist mean difference -3.1 (SD=8.4), $p > 0.05$	IDS MBCT $t = 2.73$; $p = 0.008$; $d = 0.42$	Geschwind, 2011	MBCT	Waitlist
PHQ-9	2 months	NR	Net difference = 0.6, $p = 0.77$	Wells, 2014	MBSR	TAU
PHQ-9	4 months	NR	Net difference = 1.7, $p = 0.59$	Wells, 2014	MBSR	TAU
PHQ-8	8 weeks	MBSR baseline vs 8weeks mean difference -1.60 (-2.15 to -1.05)	PHQ-8 MBSR vs UC 8 week mean differences - 1.48 (-2.31 to -0.64), $p < 0.05$; CBT vs MBSR - 0.69 (-1.35 to -0.02), $p < 0.05$	Cherkin, 2016	MBSR	Active control - CBT, TAU
PHQ-8	26 weeks	MBSR baseline to 26 weeks mean difference -1.32 (-1.81 to -0.83)	NR	Cherkin, 2016	MBSR	Active control - CBT, TAU
PHQ-8	52 weeks	MBSR baseline to 52 weeks -1.51 (-2.09 to -0.92)	NR	Cherkin, 2016	MBSR	Active control - CBT, TAU

	PHQ-9	8 weeks	NR	Depression MBSR vs TAU 8 weeks $d=0.03$, $p=0.909$ Stress MBSR vs TAU $d=0.08$, $p=0.751$	Hartmann, 2012	MBSR	TAU
	PHQ-9	1 year	NR	Depression MBSR vs TAU $d=0.71$, $p=0.007$ Stress MBSR vs TAU $d=0.48$, $p=0.071$	Hartmann, 2012	MBSR	TAU
	PHQ-9	8 weeks	NR	MBSR vs TAU 8wk $f=0.22$; $p=.050$	Kearney, 2016	MBSR	TAU
	PHQ-9	6 months	NR	MBSR vs TAU $f=0.27$; $p=.031$	Kearney, 2016	MBSR	TAU
	PHQ-9	9 weeks	MBSR mean difference in improvement 1.34; 95% CI, -0.07 to 2.75; $t=1.87$; $p=.06$; $d=0.26$	Net difference = 9.8, group by time $p=0.24$	Polusny, 2015	MBSR	TAU
	PHQ-9	17 weeks	NR	Net difference = 4.9, group by time $p=0.57$	Polusny, 2015	MBSR	TAU
	BSS	8 weeks	NR	BSS time by treatment $F(1, 29)=0.16$, $p=0.50$	Barnhofer, 2009	MBCT	TAU
Depression (suicide)	Suicidal Cognitions Scale	8 weeks	NR	Group by time $F(2, 129)=4.2$, $p=0.02$	Williams, 2014	MBCT	Active control - CPE; TAU

Global mental health (satisfaction, wellbeing, quality of life)

CGI	8 weeks	CGI CBGT d=1.99, MBSR d=1.54	CGI-S CBGT vs MBSR F(1,53)= 8.56, p = .005	Koszycki, 2007	MBSR	Active control - CBT
Psychological Wellbeing Scale	2 months	MBSR 2 months vs baseline mean difference = 9.08 (SE 2.93); Waitlist mean difference = 2.99 (SE = 2.82)	2 months time by treatment F(57) = 2.23, p=0.14	Pradhan, 2007	MBSR	Waitlist
Psychological Wellbeing Scale	6 months	Mean difference MBSR = 5.55 (SE = 3.44); Waitlist mean difference = -5.47 (SE = 3.83)	Time by treatment F (56) = 5.23, p=0.03	Pradhan, 2007	MBSR	Waitlist
PGWI	8 weeks	NR	Time by treatment F (2, 72)= 4.73, p = 0.01, d = 0.36	Chiesa, 2015	MBCT	Active control - psychoeducation group
PGWI	26 weeks	NR	Time by treatment F(4, 144) = 5.97, p =0.0002, d = 0.5	Chiesa, 2015	MBCT	Active control - psychoeducation group

SCL-90-R	8 weeks	NR	Distress time $F(1, 47)=7.97, p=0.007$ Anxiety 8 weeks time $F(1, 47)=7.18, p=0.01$	Rosenkranz, 2013	MBSR	Active control - HEP
SCL-90-R	4 months	NR	Distress time $F(1, 49)=6.29, p=0.016$ Anxiety time $F(1, 49)=5.41, p=0.024$	Rosenkranz, 2013	MBSR	Active control - HEP
SCL-90-R	2 months	MBSR 2 months vs baseline mean difference = 0.23 (SE 0.07); Waitlist mean difference = 0.16 (SE = 0.07) MBSR Distress 2 months vs baseline mean difference = 0.14 (SE 0.04); Waitlist mean difference = 0.08 (SE = 0.04)	n.s.	Pradhan, 2007	MBSR	Waitlist
SCL-90-R	6 months	MBSR mean difference MBSR = 0.26 (SE = 0.08); Waitlist mean difference = 0.06 (SE = 0.08) MBSR Distress mean difference MBSR = 0.17 (SE = 0.05); Waitlist mean	6 month depressive marginally significant group time interaction $F(56)=3.16, p=0.08$. 6 month significant group by time interaction psychological distress $F(56)=4.02, p=0.04$	Pradhan, 2007	MBSR	Waitlist

difference = 0.03 (SE
= 0.05)

SCL-90R		NR	Depression MBSR vs Active control 4 months p<0.05 Anxiety, global NR	Henderson, 2012	MBSR	Active control - nutrition education group; TAU
SCL-90R	12 weeks	NR	Depression time intervention interaction F(1, 48) = 4.72, p = .01, η^2 = .09. HEP time F(1, 48) = 2.89, p = .10, η^2 = .06	MacCoon, 2012	MBSR	Active control - HEP
SCL-90R	6 months	NR	Depression HEP time interaction F(1, 48) = 10.69 p = .002, η^2 = .18 Anxiety symptoms main effect of time F(1, 48) = 4.19, p = .02, η^2 = .08	MacCoon, 2012	MBSR	Active control - HEP
SCL-90R	2 months	NR	Anxiety p=0.25 Depression p=0.07	Würtzen, 2013	MBSR	TAU
SCL-90R	6 months	NR	Anxiety p=0.05 Depression p=0.01	Würtzen, 2013	MBSR	TAU

SCL-90R	12 months	Anxiety 12 months vs baseline MBSR mean difference = -0.2, p = 0.08, d = 0.36; TAU mean difference = -0.1, d=0.12, p = NR Depression 12 months vs baseline MBSR mean difference = -0.3, p = 0.01, d = 0.55; TAU mean difference = -0.1, d=0.18, p = NR		Anxiety p=0.13 Depression p=0.03	Würtzen, 2013	MBSR	TAU
SCL-90R	8 weeks	MBSR d=1.34	NR		SeyedAlinaghi, 2012	MBSR	Active control - Education and support group
SCL-90R	3 months	MBSR d=0.87	NR		SeyedAlinaghi, 2012	MBSR	Active control - Education and support group
SCL-90R	6 months	MBSR d=0.37	NR		SeyedAlinaghi, 2012	MBSR	Active control - Education and support group
SCL-90R	9 months	MBSR d=0.12	NR		SeyedAlinaghi, 2012	MBSR	Active control - Education and support group
SCL-90R	12 months	MBSR d=0.74	Group by time F(5, 168.17)=33.75, p<0.001		SeyedAlinaghi, 2012	MBSR	Active control - Education and support group
SCL-92	20.6	NR	Anxiety MBCT main		Skovbjerg,	MBCT	TAU

Mood states (current)	weeks			effects p=0.21; Depression main effect p=0.54	2012		
	SCL-90R	8 weeks	MBSR 8 weeks vs baseline d = 0.80, Waitlist d = 0.22	d=0.57, group F(1, 74)=13, p<0.01	Vøllestad, 2011	MBSR	Waitlist
	BRUMS	8 weeks	NR	Anger p-value=0.191 Dizziness p-value=0.005 Depression p- value=0.005 Fatigue p-value=0.001 Tension p-value=0.001 Vitality p-value=0.638	Omidi, 2013	MBSR	Waitlist
	Emotion Change Factor Analysis (PANAS, BDI, BAI, ASI, Novaco Anger Inventory, Anger Rumination Scale, Rumination	8 weeks	Changes in mindfulness (TMS) predicted changes in emotional well-being F(1, 70) = 18.34, p < 0.001	NR	Anderson, 2007	MBSR	Waitlist

Scale of RSQ, PSWQ)						
Global Mood Scale	8 weeks	NR	GMS Positive affect F(1,54)=8.23, time by treatment p=0.06 GMS negative affect F(1,54)=1.77, time by treatment p=0.189	Nyklícek, 2008	MBSR	Waitlist
PANAS	6 motnhs	NR	PANAS p>0.0.5	Duncan, 2012	MBSR	Waitlist
PANAS	6 months	MBSR positive affect d= 0.13	PANAS positive affect time by treatment F(2, 391) = 0.89, p = .42	Gallegos, 2013	MBSR	Waitlist
POMS	14 months	NR	POMS n.s. for time across subscales, Depressive time by group F(3,213) = 5.57, p<0.001, η^2 .07), Angry time by group F(3,213)= 3.24, p<0.05, η^2 = .04, Tired, Powerful, Tense, time by group n..s. Effects of group and of the time by group F(3, 188)=3.73, p<0.05, η^2 =0.05	Godfrin, 2010	MBCT	Waitlist

PTSD	CAPS PTSD scale	9 weeks	NR	Time by treatment mean difference (net) = 2.35, p=0.37	Polusny, 2015	MBSR	TAU
	CAPS PTSD scale	17 weeks	NR	Time by treatment F(1, 106.8)=4.75 , mean difference (net) = 7.89, p=0.004	Polusny, 2015	MBSR	TAU
Reaction to provocation	Capsaicin induced flare size	8 weeks	NR	Treatment by time F(1, 27)=10.07, p=0.004	Rosenkranz, 2013	MBSR	Active control - HEP
	Capsaicin induced flare size	4 months	NR	Treatment by time F(1, 27)=1.19, p=0.29	Rosenkranz, 2013	MBSR	Active control - HEP
	IL-8	8 weeks	NR	Time F(1, 35)=58.58, p<0.001	Rosenkranz, 2013	MBSR	Active control - HEP

	IL-8	4 months	NR	Time $F(1, 28)=42.77$, $p<0.001$	Rosenkranz, 2013	MBSR	Active control - HEP
	Salivary cortisol provoked	8 weeks	NR	Group by time $F(1, 45)=0.30$, $p=0.59$	Rosenkranz, 2013	MBSR	Active control - HEP
	Salivary cortisol provoked	4 months	NR	Group by time $F(1, 51)=4.91$, $p=0.03$	Rosenkranz, 2013	MBSR	Active control - HEP
	Tumor necrosis factor alpha	8 weeks	NR	Time $F(1, 41)=11.35$, $p<0.01$	Rosenkranz, 2013	MBSR	Active control - HEP
	Tumor necrosis factor alpha	4 months	NR	Time $F(1, 34)=226.38$, $p<0.01$	Rosenkranz, 2013	MBSR	Active control - HEP
Reaction to provocation, coping	Coping strategies (WOCQ)	8 weeks	NR	Emotion-focused coping strategies $F=6.486$, $p=0.001$, $\eta^2 = 0.575$ Problem-focused coping strategies post-test $F=13.091$, $p<0.001$, $\eta^2=0.732$	Nejati, 2015	MBSR	Waitlist

	Coping strategies (WOCQ)	4 months	NR	Emotion-focused coping strategies $F=3.848$, $p=0.001$, $\eta^2=0.445$ Problem-focused coping strategies post-test $F=11.738$, $p<0.001$, $\eta^2=0.710$	Nejati, 2015	MBSR	Waitlist
Relational	Parenting Stress Index	8 weeks	NR	PSI Parental distress MBSR vs Waitlist $t = 2.11$, $d = 0.70$, $p < 0.05$	Neece, 2014	MBSR	Waitlist
	Parenting Stress Index	8 weeks	MBSR personal distress $d = 0.49$	Treatment and disability type MBSR vs PAD $\beta = -0.01$, $p>0.05$	Dykens, 2014	MBSR	Active control - Positive Adult Development
	Parenting Stress Index	4 months	NR	Treatment and disability type MBSR vs PAD $\beta = 0.00$, $p>0.05$	Dykens, 2014	MBSR	Active control - Positive Adult Development
Stress/coping	PSS	8 weeks	MBSR $p = .04$, $d = 0.61$	MBSR vs CICO with baseline severity $p = .03$, $\omega^2 = .11$; MBSR vs NMSR ($p = .07$, $\omega^2 = .06$)	Jensen, 2012	MBSR	Active control - nonmindfulness stress reduction; Other control (incentive and nonincentive groups)
	PSS (10 item)	all	NR	$p > 0.05$	Duncan, 2012	MBSR	Waitlist

PSS (10)	4 months	MBSR 4 months vs baseline group by time interaction p=-0.55; Waitlist p=-0.07	d = 0.12, p > 0.05	Shapiro, 2011	MBSR	Waitlist
PSS (10)	12 months	MBSR 12 months vs baseline group by time interaction p = -0.30, Waitlist p=0.02	d = 0.10, p < 0.10, $\eta^2 = 0.08$	Shapiro, 2011	MBSR	Waitlist
PSS (10)	2 months	NR	Net difference = -0.6, p=0.87	Wells, 2014	MBSR	TAU
PSS (10)	4 months	NR	Net = -3.3, p = 0.27	Wells, 2014	MBSR	TAU
PSS (10)	2 months	NR	d= -0.61, p = 0.007	Whitebird, 2013	MBSR	Active control - Community Caregiver Education and Support
PSS (10)	6 months	NR	d = -0.47, time by treatment p = 0.01	Whitebird, 2013	MBSR	Active control - Community Caregiver Education and Support

PSS (14 item)	9 weeks	MBSR baseline vs 9weeks mean difference -4.04(SE =.80) Control baseline vs 9weeks mean difference -.22 (SE = .78)	MBSR vs Control baseline to 9 weeks p = 0.001	Carmody, 2011	MBSR	Waitlist
PSS (14 item)	20 weeks	MBSR 9 weeks vs 20 weeks mean difference -0.73 (SE = .70) Control 9weeks vs 20 weeks mean difference .38(SE = .55)	MBSR vs Control 9 weeks to 20 weeks p = 0.262	Carmody, 2011	MBSR	Waitlist
PSS (14 item)		NR	F(1, 54)=6.17, time by treatment p=0.016	Nyklícek, 2008	MBSR	Waitlist
PSS (14)	8 weeks	MBSR 8weeks p<0.001, TAU p>0.05	t = -2.9, P < 0.01	Parswani, 2013	MBSR	TAU
PSS (14)	5 months	MBSR 5 months vs 8 weeks p>0.05, TAU	NR	Parswani, 2013	MBSR	TAU

p>0.05						
Sympathetic arousal	PSS (14)		PSS F(88)=14.58, d=0.48, =0.14, p=.000	NR	Sephton, 2007	MBSR Waitlist
	PSS (14)	3 months	NR	Time by treatment F(NR) = 14.41, p = .00, $\eta^2 = .21$	Zhang, 2016	MBSR TAU
	PSS (4 item)	8 weeks	MBSR 8 weeks vs baseline time F=5.30, p=0.047, $\eta^2=0.37$; Active control F=.17, p=0.69, $\eta^2=0.02$; TAU F=3.40, p=0.0.8, $\eta^2=0.15$	MBSR vs TAU $\eta^2=0.23$, p=0.007	Jazaieri, 2012	MBSR Active control - aerobic exercise; TAU
	BP	8 weeks	NR	Systolic MBSR vs TAU d=0.29, p=0.267 Diastolic MBSR vs TAU d=0.49, p=0.0605	Hartmann, 2012	MBSR TAU
	BP	1 year	NR	Systolic MBSR vs TAU d=0.42, p=0.116 Diastolic MBSR vs TAU d=0.78, p=0.004	Hartmann, 2012	MBSR TAU
	BP	8 weeks	NR	Systolic BP F=117.849, p<0.001, eta=0.787 Diastolic BP F=109.405, p<0.001, eta=0.007	Nejati, 2015	MBSR Waitlist

Work attitudes/emotional exhaustion	BP	4 months	NR	Systolic BP F=116.441, p<0.001, eta=0.754. Diastolic BP F=107.964, p<0.001, eta=0.742.	Nejati, 2015	MBSR	Waitlist
	BP	8 weeks	MBSR Systolic 8weeks p<0.001, TAU p>0.05	Systolic BP MBSR t = -2.79, p< 0.05; diastolic p>0.05	Parswani, 2013	MBSR	TAU
	BP	5 months	MBSR 5 months vs 8 weeks p<0.01, TAU p>0.05 Diastolic p>0.05	NR	Parswani, 2013	MBSR	TAU
	HR	8 weeks	MBSR 8wk decrease p < .01, d = -0.60; F=10.45	NR	Amutio, 2015	MBSR	NR
	HR	12 months	MBSR decrease p < .0.01, d=-0.59, F=11.86	NR	Amutio, 2015	MBSR	NR
	Maslach Burnout Inventory	8 weeks	MBI MBSR 8wk p=0.001, 3 months p=0.01	Burnout emotional exhaustion subscale p=0.05	Cohen-Katz, 2005	MBSR	Waitlist
	Maslach Burnout Inventory	3 months	MBSR p=0.01	NR	Cohen-Katz, 2005	MBSR	Waitlist

NR = not reported; n.s. = not significant (p-value >0.05)

TABLE 3: Study Quality

First author, Year	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11
Amutio, 2015	L	H	H	H	L	L	L	L	L	L	L
Anderson, 2007	No data	No Data	H	No Data	L	H	L	H	H	L	L
Barnhofer, 2009	L	L	H	L	L	L	L	L	L	L	L
Britton, 2012	L	H	H	L	L	L	L	H	L	H	L
Britton, 2012	L	L	H	L	L	L	L	L	L	L	L
Carmody, 2011	L	L	H	H	L	L	L	L	L	L	L
Cherkin, 2016	L	L	H	H	L	L	L	L	L	H	L
Chiesa, 2015	L	L	H	No Data	L	L	H	L	L	L	L
Cohen-Katz, 2005	No data	L	H	No Data	L	L	H	H	L	H	L
Crane, 2008	L	L	L	L	L	L	L	L	L	No Data	L
Duncan, 2012	L	L	H	No Data	L	L	L	L	L	L	L
Dykens, 2014	L	L	No Data	No Data	L	No Data	L	H	L	L	L
Eisendrath, 2016	L	L	L	L	L	L	L	L	L	H	L
Foley, 2010	L	L	H	L	L	L	L	L	H	L	L
Gallegos, 2013	L	L	H	No Data	L	L	L	H	H	L	L
Geschwind, 2011	L	L	H	H	L	L	L	L	L	L	L
Godfrin, 2010	L	L	H	L	L	L	L	L	L	L	L
Gross, 2011	L	L	H	L	L	L	L	H	L	H	L
Gross, 2010	L	No Data	H	H	L	L	L	L	L	L	L
Hartmann, 2012	No Data	No Data	H	No Data	L	No Data	L	L	H	L	L
Henderson, 2012	L	L	H	L	L	L	H	L	L	L	L
Jazaieri, 2012	L	No Data	No Data	No Data	L	L	L	L	H	H	L
Jensen, 2012	H	No Data	No Data	L	H	L	L	H	L	L	L
Kaviani, 2011	No Data	No Data	No Data	No Data	L	No Data	L	H	L	No Data	L
Kearney, 2016	L	L	L	L	H	L	L	L	L	L	L
Kolahkaj, 2015	L	No Data	No Data	No Data	L	L	L	H	L	No Data	L
Koszycki, 2007	No data	L	No Data	No Data	L	L	L	L	L	L	L

Kuyken, 2008	L	No Data	H	L	L	L	L	L	L	L	L
MacCoon, 2012	L	No Data	L	L	L	L	L	H	L	H	L
Michalak, 2015	L	L	L	L	H	L	L	L	L	L	L
Neece, 2014	No Data	No Data	No Data	No Data	L	L	L	H	L	L	L
Nejati, 2015	No Data	No Data	No Data	No Data	L	L	L	H	L	L	L
Nyklíček, 2008	L	L	H	L	L	L	L	L	L	L	L
Omidi, 2013	No Data	No Data	No Data	No Data	L	No Data	L	H	L	No Data	L
Parra-Delgado, 2013	L	No Data	No Data	No Data	L	L	L	H	L	L	L
Parswani, 2013	L	L	L	No Data	L	L	L	H	L	No Data	L
Polusny, 2015	L	L	No Data	L	L	L	L	L	H	L	L
Pradhan, 2007	L	L	L	No Data	L	L	L	L	H	L	L
Robins, 2012	No Data	No Data	No Data	No Data	H	L	L	H	H	No Data	L
Rosenkranz, 2013	H	No Data	No Data	No Data	H	L	L	H	L	No Data	L
Schoultz, 2015	L	L	H	H	H	L	L	H	L	L	L
Sephton, 2007	No Data	No Data	L	L	L	L	L	L	L	No Data	L
SeyedAlinaghi, 2012	L	L	L	H	L	L	L	H	H	No Data	L
Shallcross, 2015	L	L	L	L	H	H	L	L	H	No Data	L
Shapiro, 2011	L	L	No Data	L	L	L	L	H	L	No Data	L
Skovbjerg, 2012	L	L	H	H	H	H	L	H	L	L	L
van Aalderen, 2012	L	L	H	No Data	L	L	L	L	L	L	L
Vøllestad, 2011	No Data	No Data	L	No Data	H	L	L	L	H	L	L
Wells, 2014	No Data	L	L	L	L	L	L	L	H	L	L
Whitebird, 2013	L	No Data	No Data	No Data	L	L	L	L	L	L	L
Williams, 2014	L	L	H	L	L	L	L	L	L	L	L
Wong, 2016	L	L	H	L	L	L	H	L	L	L	L
Würtzen, 2013	L	No Data	H	No Data	L	L	L	L	L	L	L
Zhang, 2016	L	L	L	L	L	L	L	H	L	No Data	L

Q1: Was the allocation sequence (randomization method) adequately generated? (High risk = “no”); Q2: Was the allocation adequately concealed prior to assignment? (High risk = “no”); Q3: Were participants adequately blinded? (High risk = “no”); Q4: Were outcome assessors adequately blinded? (High risk = “no”); Q5: Is there incomplete outcome data (attrition bias) due to amount, nature, or handling of incomplete outcome data? (High risk = “yes”); Q6: Are

attrition rates more than 20% different (absolute difference in rates) between arms? (High risk = “yes”); Q7: Is there evidence of selective outcome reporting bias? (High risk = “yes”); Q8: Is the analysis an intention-to-treat analysis? (High risk = “no”); Q9: Are groups generally similar at baseline? (High risk = “no”); Q10: Was there incomplete compliance with interventions across groups? (High risk = “yes”); Q11: Is there additional bias due to problems not covered elsewhere in the table? (High risk = “yes”)

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***Meditation, Mindfulness, and Health Training:* Framework and Pilot Data for a
Mindfulness-Based Intervention Designed for College Students**

Abstract

Context: Mindfulness-based interventions (MBIs) and mindfulness research are a growing area of research. MBIs that are customized to their target population may have greater impact than those which are not customized. College students often live in high-stress conditions. MBIs have potential to enhance college students' ability to maintain healthy, happy lives in the midst of high-stress.

Objectives: The primary aim of this study was to evaluate impacts of the college-population customized Mindfulness-Based Intervention called *Meditation, Mindfulness, and Health Training* (MMHT) intervention on college students' emotional well-being, assessed using the Difficulties in Emotion Regulation Scale (DERS). Secondary aims include additional affective outcomes (Positive and Negative Affect Schedule (PANAS), Self-compassion Scale (SCS), Rosenberg Self-esteem Scale (RSS), general health indicators (blood pressure, body mass index, sleep [Pittsburgh Sleep Quality Index], diet [Fruit and Vegetable Intake]) as well as cognitive performance (Adapted Graduate Records Examination Reading Comprehension, Trail Making Test), and levels of mindfulness (Five-Facet Mindfulness Questionnaire [FFMQ]). This study served as a pilot for a randomized control trial currently underway.

Methods: Data were collected from participants consented during the 7 week intervention using Qualtrics online survey and in-person laboratory visits. Paired t-tests and Cohen's d effect sizes assessed the impact of MMHT on emotion regulation, general health indicators, cognitive performance, and mindfulness levels.

Results: Of the students in the course ($N = 13$), 11 consented to data collection and provided full data. Although participant's capabilities for difficult emotion regulation and situational strategies slightly increased through MMHT, the mean DERS total score post-intervention was not significant ($p = 0.11$; $d = .38$). After MMHT, participants showed reductions in diastolic blood pressure (6.2 mmHg, $p = 0.002$; $d = 1.1$) and the PSS ($p = 0.03$; $d = .65$). Additionally, participants improved in cognitive performance (TMT Form B post-intervention reduction of 9 seconds, $p = 0.013$; $d = .81$). Compared to baseline, MMHT participants showed significant increases in FFMQ total score and all subscales ($p = 0.0003$; $d = -1.1$).

Conclusions: Data suggest a trend towards improvement such that MMHT may be a viable intervention to improve college students' emotional health, well-being, and cognitive performance, with the promising effects across domains. More rigorous study designs, including randomized controlled trials with larger sample sizes, are required to more confidently assess potential health effects of MMHT.

Keywords: mindfulness, college students, emotion regulation

Background

Emerging adults, aged 18-25 years old, occupy a transitional point in life that can introduce high levels of stress and personal identity development which may impact their emotional and physical well-being.¹ Many of these emerging adults in the 18-22 age range are undergraduate (college) students, and the additional educational transition introduces changing sleep habits, increased workload, and new responsibilities.² The combination of academic and social pressures on this specific population may be expressed as improper sleep habits, increased drug and alcohol use, high levels of stress, and prevalence of eating disorders or unhealthy diets.³ The National Center for Education Statistics estimated 20.5 million students total enrolled in degree-granting institutions across the United States as of the fall of 2016,⁴ with existing literature pointing to the need to cost-effective interventions to improve college student well-being.⁵⁻⁷

One approach for interventions to enhance well-being of emerging adults in college settings might be through mindfulness programs and techniques. Mindfulness may be defined as the ability to attend nonjudgmentally to the present moment.⁸ Among mindfulness researchers, an operational definition for mindfulness is comprised of two components: the self-regulation of attention focused on present moment experiences and the metacognitive experience of becoming aware of the workings of one's mind.⁹ Further elaborated, the metacognitive aspect of the consensus definition refers to an open and curious orientation towards experiences that is amenable to the cultivation of mindfulness practices. The exponential growth of the literature over the last decade

demonstrates mindfulness as a topic of both academic and public interest. Studies suggesting improved health outcomes through mindfulness interventions have expanded from the roots of applying mindfulness-based interventions for chronic pain and stress-reduction^{8,10,11} to more recent studies on health conditions such as depression,¹² anxiety,¹³ and migraines.¹⁴ Observed health benefits, including weight loss,¹⁵ blood pressure reduction,¹⁶ and improved cognitive processing¹⁷ indicate that mindfulness-based interventions (MBIs) may improve health indicators in both healthy and clinical populations, though these findings are in need of greater methodological rigor.

As multidimensional interventions, MBIs incorporate both a formal and informal meditation training, guided practices, social support, and didactic component wherein participants may learn about the historical applications of these programs. A recent area of academic focus is the application of MBIs or other mindfulness-based practices as a complement to medical treatment specifically for the medical and nursing students in an attempt to prevent excessive stress and professional burn-out^{18,19} as well as general well-being and numerous health conditions. Early work is now starting to focus on the undergraduate population.^{5,6,20-22}

The structure and the content of MBIs may be customized so that the particular needs of the cohort of participants may be addressed, specifically aimed at targeting the theoretical mechanisms appropriate for an outcome of interest. Among these adaptations are a growing offering of mindfulness-based trainings for

college-aged emerging adults. These interventions capitalize on the opportunity to enhance health promoting behaviors by engaging these students at a point in life where the skills acquired may be sustained throughout the lifecourse. For example, customized MBIs for college students exist for focusing on regulating negative affect in the context of the urge to drink alcoholic beverages among college student drinkers²³ or tailoring the intervention content for college-aged smokers to minimize tobacco use.²⁴ In an academic context for students, a brief (7 hours over 7 weeks) mindfulness training program was shown to aid in lowering mind-wandering, illustrating the potential for MBIs to assist in improving the academic concentrative capacities of students.²⁵ By focusing in on the most applicable area of self-regulation to engage the college population experiencing a certain condition, early evidence suggests that the customized mindfulness intervention may elicit better results.

This array of health metrics that are improved by MBIs may be due to the ability of mindfulness to infiltrate a variety of internal processes, several of which are ripe for strengthening in the college setting.^{5,6} The underlying theoretical framework of mindfulness illustrates an interplay of emotion regulation, attention control, and self-awareness that, together, may impact an individual's capacity for self-regulation.²⁶ Improved self-regulation, through these pathways of improved emotion regulation, attention control, or self-awareness, is associated with improved status of many of the aforementioned health conditions.^{27,28}

Emotion regulation, one of the components of the underlying theoretical framework of mindfulness, refers to the process of altering continual emotional responses through the use of regulatory processes.²⁹ The term itself refers to multiple strategies of modulating response to stimuli which may be considered either as reappraisal (antecedent-focused) or suppression (response-focused) techniques to positive or negative stimuli.³⁰ Another response related to emotional stimuli is the stress response, a neurophysiological process that MBIs generally explicitly address and normalize so that participants are encouraged to explore an enhanced awareness to how and when they experience this response.²⁷ The particular neurophysiology of meditation naïve participants before and after meditation demonstrate increased gray matter density in the hippocampus as well as alterations in amygdala activity, modulated by the prefrontal cortex which manages executive function and control.^{31,32} Excessive activation of the amygdala, in tandem with reduced prefrontal cortex activation, is a characterization of a dysfunctional frontal-limbic system.³¹ The impact of mindfulness meditation on emotion regulation includes self-report measures, peripheral biological measures, and neuroimaging experimental data, nearly each of which has been utilized to implicate positive effects of mindfulness on emotion regulation in college students.^{5,20,33}

Enhanced emotion regulation for college students is important in minimizing an unhealthy response to academic and other stresses.³⁴ These stressors may negatively impact their overall health and wellbeing, and may be manifested

through poor diet and minimal physical activity³⁵ or poor sleeping habits,³⁶ possibly associated with a lack of skills in adequate stress and emotional response management.³⁴ The neural mechanisms of emotion regulation, such as amygdala and prefrontal cortex activity, may be trained through attentional, emotional, and introspective practices taught in MBIs. In college students, emotion dysregulation was found to be associated with social impairment and sluggish cognitive tempo (that is, daydreaming, starting, confusion, mental foggy, lethargy, hypoactivity, and drowsiness).³⁷

The previously mentioned interventions have set a foundation of research in this area, but there is a need for more replication of current findings in the field to scientifically and accurately support claims while also assessing the mechanisms and viability of these adapted programs. Specific research into the potential modulation of emotion regulation through a mindfulness-based training program specifically tailored for the general college student population, in addition to other general health and college-specific measures (e.g., cognitive performance, diet, sleep, physical activity) would improve the knowledge base of the applications of MBIs. Several of these college-MBI studies lack of widespread college student populations rather than specific subsets, such as nursing students, smokers, or folks with disordered eating habits. Under consideration of this gap in the literature, and following the student interest for an academic course in a medium, liberal arts university in the Northeastern United States, the intervention described here was created and implemented.

Objective

The primary aim of this study was to evaluate impacts of the college-population customized MBI called *Meditation, Mindfulness, and Health Training (MMHT)* intervention on college students' emotional well-being, assessed using the Difficulties in Emotion Regulation Scale (DERS).

Secondary emotion regulation outcomes include the Positive and Negative Affect Schedule (PANAS), Self-compassion Scale - Short Form (SCS), and the Rosenberg Self-esteem Scale (RSS). It was hypothesized that compared to baseline, participants in MMHT would show improvements in emotion regulation after intervention completion.

Secondary aims were to evaluate participants' general health (blood pressure, body mass index, sleep [Pittsburgh Sleep Quality Index], diet [Fruit and Vegetable Intake]) as well as cognitive performance (Adapted Graduate Records Examination Reading Comprehension, Trail Making Test), and levels of mindfulness (Five-Facet Mindfulness Questionnaire) before versus after the intervention.

Methods

Study design

The current study is a single-arm prospective clinical trial study design. This study served as a pilot trial for the intervention *Mindfulness-Based College* that is currently underway as a randomized controlled trial (intervention versus waitlist control).

Setting

MMHT took place at the Brown University School of Public Health in Providence, Rhode Island. An exam room in the school's collaborative research center was used for laboratory assessments of the participants. Questionnaires, designed and recorded using Qualtrics survey software (Qualtrics, Provo, UT), were completed online at the convenience of the participants.

Participants

Recruitment

Recruitment for the summer course in which MMHT was embedded was done through electronic mail notifications through the University notifying students of the possibility to register for summer courses. Particular undergraduate departments with established interest in the topics of the course and of MMHT, such as Contemplative Students and Public Health, shared additional electronic mail notifications and in-person announcements for the course. Recruitment for the data collection was solicited to enrolled students via another electronic mail notification before the first class. Additionally, an in-person announcement was made in the first class to ensure that students were aware of the proceedings.

Intervention

MMHT was designed, implemented, and assessed as the pilot study of a small-scale randomized control trial (intervention versus waitlist control). MMHT was comprised of

10 sessions lasting approximately one hour and twenty minutes each: two sessions per week over 7 weeks and one half-day (4.5 hour) retreat, which took place during session 9. One session fell on a holiday where university proceedings were canceled, so week 3 and was comprised of one session only. The curriculum for MMHT combined mindfulness meditation and mindful movements (based on hatha yoga) for 7-weeks of intensive exposure, practice, and cultivation of the skills introduced in the program (the curriculum from which MMHT was adapted is shown in more detail in the **Appendix**). These skills, rooted in the foundational standardized Mindfulness-Based Stress Reduction (MBSR) curriculum, were adapted to specifically address how the undergraduate college population may integrate mindfulness into their emerging adult lives through both formal and informal mindfulness practices.

As a subset of behavioral medicine, MMHT uses the underpinnings of behavioral activation and self-regulation to approach the aim of enhancing positive health behaviors, affective and psychological regulation, and build emotional resilience through an experiential and guided manner. These skills, especially when introduced to young adults, may be incorporated throughout the lifespan.

MMHT builds a foundation of mindfulness skills (e.g. meditation, self-awareness, etc.) through the MBSR curriculum. The course then directs participants' attention towards their relationship with a number of health-related factors relevant in emerging adulthood. Early in the MMHT course, the importance of physical activity, diet, sleep, stress, social relationships, drug and alcohol use, and cognitive performance in health, mortality and

academic success is described. Participants have health assessments taken at baseline, and are provided with health cards showing their health characteristics (e.g. body mass index, fruit and vegetable consumption, physical activity, sleep duration, perceived stress) during an MMHT session early in the course. This phase aims to engage participants' interest in their own well-being, and increase motivation for behavior change. MMHT encourages participants to explore personal readiness for change in the different health behaviors, and utilize mindfulness practices to engage with the health behaviors that they choose to. Each week, focus is provided on different health behaviors. However, common themes exist across all health behaviors including (1) awareness of thoughts, emotions and physical sensations particularly surrounding health behaviors such as overconsumption of palatable foods, sedentary activities, alcohol consumption; (2) craving, particularly for health-related behaviors such as overconsumption of palatable foods, sedentary activities, and alcohol consumption; (3) the impact of bringing mindfulness to every moment, particularly in relation to health behaviors. For example, when consuming highly palatable food, bringing awareness to the emotions, thoughts and physical sensations prior to eating it, during eating it, along with the many minutes, if not hours, afterwards. Participants are trained to bring non-judgmental attention to the often short-term pleasure of overconsumption of foods, sedentary activities, heavy alcohol consumption, and bring non-judgmental attention to the longer term suffering associations with these activities. Through this process, participants are encouraged to reflect on if behavioral choices provide more benefit or harm to their well-being, and to choose the behaviors that bring benefit. (4) Self-care: as awareness of thoughts, emotions and physical sensations increases, and self-regulation likely increases as a result of the

meditation practices, the curriculum will emphasize to participants that it is common for people to start caring for themselves more. It is a way of better knowing ourselves, and through knowing ourselves in in each moment, we often want to care for ourselves in each moment. This may mean taking medication that will help our health, or being more physically active, eating more healthily, or consuming more moderate amounts of alcohol.

The customization of the program was completed by a qualified MBSR instructor who is also a cardiovascular physiologist and epidemiologist. These topics of focus were selected as areas of interest to undergraduate students that could potentially benefit their well-being at this sensitive period in the life course as emerging adults (**Figure 1**). While participation in the intervention was integrated in the course, only consenting students were included in data collection and analysis. Students were informed that participation was not required and that opting out of participating in data collection would not affect their grades or relationships with the instructor or teaching assistants (TAs).

Instructor

MMHT was led and developed by a qualified MBSR instructor trained at the University of Massachusetts Center for Mindfulness, with 20 years' experience in mindfulness meditation (Loucks).

Assessments

The participants were assessed at two timepoints in the course of the study: baseline

assessments in the first week of the course through an online questionnaire (~1.5 hour) and lab visit (~1 hour), and a post-intervention questionnaire and lab visit that took place in the final week of the course. Participants underwent randomization to receive one of two online surveys using a random-number generator in Microsoft Excel (Microsoft, Seattle, WA). In order to counterbalance the cognitive performance questions, which differed by assessment form, participants were given the opposite follow-up questionnaire form.

Demographic Variables

Data were collected on participants' age, gender, ethnicity, race, and total number of years of education to date.

Outcome variables

Emotion Regulation

The first emotion regulation measure was the Difficulties in Emotion Regulation Scale (DERS), a valid and reliable measure consisting of 36-items designed to assess multiple aspects of emotional dysregulation.³⁸ Each item is scored on a five-point Likert scale where 1 is “almost never” and 5 is “almost always.” Scoring is comprised of a total score as well as six-subscales, which are Non-acceptance of emotional responses, Difficulties in engaging in goal directed behavior, impulse control difficulties, Lack of emotional awareness, Limited access to emotion regulation strategies, and Lack of emotional clarity. Higher scores indicate greater problems with emotion regulation. Cronbach's α for the DERS was 0.86 at baseline and 0.78 at follow-up.

The Perceived Stress Scale (PSS) is a 10-question assessment of feelings of stress and stress coping strategies within the past 30-days. The PSS is a valid and reliable instrument that uses a five-point Likert scale.^{39,40} Scores are generated by reverse-coding the four positively phrased items and summing those with the remaining items, and higher scores are linked with higher levels of perceived stress. Cronbach's α was 0.84 at baseline and 0.87 at follow-up.

The Rosenberg Self-esteem Scale (RSS) uses positively- and negatively-phrased items to assess self-worth in a 10-item instrument comprised of four-point Likert scales, ranging from "strongly agree" to "strongly disagree." The RSS is valid and reliable and is widely used.^{41,42} Scores are generated by summing all items, with negatively phrased items reverse coded. Higher scores indicate higher levels of self-esteem. Cronbach's α for the RSS was 0.88 at baseline and follow-up.

The Self-Compassion Scale - Short form (SCS) is a valid and reliable 12-item instrument comprised of five-point Likert scale items ranging from "almost never" to "almost always."⁴³ Although the full version of the SCS is 26 items, the short form has "near perfect correlation" in assessing total scores. Subscales, however, are not recommended to be assessed using the short form. Negative scale items are reverse-coded and total items are added together to create the total score. Cronbach's α for the SCS was 0.89 at baseline and 0.91 at follow-up.

The Positive and Negative Affect Schedule (PANAS) is 20-item questionnaire with a five-point Likert scale, ranging from “very slightly or not at all” to “extremely,” wherein participants categorize how strongly they associate with the listed adjective at that moment in time. This questionnaire shows good validity and reliability, and is commonly used to assess affective states.⁴⁴ The PANAS is scored by summing all positive adjective items for a Positive Affect score and summing all the negative adjective items for the Negative Affect score. Cronbach’s α for the PANAS was 0.87 at baseline and 0.89 at follow-up.

Cognitive performance

For a general measure of academic cognitive performance, a short-form Graduate Records Examination (GRE) was created by adapting the verbal reasoning sections of existing practice exams to include questions of reading comprehension alone, after removing vocabulary questions. This methodology is similar to that of Mrazek.⁴⁵ The verbal reasoning sections of the GRE assess the English language reading abilities of students who are applying to graduate school.

The Trail Making Test (TMT) is a short assessment comprised of two forms: A and B.⁴⁶ In both forms, there are 25 circles scattered across a sheet of paper, labeled either 1-15 (Part A) or 1-13 and A-L (Part B). The goal is to connect the circles in the correct order (either 1-2-3... in Part A or 1-A-2-B-3-C... in Part b) as quickly as possible, without lifting the pen from the paper at any point. Administrators of the TMT point out errors for participants to correct as the task is being completed.

General health indicators

Blood pressure was assessed by a research assistant (Kimmel) by use of an Omron automatic blood pressure machine validated for epidemiologic research (model HEM-705-CP, Omron, Kyoto, Japan).⁴⁷ Participants were seated with arm placed at heart level, with back supported by the chair, and feet placed flat on the ground. Participants rested for five minutes prior to having blood pressure assessed. Three blood pressure readings were taken, with one minute of rest in between each assessment. The average of the second and third reading was used as the value for each participant's blood pressure. This procedure is in accordance with guidelines set by the American Heart Association (available from: <http://www.aafp.org/afp/2005/1001/p1391.html>).

In the lab assessment, participant's height and weight were recorded using a stadiometer and electronic scale (SECA 813, SECA, Hamburg, Germany). Calibration weights were routinely used to calibrate the electronic scale for accuracy. Using this information, Body Mass Index (BMI) was calculated for each individual as kg/m^2 .

The Food Frequency Questionnaire (FFQ) was administered to participants, with particular interest in their responses to questions of Fruit and Vegetable Consumption. Mean daily averages of fruit and vegetable consumption were calculated for analysis. The FFQ has been validated for use among men⁴⁸ and women.⁴⁹

The Pittsburg Sleep Quality Index (PSQI) is a widely used and accepted

multidimensional instrument through self-report single-, multiple-, and open-ended questions.⁵⁰ The PSQI assess sleep using seven components: Subjective sleep quality, Sleep latency, Sleep duration, Habitual sleep efficiency, Sleep disturbances, Use of sleeping medication, and Daytime dysfunction. Scores are calculated for each component as well as a summative Global PSQI score.

Mindfulness

Mindfulness was assessed using the Five-Facet Mindfulness Questionnaire (FFMQ), a valid and reliable measure of self-reported mindfulness.⁵¹ The FFMQ is one of the most commonly used measures of dispositional mindfulness in the field based on a factor analysis of five independently designed mindfulness questionnaires. The FFMQ is comprised of 39-items, which are asked on a five-point Likert scale and categorized into five subscales: Observing, Describing, Acting with Awareness, Non-judging of inner experience, and Non-reactivity to inner experience. Higher scores indicate higher levels of mindfulness. Cronbach's α for the FFMQ was 0.82 at baseline and 0.76 at follow-up.

Observing refers to observing, attending, or noticing internal or external sensations and emotions. Describing refers to labeling internal experiences. Acting with awareness pertains to attending to one's present-moment activities, different from acting mechanically, automatically, absent-mindedly. Non-judging of inner experience refers to observing and reflecting on thoughts and feelings in a neutral, non-evaluative manner. Non-reactivity to inner experience refers to the ability to observe thoughts and emotions as they come and go without getting lost, caught up, or carried away by them.

Study Size

Thirteen students registered in the summer course. Of these 13 students, 12 consented to participate in data collection (92.3%). Eleven students provided full baseline and follow-up data and were included in the analyses (91.6% of consented participants).

Statistical methods

Data were analyzed using STATA (StataCorp, College Station, TX). Means and standard deviations were assessed for all variables. Paired t-test were conducted to assess the impact of the intervention among participants, and effect sizes (Cohen's d) were reported for all outcome variables. Effect sizes were classified as small ($d < .20$), medium ($.20 < d \leq .50$), and large ($.50 < d \leq .80$). Graphical methods were used to check for normal distribution and potential outliers of the variables. Statistical significance results refer to those with an p value < 0.05 . However, it should be emphasized that with a pilot study with sample size of 11, these analyses are statistically underpowered. The p -values should be interpreted in the context of low statistical power.

Results

Participants

Participants ($N = 11$) were primarily female (90.9%) and identified as Caucasian (36.4%). One participant did not disclose racial identity, and two participants identified as African-American. One participant was international and identified as "Other." Under one-fifth of participants identified ethnically as Hispanic (18.2%). On average, participants were 19.7 years old and completed 13.9 years of formal education. (**Table 1**).

Emotion regulation

Primary affective outcome

Participant's self-reported capabilities for difficult emotion regulation and situational strategies slightly increased through MMHT, measured through reductions of DERS total and subscale scores. The mean baseline DERS total score was 82.0 ($\pm$ 28.3). After MMHT, the mean DERS total score among participants was 73.0 ($\pm$ 18.2), a decrease in total DERS from baseline that was not significant ($p = 0.11$) and there was a medium effect size ($d = .38$) (**Table 2**). With a sample size of 11, analyses are underpowered for statistical significance at the $p = 0.05$ level. Additional score reductions were found in all subscales, except for *Awareness* (12.7 at baseline versus 12.9 at follow-up) and *Impulse* (12.0 versus 13.4). Effect sizes for the subscales ranged from small (*Awareness* $d = -.40$) to large (*Clarity* $d = .58$).

Secondary affective outcomes

While there were alterations in mean PANAS positive and negative values at follow-up, positive affect PANAS score remained the same (28.1 versus 28.6, $p = 0.80$), and the mean negative affect PANAS score decreased from baseline (19.4 versus 15.5, $p = 0.12$). Effect sizes for both positive and negative PANAS scales were large (positive $d = -.51$; negative $d = .51$). Although positive and negative affective states were not largely different after the intervention, participant's assessment of how their current situations were perceived as stressful was significantly reduced. The mean participant PSS score decreased by 3.7 points after MMHT (18.3 at baseline; 14.6 at follow-up; $p = 0.03$).

There was a large effect of the intervention on PSS scores ($d = .65$). Participant's perception and assessment of their own levels of both self-compassion and self-esteem were also increased after completion of MMHT with a medium effect size ($d = -.47$). The mean SCS score increased from 36.8 (± 9.32) at baseline to 40.3 (± 4.67 ; $p = 0.08$), and mean RSS score increased from 28.3 (± 5.33) to 30.8 (± 5.19 ; $p = 0.06$; $d = -.48$).

General health outcomes

Baseline systolic blood pressure among MMHT participants went from 109.1 mmHg (± 5.5) at baseline to 106.3 (± 8.5) mmHg ($p = 0.22$; $d = .39$) (**Table 3**). At baseline, mean diastolic blood pressure was 72.2 mmHg (± 6.0). At follow-up, diastolic blood pressure reduced to a mean value of 66.1 mmHg (± 5.6), marking a significant decrease from baseline ($p = 0.002$) with a large effect size ($d = 1.1$). While the reduction in diastolic blood pressure was large enough to reach statistical significance, the mean BMI of participants in MMHT only decreased by 0.5 kg/m² ($p = 0.175$; baseline BMI 24.6 kg/m² ± 4.39 , follow-up BMI 24.1 kg/m² ± 3.85 ; $d = .12$). The mean BMI for participants was within a normal recommended range (BMI 18.5-25 kg/m²), and few participants needed to lose weight. Among a subgroup of participants with baseline BMI considered overweight or obese, i.e. BMI ≥ 25 kg/m² ($n = 4$), their mean baseline BMI was 29.7 kg/m² (± 2.20) and post-MMHT mean BMI was 28.6 kg/m² (± 1.41) ($p = 0.36$; $d = 1.2$).

Both assays for measuring mean difference in sleep parameters after MMHT suggest increased difficulty sleeping compared to baseline. Participants' PSQI Global mean scores at baseline were 5.82 (± 2.60). After MMHT, mean PSQI Global scores were 5.91

(2.84) ($p = 0.92$; $d = -.03$). Total self-reported hours slept per night were 8.0 hours (± 1.26) at baseline compared to 7.05 hours (± 0.91) at follow-up ($p = 0.06$; $d = .86$), noting that these amounts of sleep are within ranges considered healthy (National Sleep Foundation recommendation for 7-9 hours per night for young adults 18-25 years old⁵²).

Dietary habits after MMHT show mild increases in both mean fruit and mean vegetable intake. Daily consumption of fruits among participants was 1.5 (± 1.3) at baseline and 2.2 (± 1.3) at follow-up ($p = 0.13$) with a large effect size ($d = -.50$). Mean daily vegetable intake among participants was 2.1 (± 1.5) at baseline and 2.3 (± 1.9) at follow-up ($p = 0.31$) with a small effect size ($d = -.19$).

Cognitive performance

Cognitive performance measured by mean adapted GRE Reading Comprehension scores among the participants did not significantly increase after MMHT compared to baseline (5.3 ± 2.1 versus 6.1 ± 2.5 , $p = 0.46$), although there was a medium effect size of the intervention ($d = -.37$) (**Table 4**). The mean time for completion of TMT Form A among participants went from 20.6s (± 5.1) at baseline to 18.6s (± 6.1) at follow-up ($p = 0.13$), with a medium effect size ($d = .36$). Form B mean time-to-completion at follow-up was 38.6s (± 10.3) compared to 47.6s (± 11.9) at baseline ($p = 0.013$). The effect size for Form B of the TMT was large ($d = .81$).

Mindfulness

Participants significantly improved on the total FFMQ score (baseline mean FFMQ 123.6

versus follow-up 145.4; $p = 0.0003$) with a large effect size ($d = -1.1$). (**Table 5**). The mean value of each of the five-subscales also significantly increased from baseline with effect sizes ranging from medium (*Observing* $d = -.46$) to very large (*Acting with Awareness* $d = -1.1$). The greatest subscale increase occurred in *Non-judging of inner experience* (24.9 ± 7.29 baseline, 31.6 ± 5.48 follow-up; $p = 0.007$; $d = -1.0$), and the most statistically significant increase occurred in *Non-reactivity* ($p = 0.0005$; $d = -.98$).

Discussion

Summary of findings

While the effects of MMHT on emotion regulation measured by DERS was not statistically significant, there were reductions in the DERS total score as well as nearly all subscales. Specifically, the mean participant total DERS score reduced by approximately 9 points (from 82.0 to 73.0; $p = 0.11$), indicating a trend of overall improvements in participant's capacities and strategies for emotion regulation along with a close-to-medium effect size ($d = .38$). Among the DERS subscales, the lowest score after MMHT was found in the Clarity subscale, meaning that of the five measures of capacity for self-regulation of emotional states, participants found the least about of difficulty in the ability to make sense of emotions and feelings after the program. After MMHT, there was also a significant increase in mean participant levels of mindfulness (increase of 21.8 points on FFMQ, $p = 0.0003$) with a very large effect size ($d = -1.1$).

Although the primary emotion regulation outcome reductions were not statistically significant, there was additional modulation of secondary emotion regulation outcomes,

such as perceived stress, self-compassion, and self-esteem. Reduction in perceived stress (3.7 points; $d = .65$) and increases in self-compassion (3.5 points; $d = -.47$) and self-esteem (2.5 points; $d = .65$) suggest an impact of MMHT in the realm of emotion regulation, and a more adequately powered study may find such results significant. Compared to a national sample of PSS among individuals aged less than 25 years old (PSS mean of 16.78 ± 6.86), the baseline PSS score of MMHT participants was less than one standard deviation above the norm (MMHT mean of 18.3 ± 5.82) (Cohen, 2006). After MMHT, the mean PSS score of participants was lower than the national norm (14.6 ± 5.48). The positive terms in the PANAS were nearly equally identified by students as relating to their current state at baseline (28.1 ± 9.12 baseline) and at follow-up (28.6 ± 10.6 ; $d = -.51$), though participant identification with negative terms decreased and showed less variance at follow up compared to baseline (19.4 ± 9.40 baseline, 15.2 ± 5.99 follow-up; $d = .51$). Lower levels of identification with negative terminology may be the result of the cultivation of strategies in reframing emotional and thought processes as negative though added distance between emotions and perceived value of the thought.

The TMT Form A score was not expected to change after the intervention cognitive performance as the (TMT-B, reduction of 9 seconds), although there was a medium effect size ($d = .38$). Compared to a normative sample of a group aged 18-24 (Tombaugh 2004), MMHT participants did show faster completion times for both TMT-A and TMT-B at baseline as well as at follow-up (normative mean TMT-A 22.9s, TMT-B 49.0s; MMHT baseline TMT-A mean 20.6s, follow-up 18.6s; TMT-B baseline 47.6s, follow-up 38.6s). These reductions, although significant among MMHT participants for TMT-B (p-value

0.013; $d = .81$), could be a function of participants becoming familiar with how the task is completed rather than a reflection of a significant increase in cognitive performance.

Alternative measures of cognitive performance, such as the Sustained Attention to Response Task (SART) may be better suited for assessing reaction-time changes in cognitive functioning.

While there was a decrease in the number of hours slept after initiation of a meditation practice among MMHT participants, MMHT participants' baseline and follow-up Global PSQI scores were, however, above the mean value found in a sample of otherwise healthy undergraduate students⁵³ (MMHT baseline mean PSQI score 5.82 ± 2.60 , follow-up 5.91 ± 2.84 versus Milojevich mean PSQI score 4.65 ± 2.38). Findings from previous mindfulness-based intervention studies finding reductions in blood pressure among various adult populations⁵⁴⁻⁵⁶ were replicated here among undergraduates. Although MMHT participants were younger than the participants of previous studies showing such effects, mean MMHT participant systolic blood pressure decreased (109.1 ± 5.5 at baseline versus 106.3 ± 8.5 at follow-up, $p = 0.22$), as did mean diastolic blood pressure reduction (reduction of 6.2 mmHg; $p = 0.002$). The effect size of the intervention on systolic blood pressure was medium ($d = .39$) whereas the effect size on diastolic blood pressure was very large ($d = -1.1$). Evidence suggests that earlier in the life-course, under age 50, diastolic blood pressure is a more relevant factor of cardiovascular health, whereas systolic blood pressure holds greater importance later in life.⁵⁷ The cardiovascular risk in populations over the age of 50 may be therefore more logically stratified by systolic blood pressure, whereas for younger populations, diastolic blood

pressure holds greater relevance in risk categorization.

Additional general health metrics measured in MMHT included diet and BMI. Although participants increased their daily intake of both fruit (1.50 ± 1.31 servings/day at baseline, 2.2 ± 1.4 servings/day at follow-up, $p = 0.13$; $d = -.50$) and vegetables (1.95 ± 1.51 servings/day at baseline, 2.27 ± 1.88 servings/day at follow-up, $p = 0.31$; $d = -.19$), the seasonality of the intervention and the presence of vegetarians among the participants should be considered. As the intervention occurred mid-to-late summer, the increased availability of fresh fruits and vegetables may have impacted the increased consumption of produce. An additional consideration is that the change in BMI among participants (0.5 kg/m^2 reduction; $d = .12$) does not accurately reflect the goals set by participants. While some participants set goals at the beginning of the intervention to lose weight, others sought to gain weight or muscle. Examining individual BMI changes along with the preset goals at the start of the intervention would be a more meaningful metric.

In a similar manner to the differences among students in goal setting behavior in relation to weight loss or gain, the emotion regulation outcomes may be skewed by a small number of students with outlying scores for certain measures. Some participants disclosed diagnoses for anxiety/depression and take medication to treat these conditions. These outliers may carry much of the variance in measures of emotion regulation such as the DERS and PANAS. This information was not formally assessed in the present study, though future mindfulness interventions among undergraduates would benefit from focused analyses of the dispositions of students that are most likely to participate and

benefit from these interventions.

Comparison to relevant literature

In contextualizing MMHT among the other college-specific mindfulness interventions taking place in the last two years, there are several aspects which are strengthened. A systematic review of these interventions for college students found significant reductions in both stress and depression scores after the mindfulness-based interventions.⁵⁸ Similar to MMHT, all but one of the interventions included in the systematic review were abbreviated or shortened interventions, yet significant reductions were still found. MMHT replicates such findings. Another intervention in college-aged students focused on levels of mindfulness after the intervention, finding significant increases in average participant FFMQ scores using an Italian validated version of the instrument.⁵⁹ This study found significant increase among the Observing ($p=0.035$) and decrease among the Describing ($p=0.031$) subscales, but not in the total FFMQ score ($p=0.28$). These results differ from the significant and large effects of MMHT on participant total FFMQ scores ($d=-1.1$, $p=0.0003$). Conversely, in regard to self-compassion, a randomized control trial comparing a mindfulness-based intervention to yoga found significant increases in self-compassion among the MBI arm alone ($p<0.01$).⁶⁰ Additionally, depressive symptoms, symptoms of anxiety, and stress symptoms decreased significantly ($p < .01$) from baseline to follow-up conditions in both intervention groups, as did increased mindfulness scores. This study, with similar participant demographics to MMHT, but with a larger sample size (67 total), indicates the

possibility that with adequate power, the results presented here would gain statistical significance.

Among these recent studies that have been conducted explicitly for college students, two interventions in particular do have certain shortcomings that the present study sought to ameliorate. A multicomponent mindfulness intervention named Koru is a promising adaptation for emerging adults.⁵ The one study to date on Koru was composed of primarily graduate students with mean age 26 years, older than the mean age of $19.7(\pm 1.9)$ in MMHT. Although the window of ages may overlap between undergraduate and graduate students, they experience different lifestyles, stressors, and living environments that may differentiate the effects of the intervention on measures such as stress and blood pressure. The baseline levels of perceived stress and for sleep problems fell approximately at or above one standard deviation from the norm for individuals aged 18-34.⁶¹ Koru found significant improvements in the intervention group post-treatment in measures of perceived stress, levels of mindfulness, sleep problems, and self-compassion. The study showed no statistically significant changes in sleep duration and levels of gratitude after the intervention. These findings are similar to the MMHT study which also showed significant improvements in perceived stress, self-compassion, levels of mindfulness, and no significant change in sleep duration.

The variation between these two study populations however must be considered in

interpreting these similarities and differences. Compared to Koru, the MMHT sample differed in several ways. Although the mean hours of sleep per night, in both interventions did not change significantly after completion (Koru 7.56 ± 1.09 hours/night at baseline, 8.09 ± 1.16 hours/night at follow up, $p = 0.27$ versus MMHT baseline 8.00 ± 1.26 hours/night, 7.05 ± 0.91 hours/night at follow-up, $p = 0.13$). Self-compassion was measured in Koru through the full SCS rather than the short-form version used in the present study, making comparisons on that outcome across the two interventions difficult. Levels of perceived stress, measured through the PSS in both studies, was also different among the two. In the Koru intervention, baseline PSS among the sample was $23.71 (\pm 5.65)$ at baseline and $20.43 (\pm 6.20)$ at follow-up. These values, greater than the PSS levels of MMHT participants (18.3 ± 5.82 at baseline, 14.6 ± 5.48 at follow-up) reinforces the difference among the two populations – Koru’s older and mostly graduate students compared to MMHT’s younger undergraduates – in relation to stress.

Another recent mindfulness program for undergraduates that may compare with MMHT is the Mrazek et al. investigation of the effects of a mindfulness training (MT) program for undergraduate students.⁴⁵ This intervention, with a larger sample size than MMHT (48 undergraduates compared to 11 in MMHT) also implemented a randomized design wherein participants were placed either in the mindfulness group or a nutrition education group. The focus of this brief program was on applications of mindfulness training for enhanced cognitive performance, another difference from the primary aim of MMHT to improve undergraduate

student emotion regulation. Although Mrazek's study was methodologically more rigorous than MMHT; the current MMHT study was the pilot intervention for a larger, more refined and rigorous randomized trial. The dosage and delivery of the MMHT and Mrazek's MT were quite different -- the MT occurred over two-weeks, in four sessions of 45 minutes each, whereas MMHT was comprised of two 80 minute sessions per week over 7 weeks. Mrazek's MT also minimized the formal daily meditation practice required of participants compared to both MMHT and MBSR. When comparing the adapted GRE verbal section for MMHT to the results of the Mrazek study, comparisons are again difficult to make. The latter study, which kept the testing section marginally lengthier in time, used the standardized scoring process used by the Educational Testing Service (ETS) which uses a fractional point system converted to percentiles. MMHT, however, used raw scoring of correct answers to ascertain the adapted GRE verbal scores for participants. The two-week long mindfulness training in Mzarek led to an average increase in adapted GRE verbal scores of 16 percentage points, whereas MMHT participants – including two graduating high school students – increased the mean GRE score by 0.84 points.

Mechanisms

Plausible mechanisms through which the MBIs may influence well-being include psychological, behavioral, and biological processes.²⁸ The MMHT intervention in particular may impact emotion regulation through a pathway of self-efficacy, the extent to which one's ability to complete tasks and achieve goals is associated with the belief in

accomplishing the tasks and goals. Through enhanced belief in the ability to accomplish goals, one's sense of self-control and thereafter the belief in the ability to change behaviors may impact health outcomes, a trait that MBIs have been shown to enhance.²⁷ In relation to emotion regulation, such a pathway may impact one's ability to believe his or her capacity to engage in healthy techniques to regulate emotion, such as physical activity rather than unhealthy techniques such as alcohol consumption. Healthy techniques in regulating emotions are taught through MMHT, and the skills in self-control taught through the intervention may mediate participants' affective control and emotion regulation.

Values clarification and self-referential processing may be notably implicated in the effects of MMHT in a college population. As emerging adulthood is characterized by a transitional point wherein late teens to early twenty-year-olds are shaping, defining, exploring, and altering their individual personas, and the impact of MMHT may lie in providing structure and guidance for bringing attention to the elements of value in one's life. In guiding the potential for healthy behaviors to be valued, such as restful sleep or nutritional food consumption, positive impacts in affective outcomes may be modulated. This pathway may be beneficial in seeing lasting effects of MMHT throughout the lifecourse, after values in healthy emotion regulation techniques have been understood and applied in the lives of participants, and longitudinal studies of MBIs in emerging adults would provide insight to the plausibility of this pathway in enhancing health behaviors long after the termination of the intervention.

An additional pathway of self-kindness and self-compassion may be implicated in mechanisms and underpinnings of the effects of MMHT. Self-kindness and self-compassion were found in previous studies to be a mediator for the effects of MBIs on affective outcomes such as depression.⁶² Although the topics of focus change weekly in the MMHT program, a common theme of learning and practicing the recognition of emotions and thoughts in addition to promoting overall emotional and physical awareness. This focus is augmented by promoting self-compassion and improving participant's awareness and skills in self-care techniques. Providing participants with these tools to recognize emotional states and care for them may be associated with the reduction in the Strategies DERS subscale, which measures a self-reported limited access to strategies in regulating emotion. Such strategies taught in MMHT include elements of increasing emotional perception and creative responses such as mindful movements, exercises in labeling pleasant/unpleasant events, reframing this labeling, cultivation of curiosity and openness, and the practice of responding with awareness rather than automatically by introducing decentering and communication.

Strengths and limitations

The current study was instrumental in the design, framework, and protocol for the next phase of a randomized controlled trial intervention examining the effects of an adapted mindfulness-based intervention for college students. The results of MMHT indicate possible effects on emotion regulation, perceived stress, self-compassion, self-esteem, and cognitive performance to be found in the adequately-powered RCT of Mindfulness-Based College. The present study was developed

and administered by a qualified mindfulness instructor and researcher in the field, and it was therefore thoughtfully adapted to meet the evidence-based needs of an undergraduate population. As a pilot study for Mindfulness-Based College, the ability to test hypotheses, assess the flow of MMHT, and make alterations to fine-tune the next phase of research in tailored mindfulness interventions in undergraduates is a particularly advantageous element of MMHT. Two important limitations of MMHT are the small sample size and the single arm prospective study design with lack of a comparison group. Assessing MMHT in a more methodologically rigorous manner (such as an adequately powered randomized controlled trial) is needed to advance the field. The use of more biological markers (e.g. neuroimaging) would also strengthen the present study.

As the present study was embedded in an academic course, the information and skills learned in MMHT were not independently found in the intervention. Since participants were also students in the academic course, the articles they read on the topics provided additional exposure to the terminology and concepts that may impact the behavioral motivations and activation of the MMHT teachings. The timing of the intervention, delivered in the summer, when students may experience happier sentiments and different stress levels than during the academic year, and the short follow-up time of the current study may additionally impact the results and the potential generalizability of findings for interventions enhancing undergraduate wellbeing during the academic year. Generalizability may be limited due to the self-selection of those who partake in these types of

classes/interventions versus those who do not. However, the findings may be generalizable to students who would be interested in taking mindfulness interventions.

A general lack of diversity in the field of mindfulness research limits the generalizability of the findings to a broader population, and this limitation exists in MMHT. In this study, 90.9% of participants were female and there was minimal racial and ethnic diversity among the small sample (36.4% identifying as Caucasian). The socio-economic status of students that were able to afford summer courses and therefore eligible to participate in the data collection for the present study presents another limitation.

Population Health Implications

These findings will be foundational in the implementation of a randomized controlled trial based on the MMHT curriculum. Broadly, these findings inform the creation of future complementary and cost-effect methods that may be employed among undergraduate students to promote health behaviors and enhance emotion regulation skills. Through interventions such as MMHT, these skills may be acquired and fine-tuned in a small-scale and safe environment so that students develop the skills to continually employ throughout the lifecourse. Previous findings suggest that male-identifying college students typically use less healthy emotion regulation techniques than female-identifying students,³⁴ suggesting that specific interventions such as MMHT may be adapted for this subset of the

population to enhance their wellbeing.

Conclusion

MMHT may be a viable intervention to improve college student's emotional health, well-being, and cognitive performance, with modest-to-large, promising effects across each of these domains.

FIGURE 1: FORMAT AND PRACTICES OF EACH MMHT SESSION

Class 1 <i>Orientation and education about health factors</i> • Short introductory meditation (few minutes), Mindful speaking and listening - group discussion, Share baseline survey results
Class 2 <i>Introduction to mindfulness practices</i> • Opening meditation, Guided internal reflection, Raisin-eating exercise, Abdominal breathing, Standing-up yoga
Class 3 <i>Diet</i> • Body scan, Mindful eating exercise, Sitting meditation - Awareness of Breath, Lying down yoga
Class 4 <i>Physical activity</i> • Sitting meditation -- Focus on breath, body sensations, and the whole body, Physical activity, Pleasant events calendar review
Class 5 <i>Sleep</i> • Sitting meditation -- Focus on breath, body sensations, and the whole body, Unpleasant events calendar review, Personal writing reflection
Class 6 <i>Communication, social support, loneliness</i> • Standing yoga, Guided reflection, Sitting meditation, Discussion about difficult communication
Class 7 <i>Anxiety and depression</i> • Sitting meditation, Yoga choices exercise, Mountain meditation, Lovingkindness meditation, S-T-O-P practice, Difficult communication calendar review
Retreat <i>Establishing use of skills across multiple situations</i> • Sitting meditation -- silent, Silent aerobic or strength activity, Sitting meditation, Silent lunch, Lovingkindness meditation, Walking meditation, <i>Free write</i>, Mountain meditation, Visual meditation
Class 9 <i>Cognitive functioning and performance</i> • Yoga choices exercise, Sitting meditation -- participant's choice on theme, <i>Changing seats exercise</i>
Class 10 <i>Exploring next steps</i> • Body scan, Yoga, Sitting meditation -- mostly silent, Guided reflection

TABLE 1: Demographics of MMHT Participants

Characteristic	<i>MMHT</i> Total (N=11)
Female, n (%)	10 (90.9%)
Age, M $\pm$ SD	19.7 $\pm$ 1.90
Years of Education, M $\pm$ SD	13.9 $\pm$ 1.47
Race, n (%)	
Caucasian	4 (36.4%)
African-American	3 (27.3%)
Don't Know	3 (9.09%)
Other	1 (9.09%)
Hispanic, n (%)	2 (18.2%)

TABLE 2: Paired Results of on Emotion Outcomes

Measure	Baseline	8 weeks follow-up	p-value	Cohen's <i>d</i>
DERS, M ± SD				
Total	82.0 ± 28.3	73.0 ± 18.2	0.11	.38
Nonacceptance	12.1 ± 6.52	10.8 ± 3.79	0.29	.24
Goals	16.1 ± 5.01	14.2 ± 3.79	0.22	.43
Impulse	12.0 ± 5.14	13.4 ± 3.17	0.18	-.33
Awareness	12.7 ± 4.24	12.9 ± 5.32	0.85	-.04
Strategies	17.4 ± 8.16	15.2 ± 5.99	0.10	.31
Clarity	11.7 ± 3.95	10.0 ± 1.21	0.06	.58
PANAS, M ± SD				
Positive	28.1 ± 9.12	28.6 ± 10.6	0.80	-.51
Negative	19.4 ± 9.40	15.5 ± 5.54	0.12	.51
PSS, M ± SD	18.3 ± 5.82	14.6 ± 5.48	0.03	.65
SCS, M ± SD	36.8 ± 9.32	40.3 ± 4.67	0.08	-.47
RSS, M ± SD	28.3 ± 5.33	30.8 ± 5.19	0.06	-.48

DERS, Difficulties in Emotion Regulation Scale; PANAS, Positive and Negative Affect Schedule; PSS, Perceived Stress Scale; SCS, Self-compassion Scale - Short Form; RSS, Rosenberg Self-esteem Scale

TABLE 3: Paired Results of MMHT on General Health Outcomes

Measure	Baseline	8 weeks follow-up	p-value	Cohen's <i>d</i>
BP, M ± SD				
Systolic (mmHg)	109.1 ± 5.52	106.3 ± 8.52	0.22	.39
Diastolic (mmHg)	72.2 ± 5.95	66.1 ± 5.59	0.002	1.1
BMI, M ± SD (kg/m ²)	24.6 ± 4.39	24.1 ± 3.85	0.18	.12
Sleep, M ± SD				
PSQI Global	5.82 ± 2.60	5.91 ± 2.84	0.92	-.03
Hours Slept	8.00 ± 1.26	7.05 ± 0.91	0.06	.86
Diet, M ± SD				
Daily Fruit Intake	1.50 ± 1.32	2.18 ± 1.38	0.13	-.50
Daily Vegetable Intake	1.95 ± 1.51	2.27 ± 1.88	0.31	-.19

BP, blood pressure; BMI, body mass index; PSQI, Pittsburgh Sleep Quality Index

TABLE 4: Paired Results of MMHT on Cognitive Performance Outcomes

Measure	Baseline	8 weeks follow-up	p-value	Cohen's <i>d</i>
GRE Reading Comprehension, M ± SD	5.25 ± 2.07	6.09 ± 2.51	0.47	-.37
TMT, M ± SD (Seconds)				
Form A	20.6 ± 5.07	18.6 ± 6.05	0.13	.36
Form B	47.6 ± 11.9	38.6 ± 10.3	0.013	.81

GRE, Graduate Records Examination – MMHT adaptation; TMT, Trail Making Test

TABLE 5: Paired Results of MMHT on Mindfulness

Measure	Baseline	8 weeks follow-up	p-value	Cohen's <i>d</i>
FFMQ, M ± SD				
Total	123.6 ± 22.5	145.4 ± 18.7	0.0003	-1.1
Observing	29.2 ± 5.98	31.8 ± 5.23	0.0015	-.46
Describing	25.2 ± 6.78	28.7 ± 6.31	0.016	-.53
Acting with Awareness	24.4 ± 3.41	28.6 ± 4.48	0.020	-1.1
Nonjudging	24.9 ± 7.29	31.6 ± 5.48	0.007	-1.0
Nonreactivity	19.8 ± 5.13	24.6 ± 4.72	0.0005	-.98

FFMQ, Five-Facet Mindfulness Questionnaire

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APPENDIX

Systematic Review Search Term

3/25/16 1:00PM EST, PubMed Results = 8,312

3/26/16 12:38PM EST, CINAHL, PsychInfo, and ERIC Results = 4,772

((Mindful* OR "Mindfulness"[MeSh]) OR (meditat*) OR ("Meditation" [MeSh]) OR ("body scan") OR ("breath awareness") OR ("focused attention") OR ("open-monitoring" OR "open monitoring") OR ("choiceless awareness")) AND ((achievement) OR (alert*) OR (orienting) OR (attention*) OR (cogniti*) OR (concentration) OR (control) OR ("conflict monitoring") OR (decentering OR de-centering OR decentring) OR ("decision making" OR decision-making) OR ("delay discounting") OR (discrimination) OR (distraction) OR ("dot probe") OR (fatigue) OR (efficiency) OR ("executive function") OR (impulsivity) OR ("inhibitory control") OR (insomnia) OR (intelligence) OR (learning) OR (memory) OR (meta-awareness) OR (metacogniti*) OR ("mind wandering") OR (performance) OR (resource deplet*) OR ("Sustained Attention to Response Task" OR SART) OR ("selective attention") OR ("selective stopping") OR (sleep) OR ("stimulus prioritization") OR (stop signal) OR (stroop) OR ("sustained attention") OR (top-down) OR ("task switching") OR (vigilance) OR (acceptance) OR (affect*) OR (amygdala) OR (anger) OR (anxiety) OR (arousal) OR (autonomic) OR (avoidance) OR ("cognitive defusion" OR "cognitive de-fusion") OR (compassion) OR (coping) OR (decentering OR de-centering OR decentring) OR (depression) OR ("distress tolerance") OR (emotion*) OR ("emotion identification") OR ("emotional reactivity") OR ("emotion regulation") OR (equanimity) OR ("experiential avoidance") OR (exposure) OR (expression) OR (fear) OR ("fear extinction") OR (habituation) OR (kindness) OR ("loving kindness" OR loving-kindness OR lovingkindness) OR (limbic) OR (motivation) OR (neuroticism) OR (nonattachment OR non-attachment) OR (nonjudgment OR non-judgment) OR (nonreactivity OR non-reactivity) OR (pain) OR ("positive psychology") OR (reappraisal OR "cognitive reappraisal") OR (reconsolidation) OR (resilience) OR (reperceiving OR re-perceiving) OR (reward) OR (rumination) OR (stress) OR ("stress reactivity") OR (suppression) OR (sympathetic) OR (threat) OR (wellbeing OR well-being OR "well being") OR (agency) OR ("body awareness") OR (decentering OR de-centering OR decentring) OR (detached OR detachment) OR (disidentification OR dis-identification) OR (dissociation OR dissociative) OR ("default mode network" OR DMN) OR (ego*) OR (embodiment) OR (empathy) OR ("experiential self") OR (identity) OR (identification) OR (insula) OR (interocept*) OR ("lifespan development" OR "life-span development") OR (meta-awareness) OR ("metacognitive awareness") OR ("meta-cognitive awareness") OR ("narrative self") OR ("psychological distance") OR ("observing self") OR ("posterior cingulate cortex" OR PCC) OR ("perceived control") OR (perspective*) OR (prosocial) OR (reperceiving) OR (self*) OR ("social cognition") OR ("sense of agency") OR ("sense of control") OR ("sense of ownership") OR ("theory of mind")) NOT ((("addresses"[pt] OR "autobiography"[pt] OR "bibliography"[pt] OR "biography"[pt] OR "case reports"[pt] OR "comment"[pt] OR "congresses"[pt] OR "dictionary"[pt] OR "directory"[pt] OR "editorial"[pt] OR "festschrift"[pt] OR "government publications"[pt] OR

“historical article”[pt] or “interview”[pt] or “lectures”[pt] or “legal cases”[pt] or
“legislation”[pt] or “letter”[pt] or “news”[pt] or “newspaper article”[pt] or “patient
education handout”[pt] or “periodical index”[pt] or "comment on" OR ("Animals"[Mesh]
NOT "Humans"[Mesh]) OR rats[tw] or cow[tw] or cows[tw] or chicken*[tw] or
horse[tw] or horses[tw] or mice[tw] or mouse[tw] or bovine[tw] or sheep or ovine or
murinae) OR (“Child”[MeSH] NOT “Adult”[MeSH]))

Brown University School of Public Health

**MINDFULNESS-BASED COLLEGE (MB-College)
CURRICULUM GUIDE DRAFT**

Based on University of Massachusetts Medical School
Mindfulness-Based Stress Reduction (MBSR) Curriculum Guide.

Please do not distribute without explicit approval from Dr. Loucks and the University of
Massachusetts Medical School Center for Mindfulness in Medicine, Health Care, and Society.

Eric B. Loucks, PhD

Overview

This 8-week, 9-session MB-College curriculum is based on systematic and intensive training in mindfulness meditation and mindful hatha yoga. The curriculum, which is based on the manualized and standardized Mindfulness-Based Stress Reduction (MBSR) curriculum developed at the University of Massachusetts Medical School by Jon Kabat-Zinn, Saki Santorelli, and colleagues, is designed to teach program participants how to integrate and apply mindfulness in their everyday lives to the range of challenges arising from medical and psychological conditions and life stresses. Furthermore, this program has been further customized to participants particularly in undergraduate and graduate programs.

Embedded within the context of behavioral medicine, the MB-College curriculum focuses on the experiential cultivation of both “formal” and “informal” mindfulness practices as a foundation for the cultivation of positive health behaviors and psychological and emotional resilience that can be effectively utilized across the adult life span. The approach supports the learning, strengthening and integration of a range of mindfulness-based self-regulatory skills through the development and refinement of inherent internal resources. A primary aim is to cultivate ways of learning and being that can be utilized far beyond the completion of the program.

MB-College builds a foundation of mindfulness skills (e.g. meditation, self-awareness, etc.) through the MBSR curriculum. MB-College then directs attention towards a number of health-related factors relevant in young adulthood. Early in the MB-College, the importance of physical activity, diet, sleep, stress, cognitive performance, depression, anxiety, health, mortality and academic success is described. Participants will have health assessments taken at baseline, and be provided with this information during the first in-person MB-College session. This phase aims to engage participants’ interest in their own well-being, and increase motivation for behavior change. MB-College encourages participants to explore personal readiness for change in the different health behaviors, and explore utilizing mindfulness practices to engage with those health behaviors that

they choose to. Each week, focus is provided on different health behaviors. However, common themes exist across all health behaviors including (1) awareness of thoughts, emotions and physical sensations particularly surrounding health behaviors such as overconsumption of palatable foods, sedentary activities, alcohol consumption; (2) craving, particularly for health-related behaviors such as overconsumption of palatable foods, sedentary activities, and alcohol consumption; (3) the impact of bringing mindfulness to every moment, particularly in relation to health behaviors. For example, when consuming highly palatable food, bringing awareness to the emotions, thoughts and physical sensations prior to eating it, during eating it, along with the many minutes, if not hours, afterwards. Participants are trained to bring non-judgmental attention to the often short-term pleasure of overconsumption of foods, sedentary activities, heavy alcohol consumption, or not taking medications, and bring non-judgmental attention to the longer term suffering associations with these activities. Through this process, participants are encouraged to reflect on if behavioral choices provide more benefit or harm to their well-being, and to choose the behaviors that bring benefit. (4) Self-care: as awareness of thoughts, emotions and physical sensations increases, and self-regulation will likely increase as a result of the meditation practices, the curriculum will emphasize to participants that it is common for people to start caring for themselves more. It is a way of better knowing ourselves, and through knowing ourselves in in each moment, we often want to care for ourselves in each moment. This may mean taking medication that will help our health, or being more physical active, eating more healthily, or consuming more moderate amounts of alcohol. The intervention can be modified to change the dose of any of these 4 components, for example via (1) Increased use of specific meditations focused on health behaviors such as diet and physical activity. (2) Increased use of meditations focused on craving. Participants will be trained to notice craving arising, and fading away in relation to health behaviors such as palatable high caloric foods, sedentary activities, and alcohol consumption. (3) Increased used of mindfulness practices related to long term experiences of health behaviors such as alcohol consumption, diet, physical activity on thoughts, emotions, physical sensations and well-being. (4) Self-care: Increased use of modules that show how mindfulness practice increased self-awareness and in doing so

can increase people's desire to care for themselves. The potential use of loving kindness meditation will be considered.

Orientation Session

Overview

The main intentions of the orientation include:

- Orienting the participant to the MB-College Program
- Eliciting a commitment to engage in active participation with this program, including taking 45 minutes or more per day to do the home practice
- Providing the participant with an experience of mindfulness in an atmosphere of trust and non-judgmental awareness and exchange
- Educating about health factors relevant in young adulthood.
- Encouraging participants to look into what are their main challenges related to well-being that are most present for them now and throughout the course (e.g. obesity, physical activity, etc.), and apply the tools of the course to those areas.
- Educating the participant about class logistics
- Getting a sense of how the person interacts in the group to determine whether the program is still a good match and appropriate for them.

Formal Practice

- Sitting Meditation – Awareness of Breath

Informal Practice

- Possibly mindful speaking and listening during group discussion

Typical Class Sequence

Time	Content
	Before the Orientation • The support staff and the teachers conducting the orientation will prepare the room with the appropriate number of seats, either in a circle or in an audience configuration. • The support staff will write the dates and times of classes and the all-day.

	- The support staff will greet each participant, provide them with a name tag, direct them to the room in which the orientation will be held, and show where the restrooms are. <u>Greet participants</u> as they arrive in the room, and be available to answer questions. - Remind people where the bathrooms are, and to turn off their cell phones
15 min	<u>Introduce yourself</u> again, and welcome everyone. <u>State your experience in (1) teaching mindfulness practices, (2) health and health behaviors and (3) working with relation between mindfulness and well-being (e.g. your diet, physical activity, sleep, etc.) in your own life.</u>
5 min	<u>Give an overview</u> of the whole orientation.
3 min	<u>Give a brief history</u> of MBSR and MB-College, including the following points: - MBSR and MB-College are considered a complement to medical treatment - MBSR was founded in 1979 by Jon Kabat-Zinn - Brown University is a research institution, studies conducted here and at other research institutions have demonstrated the benefits of mindfulness practice for people with several psychological and physical ailments.
20 min	<u>Introduce mindfulness</u> and mention some or all of the following points: - Mindfulness is paying attention, on purpose, in the present moment, nonjudgmentally - In this practice, we cultivate a sense of curiosity, exploration, kindness and basic friendliness to whatever we experience - Mindfulness helps us to wake up to our lives - In this practice, we notice how the mind moves to the past or future; as soon as this is noticed, we bring it back with gentleness and firmness, to experience the present moment, such as the feeling of the breath in the body. The movement of the mind involved in thinking creates unnecessary striving, wasting energy that could be employed in healing, problem solving and a full enjoyment of life. - It can be helpful to do <u>a short (a few minutes) guided meditation</u> here, to allow people to have a “taste” of mindfulness. You can guide them to be

	aware of sensations in the body, the breath, other sense perceptions, emotions and thoughts. • Meditation components to consider including: • Introduction to posture – e.g. use of cushion vs. chair (and other options e.g. bench); balancing comfort with alertness • Focused attention on the breath • Open awareness of thoughts, emotions and physical sensations, while gently and non-judgmentally bringing attention back to the breath.
30 min	<u>Group introductions</u> • Explain that we will be going around the room and that everyone can take a moment to introduce themselves. • <u>Mention confidentiality</u> • You may want to encourage people to be brief, to say their names, where they're from, and to comment on the brief meditation if they would like to. • You can interact with people as they introduce themselves, using the time as a way of delivering more information about the program. • <i>Note: It's helpful to avoid asking people "why" they have come, since that will be explored in the first class of the program, and this will keep the orientation a bit lighter in tone. However, you may decide that you want to deepen the experience of the orientation by making it more personal and asking people to be more self-revealing. There are positives and negatives to both approaches. The deeper questioning can lead to a strong bonding experience for the group. On the other hand, some participants may be "put off" by an emotionally resonant orientation session.</i>
10 min	<u>Hand out health feedback results</u> (share FitBit data next week or following week, as it is ready). • <u>Give participants a few minutes to look over them</u> • <u>Consider using this as a lesson to notice thoughts arising about these health values in participants.</u>
30	<u>Introduce the impact of health behaviors and mental health on mortality,</u>

min	<u>health outcomes, and well-being.</u> • <u>Describe the role key health behaviors and health factors in well-being, obesity, diet, physical activity, sleep, social connectedness, anxiety, depression, and cognitive performance.</u> • <u>Describe how we live in an environment that promotes unhealthy levels of many of these factors, and how craving for certain health behaviors (e.g. palatable foods and sedentary activities) exists and can lead to lower well-being.</u> • <u>Describe how mindfulness meditation can help lead our attention to our thoughts, emotions and physical sensations, as well as improve our self-regulation and ability to deal with craving.</u> • <u>Talk about how everyone in class is a college student, and that this class will be teaching mindfulness practices in the context of helping college students potentially modify factors they want to, in order to enhance well-being and cognitive performance.</u> • <u>State that not everyone will have all health risk factors, and that not all issues presented will be their issues. You may like to look into what are your main challenges related to well-being that are most present for you now and throughout the course (e.g. obesity, physical activity, sleep, etc.), and apply the tools of the course to those areas.</u>
5-10 min	<u>Logistics of the class</u> • The class meets weekly for 9 weeks, either in the morning or evening, for 2.5 hours. • There is an all-day class typically between the 6th and 7th week on a weekend day, from 9:00-4:30 • In each class we will learn different forms of mindfulness practice: yoga, sitting, body scan, walking meditation and mindful eating. • We will learn about determinants of well-being, and explore our own behavioral, physical, emotional and cognitive patterns related to well-being, and more skillful responses to these patterns, as well as more mindful ways to communicate and choose nourishing behaviors and activities.

	• In each class there will be periods of mindfulness practice, large group discussions, talks, small group discussions, and practices and exercises related to that week's topics. • You will receive CD's or thumb drives with meditation and yoga practices, and a practice manual. • There will be around 6-20 people in each class. • Wear comfortable clothing, and avoid perfumed toiletries. • There are no scheduled breaks, but you can bring water, food or medicine as needed. We encourage you to have a meal before your class. • Expect your daily home practice to be at least 45 minutes to 1 hour per day, or longer. Make sure that you can set aside this time for daily practice. • Mention the commitment required, and that it is challenging work. • Encourage attendance at all 9 classes, including the all day. If someone misses 3 or more classes, we encourage them to drop out and take the entire program again in another cycle when they are able to make the time commitment. • Emphasize the importance of arriving on time. • Call your own teacher if you are unable to attend class, or know you will be late. • Explain the inclement weather policy, and encourage people to set aside two more weeks for class, especially in the winter cycle.
5-10 min	<u>Explain the risks and benefits of the program.</u> (Note: it is only after these have been explained that the participant can sign the informed consent agreement.) Physical risks: • The primary physical risks are connected to practicing mindful yoga and doing physical exercise. • Taking care of oneself is at the core of practicing mindfulness. • If you hear guidance that you know is not healthy for your body or condition, or if you are feeling pain, please disregard the teacher and

	either modify the pose/exercise or rest and imagine doing the pose/exercise. • Explore your limits; go to your own edge, but not beyond. • Because we use yoga to teach mindfulness of the body, being aware of the body from moment to moment is more important in this class than in other forms of yoga where proper form is emphasized. • The teacher can help you with making modifications. • It's also a good idea to ask your doctor or physical therapist to review the postures in the practice manual, and to make an "X" through postures that are not suitable for you. • It's also a good idea to ask your doctor or physical therapist about any new exercises you may consider doing. The main exercise we will engage in is walking or running, depending on what is best for your body. Emotional risks • Feelings of sadness, anger, fear, could seem stronger at the beginning because you may be paying attention in a conscious way for the first time. • A history of trauma, abuse, or addiction to substances may heighten these reactions. Please tell your interviewer if this is true for you, and we can determine together whether or not it makes sense for you to take this class. • You may find that you make discoveries about yourself that you may not like. • You may be challenged, and find yourself facing the unknown. Other people in your life • It may be a challenge to set aside the space and time to do this practice, so it's important to request support from your family, friends, and/or co-workers.
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	- You may find that you change patterns of reactivity, behavior and communication, and your family, friends, and/or co-workers may be uncomfortable with the “new you”. - You may find that your relationships change. Time - Finding time to make a new habit of mindfulness practice can be challenging: it’s normal to have the idea that there is not enough time for practice. We sometimes find, counter-intuitively, that setting aside time for practice increases the sense of spaciousness in the rest of the day. Benefits - Increased awareness and concentration - Some people report a quieter mind, a sense of balance and enhanced wellbeing. - New ways to cope more effectively with your own condition, difficulty, pain or suffering. - Learning to take better care of yourself. - Many physical health benefits have been suggested in scientific research, although there is no guaranteed health outcome.
10-15 min	<u>Invite additional questions.</u>

Class One

Overview

This 2.5 hour session includes a review of the intervention and the establishment of a learning contract with the patient/participant. The theoretical underpinnings of behavioral medicine and the application of self-regulatory skills as related to health behaviors and well-being are also established. The patient is experientially introduced to mindful eating, mindfulness of breathing and the body scan home practice is assigned using the first guided recording (body scan meditation) as a means of beginning to learn to become familiar with mindful awareness of the body.

Theme

From our point of view, there is more right with you than wrong with you, no matter what challenges you are facing. Challenges and difficulties are workable. Mindful awareness, defined as paying attention, on purpose, in the present moment, non-judgmentally, is fundamental to this work since the present moment is the only time anyone ever has to perceive, learn, grow or change.

Typical Class Sequence

Time	Content
5 min	• Welcome by the instructor.
10 min	• Opening meditation: becoming attentive to and aware of thoughts, emotions, and sensations in the present moment (may also include what is seen, heard, other senses).
10 min	• Class responses to opening meditation (can be just a few if class is large).
5 min	• Review of guidelines for participation: confidentiality, self-care, communication with instructor, no advice-giving, etc.
10	• Guided individual internal reflection: What has brought you here? What

min 10 min	is your intention? What do you really want? (Option: small group or dyad sharing about guided reflection.)
25 min	Group go around: Go around the room and give people the opportunity to introduce themselves, what they are here for, and their expectations for the program. The instructor may make instructive comments, observations, and welcoming remarks from time to time in response to individuals.
5-10 min	Yoga: introduction to standing Mountain Pose and other standing poses.
20 min	Raisin-eating exercise: introduction to mindfulness meditation. Discussion of the experience. Focus on direct sensory observation – what can be seen, felt, smelled, tasted, heard. Instructor is attentive to observations that become deductions, opinions and theories removed from immediate experience. Group dialogue can inquire what is experienced through this practice, and instructor stays alive to the recognition of past experience influencing the present; interconnection; relationship between hunger, satisfaction, emptiness, and fullness; and what shows up when present for the full act of eating. Not needing to necessarily bring these topics forward, but allowing them to arise in the group. Observing and then slowly eating one raisin, with guidance from instructor, stopping for observations from participants. Then, eating a second raisin in silence. Considering the third. Asking if they want it. Noticing thoughts, emotions and physical sensations arising as they consider it. Allowing them not to have it if they do not want it. - Themes: - A fuller richer experience when we are in the present moment, paying attention. - The mind wanders, and this is normal. Noticing where it wanders to... this gives us information about ourselves. Is where the mind wanders to a common place it often goes? Is it helpful for the

	mind to be there? • Questions for reflection: • Would anyone like to share their experience with this exercise? • Would anyone like to share what was happening with your mind during this exercise? • What were you noticing that was enjoyable, or helpful? • What were you noticing that was difficult?
5 min	• Abdominal breathing: tie the moment-to-moment awareness of eating exercise to experiencing the breath in the same way. Introduce various comfortable postures for lying down: corpse pose, astronaut pose, comfortable sitting in chairs if necessary. Focus on the <u>feeling</u> of the abdomen rising and falling with the in breath and the outbreath, mindfully “tasting” the breath in the same way that the group tasted the raisin. Non-judgmentally observing one’s own breathing from moment to moment; and bringing one’s attention back to the breath and the present moment when it wanders.
20 min	• From mindfulness of breathing, move into guided body scan with people continuing to lie on floor or sitting in comfortable position. • Consider ending with a poem – e.g. Two Kinds of Intelligence by Rumi
15 min	• Finish with discussion of people’s experiences with the body scan and assign daily home practice. Give instructions for use of the Body Scan recording for home practice during week 1.
5 min	• Hand out qualitative assessment of class for participants to fill out and hand in.

Home Practice Assignment

- Body Scan recording ≥ 6 days this week
- Home Practice Manual: 9 dots exercise
- Eat one meal this week mindfully
- (Optional assignment – read “Upstream/Downstream” by Donald Ardell)

Class Two

Overview

This 2.5 hour session includes one hour of experiential mindfulness training and skill development, and one hour or more of focused dialogue and reflection concerning the role of perception and conditioning in the appraisal and assessment of stress. The pivotal role of self-responsibility in the positive development of short and long-term changes in health and health-enhancing behaviors is introduced. Also, a number of mindfulness practices targeting self-awareness are performed, including the body scan, palatable food meditation, and mindful movements. Home practice is assigned with an emphasis on the regular daily practice of the body scan for a second week, plus introduction of short periods of sitting meditation, and the application and integration of mindfulness in the everyday life of the participant.

Theme

Perception and creative responding: how you see things (or don't see them) will determine in large measure how you will respond to them. This ties in with how people see their participation in the program; how they see their pain, their illness; the stress and pressure in their lives; the level of commitment they will bring to the program and to the personal discipline it requires. Make the connection to stress reactivity and recovery from acute stressors, and the principle that "It's not the stressor per se, but how you handle them" which influences the short and long-term health effects they may have on your mind and your body. This theme focuses on enhancing emotional regulation. In addition, there is a theme on self-awareness, particularly through the body scan, the sweet, palatable food meditation, and the mindful movements. Coming to sense the body as it is in this moment. What is it telling us?

Typical Class Sequence

Time	Content
30 min	Guided body scan

10 min	Guided and written reflection on mindfulness practice since last class
15 min	Small and/or Large Group Discussion: Discuss the body scan experience of this session as well as the home practice, with particular attention to how successful they were at making the time for it; problems and obstacles they encountered, sleepiness, boredom; how they worked with them or not; experiences and what participants are learning (seeing) about themselves from it, if anything.
10 min	Establish the universality of the wandering mind and the notion of working with it with acceptance and repeated re-focusing of attention; the coming back is as much a part of the meditation as the staying on the object of attention; noting where the mind goes and what is on one's mind; emphasize the importance of desisting from pressing and suppressing thoughts or feelings or forcing things to be a certain way. Best way to get somewhere is to not try to get anywhere... letting go. A new way of learning. The body has its own language and its own intelligence. Non-conceptual. Perhaps share poem, such as "Today" by Mary Oliver.
5 min	Discuss eating one mindful meal and/or the experience of their relationship with food this week.
20 min at first, but then check in over next 45 min	<u>Provide a highly palatable snack high in sugar and fat, such as muffins or cookies. Perform a mindful eating meditation with this snack, noticing sensations of taste, energy, agitation, wakefulness and sleepiness over the course of about 30 minutes, as the participant moves from noticing their relationship with the food prior to eating it, the taste sensations during eating the snack, and bodily sensations at 3 minutes, 10 minutes, and 30 minutes after the snack. Discuss analogy with alcohol consumption (perhaps over a 24 hour period instead of 30 minutes, so discussions of hangovers and grogginess can arise). Discuss evidence on impact of diet, obesity and excessive alcohol consumption on health.</u>
10-15 min	Examine the experience of working with the 9 dots and the theme of

min	expanding the field of awareness in problem solving and recognizing behavioral, cognitive and emotional patterns that arise when working with difficulties and challenges. The breakthrough “aha!” experience. (Connect this theme to practicing the body scan.) • (Option: use the old woman/young woman or other “trompe L’oeil” or visual aids to investigate different ways of seeing or not seeing. If “Upstream/Downstream” article was assigned, reflection on the theme of early intervention and self-care.) • [share story about MBSR participant who was angry with what she felt was a botched knee surgery; she had trouble with raisin meditation getting past the fact that it was a raisin, and then came to see those were her thoughts that it was a raisin. She had trouble with the trompe L’oeil, but began to see there are different ways to look at things. Her view around the “botched” surgery began to soften, as did her anger around it.] • Check in with body after sweet, palatable snack.
10 min	• Consider doing mindful movement here? (help provide a break to the stress of the palatable snack and 9 dots exercise, and prep for AOB which can also be difficult). • Check in with body after sweet, palatable snack.
10 min	• Introduce sitting meditation with awareness of breathing (AOB) as primary object of attention. Do a short guided meditation. • Check in with body after sweet, palatable snack.
0-10 min	• Optional: Discussion re: AOB meditation.
10 min	• Go over home practice. End with short AOB meditation. • Possibly a poem – e.g. “Mindful” by Mary Oliver.

Possible Stories (instructors identify stories that most resonate with them; examples below)

- Joanne’s cancer diagnosis, and her using “don’t know mind” – having had cancer for eight years, and spent no more than about 5 hours in despair about it during that time.

- Kabat-Zinn’s story about stress is like wind filling sails on a sailboat. Can we use it to guide us in directions we want to go?
- Hans Selye defined stress as “The non-specific response of the body to any demand for change.” – what is our response to stress?
- Example of me being sick – using it as an opportunity to work on email, reading, and other lower energy activities. It is a chance to stop and rest.
- MBSR participant who was angry with what she felt was a botched knee surgery; she had trouble with raisin meditation getting past the fact that it was a raisin, and then came to see those were her thoughts that it was a raisin. She had trouble with the trompe l’oeil, but began to see there are different ways to look at things. Her view around the “botched” surgery began to soften, as did her anger around it.
- Imagine you are walking down sidewalk with arms full of groceries in a hurry to get to your next appointment. Suddenly, you collide with a person heading in the opposite direction, take a little tumble, your groceries spilling everywhere. Flustered, you try to collect your things, grumbling internally or perhaps even out loud about how people need to watch where they are going. Then your eyes fall on the long white can with the red tip. You stop, and see the other person. That person is brushing themselves off, righting their dark glass, feeling their way to upright. This person is blind. – What does this story have to do with the trompe l’oeil? Or your life in general? – This story provided by Margaret Fletcher on CFM Home Teacher’s Lounge.

Home Practice Assignment

- Body Scan recording ≥ 6 times per week.
- AOB sitting meditation: 10-15 minutes per day.
- Home Practice Manual: fill out Pleasant Events Calendar for the week – one entry per day for (1) general events and (2) events related to eating and alcohol consumption.
- Mindfulness of routine activities: brushing teeth, washing dishes, taking a shower, taking out garbage, shopping, reading to kids, eating.

Class Three

Overview

In this 2.5 hour session, participants practice several distinct yet interrelated formal mindfulness practices – mindful hatha yoga (ending with a brief body scan), sitting meditation and optional walking meditation – for a minimum of 60 minutes. This extended formal practice period is accompanied by inquiry into and exploration of participants’ experiences with in-class and assigned home practices. Typical topics include challenges and insights encountered in formal practice and in integrating mindfulness into everyday life.

Theme

There is pleasure and power in being present. Attending to and investigating the way things are in the body and mind in the present moment through the practices of yoga and meditation.

Yoga as a practice of mindfulness. Emphasis on gentleness and non-judgment, curiosity, respect for current physical limits, and non-striving especially in the teaching of yoga.

Noticing the tendency of the mind to label events as pleasant or unpleasant, the way we push away what is unpleasant and grasp what we perceive to be pleasant, and the role of conditioning. Questioning of our relationship to self-narratives and fixed ideas and opinions about the nature of reality as personally experienced.

Recognition that we can have pleasant moments in spite of being in a crisis or in pain, and unpleasant moments in situations that would normally be perceived as pleasurable. (Note: this theme continues into Class 4.)

Typical Class Sequence

Time	Content
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15 min	• Sitting meditation with awareness of breathing. Specific guidance related to establishing a stable, upright and balanced sitting posture.
15 min	• Group discussion re: sitting, body scan, and mindfulness in routine activities. Discuss the importance of being embodied through the sharing of participants' direct experience of feeling embodied or ungrounded.
	• Optional: introduce walking meditation.
30 min	• Lying down yoga: Slowly going through the sequence of postures in the Lying-Down Yoga recording, with comments interspersed as required. Emphasis is on mindfulness and approaching one's current limits with gentleness. Participants are encouraged to avoid any postures they feel would cause injury or a setback, or to experiment with caution and care when in doubt. Particular attention is paid to people with chronic problems with the lower back, neck, and chronic pain in general. Verbal guidance is explicit and accurate (i.e. if lying on the floor: "...as you breathe out, drawing the right knee up to the chest and wrapping your arms around the shin...") so that people know what to do without having to look at the teacher – who is engaged in the postures while giving instructions. The teacher may move around the room and instruct people individually as needed. Ask permission of students to make adjustments to postures through physical contact.
10 min	• Group discussion about the experience practicing the yoga postures.
25 min	• <u>Provide information about different forms of physical activity</u> (strength training, aerobic training and flexibility training), and importance of each type for health. • <u>In dyads, share your relationship with physical activity in your life, including how it feels before, during, and after physical exercise, and what helps/hinders you in doing it. Have participants simply listen, and then reflect back what they heard to each other.</u> • <u>Put this on board for them to reflect on:</u> • <u>How does exercise feel (physical sensations, thoughts, emotions):</u>

	1. <u>Awhile before exercise (when contemplating it)</u> 2. <u>Immediately before exercise (when contemplating it)</u> 3. <u>During exercise</u> 4. <u>1 minute after completion</u> 5. <u>20 minutes after completion</u> 6. <u>1-2 hours after completion</u> 7. <u>1 day after completion</u> • <u>What are the types of exercise you like most and least, and why?</u> • <u>In full group, discuss what people shared with each other, as well as discuss how they find exercises that suit their personality (e.g. individual/partner/group, type of exercise matching body's characteristics and limitations, what makes it fun or meaningful).</u>
5 min	• Optional: before formal group discussion with the participants about the Pleasant Events Calendar, consider leading a short guided reflection that asks participants to select one pleasant event, focusing on physical sensations, emotions and thoughts as they arise as memory, and then as they arise in the present moment.
20 min	• Go over Pleasant Events Calendar, <u>including related to eating and drinking alcohol</u>, being particularly attentive to exploring the ordinariness of experiencing a moment as pleasant. Particular emphasis on mind/body connections, patterns, what people observed/learned about themselves. Wondering together if there were any pleasant moments experienced during the body scan in the past week. Investigating what qualities in all of these pleasant moments or events caused them to be labeled as pleasant? What qualities do these distinct pleasant moments or events have in common?
5 min	• Assign homework, alternating yoga with the body scan. Emphasize the importance of getting down on the floor and working mindfully with your body every day, if only for a few minutes.
5-10 min	• Finish class with a short sitting meditation, AOB, expanding attention to the whole body. End with a poem? Maybe "Allow" by Danna Faulds?

Home Practice Assignment

- Alternate Body Scan recording with Lying-Down Yoga recording, every other day $\geq$ 6 days per week
- Sitting meditation with AOB – 10-15 min per day
- Home Practice Manual: Unpleasant Events Calendar for the week – one entry per day for (1) general events and (2) events related to eating or alcohol consumption.
- Engage in one 20-30 min type of physical activity other than yoga (e.g. strength training, aerobic training). Similar to the mindfulness in daily activities home, practice bringing mindful attention to your thoughts, emotions and physical sensations related to the physical activity beforehand, during and after engaging in the activity.

Class Four

Overview

During this 2.5 hour session, participants engage in a combination of the three major formal mindfulness practices that have also been practiced at home during the preceding three weeks – the body scan, mindful hatha yoga, and sitting meditation. Attention and self-awareness are also guided towards participants' experiences with physical activity.

Instruction emphasizes the development of concentration and the systematic expansion of the field of awareness.

Theme

How condition and perception shape our experience. By practicing mindfulness, we cultivate curiosity and openness to the full range of experience and through this process cultivate a more flexible attentional capacity. We learn new ways to relate to stressful moments and events, whether external or internal. Exploration of mindfulness as a means of reducing the negative effects of stress reactivity as well as the development of more effective ways of responding positively and pro-actively to stressful situations and experiences. The physiological and psychological bases of stress reactivity are reviewed and in-depth discussion is directed toward the use of mindfulness as a way of working with, reducing, and recovering more quickly from stressful situations and experiences. Bringing mindful awareness to physical activity more thoroughly, especially thoughts, emotions and physical sensations before, during and after physical activity. Daily practice aimed at recognizing and experientially inquiring into reactive patterns is assigned for home practice. Engaging in motivational interviewing to determine which health determinants (e.g. diet, physical activity), if any, participants will set goals to practice with this week.

Typical Class Sequence

Time	Content
30	• Sitting meditation with focus on breath, body sensations, and the whole body.

min	Particular emphasis on working with painful physical sensations. Introducing ways of working with discomfort/pain, e.g. • Shifting posture if pain is posturally related • Using uncomfortable sensations as object of awareness by investigating quality, duration, and nature of sensations—highlighting continual changing aspect • Shifting attention to the breath if sensations are overwhelming
5 min	• Optional: before a group discussion with the participants about the Unpleasant Events Calendar, consider leading a short guided reflection that asks participants to select one unpleasant event, focusing on physical sensations, emotions, and thoughts as they arise as memory, and then as they arise in the present moment.
15 min	• Review Unpleasant Events Calendar <u>related to food, alcohol or general events (start with food and alcohol)</u>, being particularly attentive to exploring the familiarity of unpleasant moments. Emphasis on mind/body connections, patterns, what people observed/learned about themselves. Wondering together if there were any unpleasant moments experienced during any of the formal or informal home practices in the past week. Investigating any common attributes in all of these unpleasant moments or events that caused them to be labeled as unpleasant. What qualities do these distinct unpleasant moments or events have in common? (note: if pleasant events were not investigated in class three, both pleasant and unpleasant events may be explored in this session). • Consider starting in partners... just talk about thoughts, emotions and physical sensations. Don't share story of why it happened. Give example of me doing it first. Acknowledge it is weird.
20 min	• Group Discussion: continue exploring physical sensations, emotions, and thoughts associated with unpleasant events. Connect to experience of stress - How do we actually experience it physically, cognitively and affectively? Ask participants to name stressors - what is particularly stressful for you and what are you discovering about it through the practice of mindfulness? Explore

	with the class Automatic Habitual Stress Reactivity. How does it influence mind, body, health, and patterns of behavior, <u>particularly related to health?</u> Association with expectations, not getting one's own way (what is my way, anyway...and would I know it if I got it, and how long would it last?) Definitions of stress and stressors (see, for example, evolving theories and studies about stress from Cannon, Selye, Holmes and Rahe, Lazarus, McEwen.) • <u>Possible stories:</u> • <u>Second arrows story</u> • <u>Selye's definition of stress</u> • <u>John Kabat-Zinn's story of stress like wind filling sails of a boat, and using the wind to steer the boat in beneficial directions.</u> • <u>Stress boils down to resisting to what's here.</u>
10 min	• <u>Personal reflection writing – see assignment handout</u>
35 min	• <u>Engage in 20 minutes of aerobic physical activity, with additional 5 minutes of warm-up, and 5 minutes of yoga afterwards – specifically walking/jogging at a fairly fast pace, preferably outside. Allow modifications of physical activity as needed (e.g. biking, body weight-based strength exercises). Have people monitor their thoughts, emotions and physical sensations prior to starting the walk, during, and after. Group discussion about experiences of this activity today, and over the week.</u>
20 min	• <u>Motivational Interviewing module: Describe the home practice assignment (below) on picking a goal related to diet, alcohol consumption or physical activity for the week. In pairs, taking turns to ask your partner the following questions. After each answer, reflect back what you have heard in your own words. (1) What is your goal related to diet, alcohol consumption, physical activity, or stress for the week? (2) On a scale of 1-10, where 10 is high, how MOTIVATED are you to achieve this goal? (3) On a scale of 1-10, how CONFIDENT are you that you will achieve the goal? (4) What could you do that would bring your motivation or confidence a little higher? (5) What</u>

	<u>might make it difficult to achieve the goal this week, and if that happens, what will you do? (6) What is a way to measure this goal that resonates with you?</u>
15 min	Assign home practice, and fill out forms.
5 min	Conclude class with sitting meditation. End with a poem? e.g. Guest House by Rumi.

Home Practice Assignment

- Alternate Body Scan recording with Lying-Down Yoga recording, every other day $\geq$ 6 days per week
- Sitting Meditation 15 minutes per day with attention to breathing, other physical sensations, and awareness of the whole body.
- Be aware of stress reactions and behaviors during the week, without trying to change them.
- Awareness of feeling stuck, blocking, number, and shutting off to the moment when it happens this week.
- Review information about stress in practice manual or handout.
- Pick a do-able goal related to diet, alcohol consumption, or physical activity for the week that you feel may help you (e.g. eating less, eating more healthily, engaging in particular type of physical activity). Try to be very specific (e.g. eat 10 servings of fruits and vegetables per day; reduce salt intake to 1,500 mg per day; do strength training at the gym twice this week for 45 minutes each time; sign up for Weight Watchers program). Pick a way to monitor it that resonates with you (i.e. we get better at what we measure).

Class Five

Overview

During this 2.5 hour session, participants engage in a combination of the three major formal mindfulness practices that have also been practiced at home during the preceding three weeks – the body scan, mindful hatha yoga and sitting meditation. This session marks the halfway point in the course. It emphasizes the capacity of participants to adapt more rapidly and effectively to everyday challenges and stressors. Experiential practice of mindfulness continues with an emphasis on developing problem-, emotion-, and meaning-focused coping strategies. (See Lazarus and Folkman, and Folkman). A central element of the session is oriented around the patient's capacity to recover more rapidly from stressful encounters when they occur. Strategies continue to be developed with emphasis on the growing capacity to attend more precisely to a variety of physical and mental perceptions and to use this awareness as a way of deliberately interrupting and intervening in previously conditioned, habitual behaviors and choosing more effective responses. Participants are encouraged to share experiences with practicing with the health-related goal set last week. Another opportunity is offered for Motivational Interviewing and goal setting for the week related to a determinant of well-being. Daily mindfulness practice is assigned, with an emphasis on the observation and application of mindful awareness in daily life.

Theme One

Awareness of being stuck in one's life, highlighting the conditioned patterns of escape from difficulty (i.e. fight and flight – stress reactivity/automaticity/mindlessness). Investigation of the ways people often cope by escape or denial – naming the shadow side of our conditioned coping patterns: substance dependency, numbing and suppression of feelings, emotional eating, excessive sedentary activities, suicide. Honoring that these coping methods may have been protective and supported survival, and are now counter-evolutionary and limiting, if not destructive.

Theme Two

Connect mindfulness with perception/appraisal in the critical moment (the moment of conscious contact), and with the arising of reactive physical sensations, emotions, cognitions and behaviors. Emphasis on attentiveness to the capacity to respond rather than to react to stressful situations. Explore the effect of emotional reactivity in health and illness. Learning to honor the full range of emotions and when called for, to express them with clarity and respect for self and other.

Typical Class Sequence

Time	Content
10-15 min	• Standing yoga
30 min	• Sitting meditation with breath, body, sounds, emotions, thoughts, as “events” in consciousness, distinguishing the event from the content, and then choiceless awareness/open presence. Stillness is emphasized.
20 min	• From meditation move into guided reflection: The program is half-over today. How has it been going so far? Pause and take stock: What am I learning? How does it show up in my life? How am I engaging with this program in terms of commitment to weekly classes and daily practice? Am I willing to recommit for the second half of the course? Note that growth is non-linear. Letting go of expectations for the second half based on experience of the first half of course. Invitation to practice and take each moment as a new beginning; a fresh opportunity to be fully engaged, fully alive. • Midway assessments, completers moving into dyads to discuss their experience of the program so far.
15 min	• Inquire into experiences practicing the meditation and yoga home practice, as well as the new meditation introduced at the beginning of class.

15 min	• Explore observations of reacting to stressful events during the week. Note habitual behavioral patterns, thoughts and emotions associated with the feeling of being stuck in these conditioned reactions. Include patterns that arise during meditation practice. • Introduce the possibility of responding with awareness in these moments, rather than reacting automatically. In making the distinction between reacting and responding emphasize that in many situations, reacting is skillful. It's not the stress but how you handle it which dictates its effects on the mind and the body (within limits). Introduce the "S-T-O-P" practice. • <u>Optional: Give out Chinese finger traps, and discuss how the way to free our fingers is by bringing them closer to each other – similar with coming closer to understanding suffering as it is, and finding freedom from more clearly understanding the suffering and it's roots.</u>
15 min	• <u>Move into groups of same health determinants that they focused on last week during Home Practice. Within groups, share experiences with practicing with this risk factor. Did they meet their goal? What thoughts arose from meeting or not meeting those goals? Then return to full class, and allow full class sharing and inquiry about Home Practice experiences, including their relationship with goal setting and goal achieving. Noting the thoughts that came up around this, and if they are thought patterns we see often in our lives.</u>
15 min	• <u>Motivational Interviewing module: Describe the home practice assignment (below) on picking a goal related to diet, alcohol consumption, stress, physical activity or antihypertensive medication use for the week. In pairs, taking turns to ask your partner the following questions. After each answer, reflect back what you have heard in your own words. (1) What is your goal related to diet, alcohol consumption or physical activity for the week? (2) On a scale of 1-10, where 10 is high, how MOTIVATED are you to achieve this goal? (3) On a scale of 1-10, how CONFIDENT are you that you will achieve the goal? (4) What could you do that would bring your motivation or confidence a little higher? (5) What might make it difficult to achieve the</u>

	<u>goal this week, and if that happens, what will you do? (6) What is a way to measure this goal that resonates with you?</u>
	Option: Review reacting vs. responding diagrams from Full Catastrophe Living. Mention evolving theories and studies about stress hardness coping, resilience (see, for example Kobasa, Antonovsky, Schwartz and Shapiro). Best to explore this through dialogue and reflection rather than presenting didactically as a lecture.
5 min	Go over home practice assignment – Emphasize that the new Sitting Meditation recording has more silence in it to allow participants to practice more deeply on their own in between the guided instructions.
5 min	Sitting meditation.

Home Practice Assignment

- New Sitting Meditation recording. Alternate with either Body Scan or Lying-Down Yoga recordings.
- Fill out Difficult Communications Calendar.
- Bring awareness to moments of reacting and explore options for responding with greater mindfulness, spaciousness and creativity, in formal meditation practice and in everyday life. Remember that the breath is an anchor, a way to heighten awareness of reactive tendencies, to slow down and make more conscious choices.
- Pick a goal related to diet, alcohol consumption, physical activity, stress, or medication adherence for the week that you feel may help you (e.g. eating less, eating more healthily, engaging in particular type of physical activity, now add medication adherence). Pick a way to monitor it that resonates with you (i.e. we get better at what we measure).

Class Six

Overview

In this 2.5 hour session, experiential training in MB-College continues, with an emphasis on the growing capacity to cope more effectively with stress. Discussion is oriented around the continued development of “transformational coping strategies,” attitudes and behaviors that enhance the psychological characteristic known as “stress hardiness” or resilience. Theory is linked directly to the MB-College methods and skills being practiced grounded in the actual life experiences of the participants. The emphasis continues to be on the broadening of participants’ inner resources for developing health-enhancing attitudes and behaviors and the practical application of such competencies given each person’s particular life situation and health status. Daily mindfulness practices are assigned again for homework with an emphasis on the observation and application of these skills in daily life. Participants engage in an in-depth exploration of stress as it presents within the domain of communications. The focus of this strategy-building session revolves around the application of previously learned MBSR skills and methods in the area of communications. A variety of communication styles are examined both didactically and experientially, and strategies for more effective and creative interpersonal communication are developed. The role of social support in initiating and maintaining behavior change is discussed, and participants are invited to explore ways to utilize social support in ways to help transform some of their determinants of health in positive directions.

Theme

Stressful communications; knowing your feelings; expressing your feelings accurately; developing a greater awareness of interpersonal communication patterns; and barriers to doing so. Interpersonal mindfulness: staying aware and balanced in relationships, especially under conditions of acute or chronic stress, the strong expectations of others, past habits of emotional expression/suppression and the presentation of self in everyday life. Based on the skills that we have been developing through the entire program, emphasize cultivating the capacity to be more flexible and to recover more rapidly during

challenging interpersonal situations. Exploring ways of utilizing social support to transform determinants of health in positive directions.

Typical Class Sequence

Time	Content
5	• Standing yoga
35	• Sitting meditation with less instruction: breath, body, sounds, thoughts and emotions, choiceless awareness/open presence. Optional: end with poem, such as “Autobiography in Five Chapters”.
5	• Optional: return midway evaluations with comments. Possibility of using anonymous quotes from participants’ evaluations to identify and share the experiences and learnings of this particular group.
15	• Discuss the home practice, especially experiences with the sitting meditation recording. What did you notice about responding more creatively in life and in meditation? Were there new responses? What surprised you?
10	• Discuss the upcoming all day session. Explain the intentions underlying this session and describe in detail the structure and format of the day, including options for self-care and teacher availability. Discuss how to work with extended periods of silence and practice. Provide suggestions for preparing for the day, including what to bring: Healthy snacks, loose fitting clothes (layers), blanket, clothing to do outdoor exercise in.
20	• <u>Move into groups of same determinants of health that they focused on last week during Home Practice. Within groups, share experiences with practice with this risk factor. Then return to full class, and allow full class sharing and inquiry about Home Practice experiences.</u>
20	• <u>It has been shown that social support can have a substantial impact on sustaining behavior change. Do a journaling exercise where you pick one of the areas you are exploring shifting (e.g. meditation, physical activity, diet, medication adherence, etc.). Ask yourself: (1) What is the change I want to achieve, related to things that influence my well-being? (2) Why do I want to</u>

	<u>achieve this? (3) Is there a group setting that might help me with this (e.g. a workout partner, meditation meeting, gym membership, engaging spouse in shifting menus)? (4) How do I feel about taking steps towards initiating this? What arises in my thoughts, emotions and physical sensations as I do consider this? Time for sharing with full class.</u>
10	Optional: guided reflection – recall a situation from the Difficult Communications Calendar. Examine habitual relational patterns and how they are experienced in the mind and body and how they manifest as behavior.
	Optional: Discuss in small groups or dyads.
15	- Group discussion about difficult communications. - There are a number of exercises that can be used to explore this topic. Embodying a relational pattern tends to make it more available to awareness. The dialogue and inquiry during these exercises allows a heightened awareness of habitual patterns and behaviors, not only in the realm of interpersonal communication, but also in one's inner life. It is essential to pause and reflect together on these experiences and to notice how relational patterns are externalizations of internal mind and body states. Participants make connections between their present-moment experience of witnessing and/or participating in these exercises and the personal cognitive, emotional and behavioral patterns with which they have become familiar during the course. These exercises also provide an opportunity for participants to experiment with new behaviors and ways of engaging interpersonally. - Note: the intention behind engaging in any of the following (or any other) communication exercises is the cultivation of awareness. The form of the exercise is less important than the essence of this intention. - Some of the options for communications exercises may include, but are not limited to: - Experiencing and exploring patterns of communication by <u>physically</u> enacting and expressing different patterns and options (i.e. passive, aggressive, assertive, etc.), then having class take postures, possible interacting in pairs, small groups or the entire class.

	• Exploration of assumptions: Guided by instructor, participants face each other in silence, and are led into noticing differences between observation and assuming or interpreting/mind reading. This may be followed by structured dialogue between participants. • Speaking and listening exercise: in dyads, participants are given a topic based on class discussions and content. One speaks, one listens, then reverse roles. E.g. “Reflect on a time that you felt heard and understood. How did it feel in the body, thoughts, and emotions?” Person listening is just listening, then reflecting back. Bring moment-to-moment awareness to this interaction. About 3 minutes to share and 2 minutes to reflect back. In pairs afterwards, talk about what it was like to share and listen in this way. Then broaden out to discussing in full group.
10	• <u>Invitation to pick a goal related to diet, alcohol consumption, physical activity, stress, sleep, or increasing social support related to a something that influences well-being, for the week that you feel may help you (e.g. eating less, eating more healthily, practicing the S-T-O-P practice twice per day, engaging in particular type of physical activity, exploring regular bedtime, inviting a friend to go for a walk together). Pick a way to monitor it that resonates with you (i.e. we get better at what we measure). Note that you can keep the prior week’s goal if you like. Fill out the worksheet. Discuss why we fill out the worksheet (i.e. motivational interviewing).</u>
5	• Assign home practices.
5	• Sitting meditation.

Home Practice Assignment

- Alternate Sitting Meditation recording with Body Scan and/or Standing or Lying-Down Yoga recordings.
- Invitation to pick a goal related to diet, alcohol consumption, physical activity, sleep, or increasing social support related to a behavior change, for the week that you feel may help you (e.g. eating less, eating more healthily, practicing the S-T-O-P practice

twice per day, engaging in particular type of physical activity, making appointment with doctor to review antihypertensive medication effectiveness/side effects, inviting a friend to go for a walk together). Note that you can keep the prior week's goal if you like. Pick a way to monitor it that resonates with you (i.e. we get better at what we measure).

All Day Class

Overview

The intensive nature of this 7.5 hour session is intended to assist participants in firmly and effectively establishing the use of MB-College skills across multiple situations in their lives, while simultaneously preparing them to utilize these methods far beyond the conclusion of the program. Emphasis is placed on practices to enhance self-awareness, attention control, and emotion regulation. Healthy practices that can influence well-being are performed by participants and modeled by the instructor, including physical activity, healthy eating, self-care, and emotional regulation leading to stress prevention, and healthy responses to stress.

Theme

Cultivating a sense of presence from moment to moment, and being open to any experience, whether evaluated as pleasant, unpleasant or neutral, as an opportunity to practice mindful attention. Checking in with our bodies and minds, and providing the self-care that allows them to flourish.

Typical Class Sequence

Time (min)	Content
	<i>Morning Session:</i>
10	Brief sitting meditation in silence.
10	Welcome, introduction of teacher(s), and guidelines for the day, which include being silent, no eye contact, self-care, availability of teachers, turn cell phones off, avoid use of electronic technology, etc.
40	<u>Silent aerobic or strength physical activity. Aware of physical sensations, thoughts and emotions (include 5 min of warm-up).</u>
45-60	<u>Guided standing yoga, then lying down yoga, ending with short body scan.</u>

45	Sitting meditation – awareness of breath, body, sound, thought/emotions, open awareness.
5	Lunch instructions
60	Silent lunch. <u>A healthy, tasty lunch, consistent with the DASH diet is provided. Showing the DASH diet and 2015-2020 Dietary Guidelines for Americans, including the ChooseMyPlate image shown here. Inviting participants to fill their plates accordingly, noticing physical sensations, thoughts and emotions during the entire arch of lunch, including before, during, and the minutes and hours afterwards. How does this food make</u> <u>them feel?</u>
	<i>Afternoon Session:</i>
20	Lovingkindness meditation: guidance using minimal talking, emphasis on spaciousness, ending in silence. (This meditation is used to help people recognize qualities of lovingkindness, friendliness, warmth and compassion, towards self and others, that are already present and capable of being cultivated, but may not yet be available to awareness. Care is taken to recognize and affirm any resistance to the possibility of these qualities existing within oneself or wished for others.) Possible wording (from Bob Stahl): be safe/ be healthy/ have ease of body and mind/ be at peace.
20	Slow walking meditation: with introductory guidance.
10-15	Talk – an opportunity to give encouragement or inspiration, with the option of telling a teaching story or reciting a poem and drawing out one or more of the core teaching elements of the curriculum. – e.g. <u>loving kindness</u>

	<u>meditation leading to story of instructor’s relationship with loving kindness to him/herself related to health; how self-care leads to care for others – caring for ourselves helps us better care for others – e.g. what we don’t transform we transmit; emphasize teachings of self care and self efficacy in the story. Story of family friend meditating in the forest, trying to “think of nothing”. Noticing sensations of something little climbing along skin, but ignoring it in an effort to think of nothing. It ended up being a tick and giving her Lyme disease. How can we utilize meditation to increase self-awareness, attention control and emotion regulation, in a way that emphasizes kindness to ourselves and others?</u>
10-15	• <u>Invite participants to write about self-care. E.g. through free writing that no one else will see, respond to queries...</u> 1. <u>How do I care for myself in ways that foster my well-being?</u> 2. <u>How would I like to care for myself more?</u> 3. <u>Would caring for myself in these ways help others? If so, how?</u>
30	• Mountain meditation, starting with awareness of breathing, emphasizing self-efficacy. Mountain or Lake meditation – These images are used to help people understand the practice on a deeper level, not to take them out of the present moment to some other place or time. They are metaphors used to connect to aspects of the practice connected to stability, flexibility and strength.
30	• Visual meditation followed by mindful walking, possibly outdoors, stopping and noticing one thing. Teacher rings bells to bring participants back to room and guides a contemplation on the memory of what was seen, followed by an open awareness meditation.
15	• Have people pick three words that describe their day (give example of my three words). Then partner up sitting beside each other talking quietly in each other’s ear, what your three words were, and perhaps why. Conversation will then move to how the day was for you, and volume will naturally increase. Allowing people who don’t want to share, not to. After partners, go around room with people sharing their three words with the full

	group, and why; how was the day.
25	Group discussion and dialogue – Emphasize that the day was not meant to be pleasant or unpleasant. Question of how one works with whatever appears. Invite participants who had difficulties to speak about them and feel supported.
10	Ending points: (1) the effects of the retreat will continue into tonight, and over the next few days; (2) we may be more open, but also more sensitive particularly tonight – have a chill night if possible; (3) gratitude and understanding towards those at home to created space for us to be here – maybe start with asking them how their day was first, at it may have been quite different from yours; (4) careful driving.
10	Optional: closing ceremony, which may include standing in circle, and embedded in the context of the larger group, finding one word to describe the experience of the day or the moment.
10	Sitting meditation. End with a poem?
5	Good-byes.

Class Seven

Overview

In this 2.5 hour session, experiential training in MBSR skills continues. The all day class is reviewed and discussed. There may be a continuation of the discussion of communication that began in class 6. Participants are asked to exercise greater personal latitude in the choice of formal mindfulness practices done as home practice during the week between this session and the finale one. Emphasis is on maintaining 45 minutes of daily practice, without recorded instructions. Participants are encouraged to create their own blend of the various practices. (For example, 20 minutes of sitting, 15 minutes of yoga, 10 minutes of body scan.) The intention is to further maintain the discipline and flexibility of a personal daily mindfulness practice by encouraging people to become attuned to the changing conditions in their lives. A behavioral activation module is included to support participants in longer term change related to factors that nourish and drain them, including those related to well-being.

Theme

Integrating mindfulness practice more fully and personally into daily life. Participants are asked to purposefully reflect on life-style choices that are adaptive and self-nourishing as well as those that are maladaptive and self-limiting.

Typical Class Sequence

Time (min)	Content
15	• Yoga choices exercise: each participant does a standing body scan and identifies an area that needs attention. Individually and with the group, explore yoga poses that address that area of the body, or favorite yoga postures learning in the program. Each participant, with help from the teacher if necessary, teaches their chosen pose. Emphasis is on using yoga

	in ordinary daily experience, not as a special, rarified activity.
10	• Changing seats exercise: After participants take their seats in the room, invite them to close their eyes and notice how it feels to be sitting where they're sitting. Ask them to: • Pay attention to what's familiar, if this is a seat they choose often, or what's different if it's a new seat. • Notice physical sensations, thoughts, and/or emotions that may be present as they sit in this familiar or new place. • Then invite them to open their eyes, and get a sense of what the room looks like from this perspective. Is it the same room? Why did they choose to sit where they did when they came in? Scan the room for a seat in which they've never sat or where they think they won't like to sit. Ask participants to move to that seat, in silence, and to close their eyes and notice how it feels to be in the new place, with a new perspective, perhaps sitting near new people. Ask them to consider whether they tend to stay in the same places or to explore new places, making sure to emphasize that these are simply patterns, and that one pattern isn't better than the other. Can we be at home wherever we are? Mention awareness of choices of positioning oneself in a room, the idea of taking one's seat in the meditation (taking a stand sitting, no matter where you are.) Invite awareness of attachment to place. Where am I in my life – in this moment? Where am I going? Don't know... • This changing of seats may be repeated again or even a few times. Finally, invite participants to find a seat and establish themselves in a posture for sitting meditation, consciously choosing to return to "their" familiar seat or to explore being in a different place.
30	• Sitting meditation: Write meditation options on white board, and allow participants to choose which meditation they do. Examples of options: breath, breath/body/sound/thoughts/open monitoring, body scan, yoga, walking meditation, visual meditation on outdoor view, loving-kindness meditation, opening to a difficulty (S-T-O-P).

10	• Verbal sharing of what meditation practices people think they will stick with.
25	• Discuss the home practice and the all day retreat: reactions and responses to it, likes and dislikes. What you saw, what you learned about yourself. Invite responses to different aspects of the day, and how it felt afterwards. Connect the discussion to the experience of doing the meditation practice this week, both formal and informal (daily life). Emphasis on importance of making the practice one's own. This week, no recordings for home practice. Encourage people to take the same 30 minutes, and practice on their own. They decide what, how much, etc.
	• Option: questions and observations about communication stemming from last week's session. If necessary, there is the option of continuing to explore communication through the exercises that are related to this week's class discussion.
45	• <u>Behavioral activation module: Discuss theme of what we take in, as food or as any kind of sensory experience, and patterns that are self-destructive and self-nourishing. Work through the Nourishment/Poison worksheets. In partners, ask nourishment questions while the other responds. Say "thank you" after response, then ask another question – about 3 minutes per person, then time for writing. Switch to work with a different partner, and do the same for draining/poisoning questions. Time for writing afterwards, including to answer the daily meditation practice worksheet. Verbal sharing of plans with whole group for the upcoming week/weeks/months. Provide supportive resources – e.g. lists of practice groups and readings.</u>
5	• Assign home practice.
10	• Optional: Mountain, Lake or Lovingkindness meditation; or end with other meditation that seems appropriate at this time (e.g. awareness of breath). End with poem (e.g. "The Breeze at Dawn" by Rumi)?

Home Practice Assignment

- The option is to not use any recordings this week. Practice formal sitting, yoga, walking and/or body scan on your own, every day for 30 minutes. Feel free to blend practices, e.g. doing 10 minutes of yoga, followed by 20 minutes of sitting practice. Or start with an awareness of breath meditation for 20 minutes and then follow it with a 10 minute body scan or loving-kindness meditation. Experiment. See what practices resonate, but also plan and schedule the time so you continue with a regular daily practice. If going without recordings feels too difficult, alternate days using records with days of going without.
- Review the nourishing activity to chose to do every day and one day this week. Write down what you did. Note any difficulties you had nourishing yourself.
- Review the Refraining-from-Poisoning or Accepting-what I-can't control activities you chose to practice this week. Write down what you did. Note any difficulties you had refraining from poisoning yourself or accepting what you cannot control
- If you like, pick a goal (new or the same as prior weeks) related to diet, alcohol consumption, physical activity, stress, medication use, or increasing social support, for the week that you feel may help you and your well-being (e.g. eating less, eating more healthily, practicing the S-T-O-P practice twice per day, engaging in particular type of physical activity, exploring regular bed time, inviting a friend to go for a walk together). Pick a way to monitor it that resonates with you.
- Practice informally when you are not doing the above formal practices by being as aware and awake as possible through the day.
- Bring awareness to all your interpersonal interactions and communications. Pause... Be present to the person in front of you, and to yourself.
- As we approach the end of class, the invitation is to continue exploring your patterns—including those around endings.

Class Eight

Overview

In this 2.5 hour session, experiential mindfulness practice continues and participants are given ample opportunity to inquire into and clarify any lingering questions about the various practices and their applications in everyday life. A review of the program is included with an emphasis on daily strategies for maintaining and deepening the skills developed during the course of the program, including directing those skills towards evidence-based health behaviors shown to improve health and well-being. Creating a satisfying closure by honoring both the end of this program and the beginning of the rest of your life.

Theme

Keeping up the momentum and discipline developed over the past 7 weeks in the meditation practice, both formal and informal. Review of supports to help in the process of integrating the learning from this program over time: books, recordings, graduate programs, free all day sessions for all graduates 4 times per year; mention retreat centers, booster sessions.

Hand out Hints and Reminders booklet with reading list and resources list.

Typical Class Sequence

Time (min)	Content
15	• Body scan (coming full circle, since this is how class one begins).
15	• Yoga stretching, either guided or self-guided.
15	• Sitting meditation, mostly silent.
15	• Guided reflection – what do you want to be sure to remember – something you’ve touched or learned about yourself. Option of setting three short-term (3 months) and three long-term (3 years or more) goals which come out of

	your direct experience in the program and with the meditation practice, including that directed towards enhancing well-being. Include potential obstacles to reaching these goals and your strategies for working with them. Participants write letters that include these themes and then seal them in envelopes which they self-address. Instructor collects envelopes and will mail them “sometime in the future”.
10-15	As each participant completes their letter or paperwork they are placed in pairs by the instructor to discuss how the course has been for them. Examples of questions: (1) think back to why you came originally – expectations – and why you stayed; (2) What did you want/hope for? (3) What did you get out of the program, if anything? What did you learn? (4) What sacrifices did you make? What were the costs to you? What obstacles did you encounter and what did you learn about yourself in working with these obstacles? (5) How will you continue to practice when this program is over?
20	Group dialogue and discussion: Discuss the experience of practicing without recordings this week, as well as with the activities focused on nourishing, not poisoning, and accepting. Review the entire course and focus briefly on salient features.
25	Group go around – each participant shares their experience of the course with the whole group, how they feel about the course ending, what they have learned, how they will keep the momentum of their practice moving and growing.
5	Resources handout, hints and reminders booklet.
15	Optional: Each participant write a haiku (5-7-5 syllables, although it doesn’t have to be exact – 3 lines is fine) representing how they are feeling about their experience with the program, and next steps. Participants read it twice, and then place the paper it was written on in the middle of the room.
5	Home practice, address exchanges. Provide additional meditation recordings (e.g. 45 min and 15 minute practices, as well as loving-kindness and other meditations covered in class).

5	• Final meditation and acknowledgement of the ending of this particular group.
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Home Practice Assignment

- Go back to the recordings if you wish. Keep up the practice and make it your own.
- Confirm information for booster session locations, times, and formats.