UNIVERSITÉ DE GENÈVE
FACULTÉ DE MÉDECINE

Clinical Medicine Section
Department of Psychiatry

"Mindfulness in psychiatry: implementation, scientific evidence and challenges"

Thesis submitted to the Faculty of Medicine of
the University of Geneva

for the degree of Privat-Docent
by

Françoise JERMANN

Geneva

2024

TABLE OF CONTENT

Abstract

In contrast to mind-wandering, which is an automatic process, mindfulness means voluntarily paying attention to what is present (inside and outside oneself) and with a particular attitude, without judgment. Mindfulness-Based Stress Reduction (MBSR) was introduced into medicine in the late seventies and Mindfulness-Based Intervention (MBI) into psychiatry in the late nineties. The development of Mindfulness-Based Cognitive Therapy (MBCT) for the prevention of depressive relapse has been decisive from both a clinical and scientific point of view. Numerous randomized controlled trials (RCTs) have validated the efficacy of this intervention. MBCT halves the rate of depressive relapse compared with treatment as usual and is non-inferior to interventions such as continuing to take an antidepressant. In addition to efficacy studies, both quantitative and qualitative studies are favorable to MBCT. After MBCT for the prevention of depressive relapse, MBIs have been extended to other psychiatric disorders. Bipolar disorder and Attention-Deficit/Hyperactivity Disorder (ADHD) are good examples. For bipolar disorder, it was first necessary to verify feasibility, as this disorder was systematically excluded from MBCT studies, and then to set up efficacy studies. For ADHD, two approaches were developed in parallel: one developed a new MBI and the other adapted the MBCT protocol to ADHD. For both disorders, the first RCT studies are underway. Whether it's MBCT for the prevention of depressive relapses, MBCT for bipolar disorder, or MBI for ADHD, the question of the mechanisms of action is still open, and further studies are needed. To conclude, we can say that 20-30 years ago, people who took an interest in mindfulness were seen as a bit 'eccentric', but nowadays scientific evidence clearly shows that mindfulness has a place in the field of medicine.

Abbreviations

ADHD: Attention-Deficit/Hyperactivity Disorder

CBT: Cognitive Behavioral Therapy

MAP: Mindful Awareness Practices program

MBCT: Mindfulness-Based Cognitive Therapy

MBI: Mindfulness-Based Intervention

MBSR: Mindfulness-Based Stress Reduction

RCT: Randomized Controlled Trial

TAU: Treatment as Usual

I. Introduction

A. From mind-wandering to mindfulness

First of all, let's consider one of the fundamental characteristics of human beings, which is that, compared with other animals, we spend a significant proportion of our time thinking. This skill enables us to reason, solve problems, learn, plan, and so on. It allows us to adapt to new situations, innovate and create. However, our mind is not always productive and efficient. Indeed, about a quarter to a half of the time our mind wanders which means that attention and thoughts do not remain on an original or ongoing task and divert away to unrelated internal experiences (thoughts, feelings, images) (Killingsworth and Gilbert, 2010). Thoughts can for example be focused on what has happened or what will happen or on interpreting what is happening. To explore the relation between mind-wandering and well-being, Killingsworth and Gilbert (2010) measured the frequency of mind-wandering and the relation to how the person felt. In concrete terms, they contacted 2,250 adults by mobile phone and randomly asked the following questions: "How are you feeling right now?", "What are you doing right now?" and "Are you thinking about something other than what you're currently doing?". The results showed a high frequency of mind wandering, which was not influenced by the type of task people were carrying out, but that people were less happy when their mind was wandering than when it was not. On the strength of these findings, the authors published the results in an article entitled "A wandering mind is an unhappy mind".

One of the peculiarities of mind-wandering is that it works automatically. Being mindful is the opportunity to become aware of this phenomenon. Nowadays, the terms mindfulness, meditation, calmness, and relaxation appear more and more often in the press aimed at the general public and in everyday language and are sometimes used as synonyms for each other or are misused and deserve some attention. Jon Kabat-Zinn defines mindfulness as "the awareness that emerges through paying attention, on purpose, in the present moment, and non-judgmentally to the unfolding of experience moment by moment" (Kabat-Zinn, 2003, p. 145). Mindfulness is a particular mental state and differs from meditation which refers to different practices that cultivate particular qualities of the mind. Various types of meditation exist such as transcendental meditation where practitioners repeat silently a mantra or kundalini meditation where practitioners aim to promote spiritual awakening with movements and visualization to channel the flow of energy in the body. In this work, we will focus on mindfulness meditation with involves directing our attention to the present moment, and observing our thoughts, emotions, bodily sensations, and surrounding environment without judgment and attachment. This can be done through different types of mindfulness meditation practices. On the one

hand, there are *formal practices* that require people to take time to practice such as body scanning, sitting meditation, and mindfulness movements, and on the other hand, there are *informal practices* that involve doing everyday activities with mindfulness. The intention is always the same: developing awareness, acceptance, and nonreactivity toward the inner experience. One common misunderstanding or misinterpretation of mindfulness meditation is that practicing mindfulness meditation would be a way to stop thinking or clear one's head or get calm and relaxed. On the contrary, the practice of mindfulness meditation is the opportunity to develop an awareness of the mind wandering nature of the mind with a stance of acceptance.

1. Defining mindfulness from a scientific point of view

The roots of mindfulness lie in Buddhism, in Eastern pre-scientific cultures. It was only about forty years ago that mindfulness became of real interest in Western contemporary culture and that scientific research began. Since then research in the field of mindfulness has grown impressively with an acceleration over the last 15-20 years. In the beginning, to enable scientific research, an important step was to define and operationalize the concept of mindfulness from a scientific point of view. Therefore a group of clinicians-scientists has met several times and proposed a consensual and operational definition of mindfulness (Bishop et al., 2004). It is a definition with a two-component model of mindfulness: “self-regulation of attention” and “orientation to experience”. To define these two components, scholars referred to a sitting meditation which is a way to illustrate the phenomenon of mindfulness. During a sitting meditation practice, the person deliberately focuses his or her attention, for example, on the breath (e.g. movements of the abdomen, the chest, the passage of air through the nostrils). Sooner or later the mind will wander, i.e. the attention will no longer be focused on the sensations of the breath but will have been drawn to thoughts, images, sounds, and sensations elsewhere in the body. If the person notices this, he or she will bring his or her attention back to the original object of attention, i.e. the breath. The *self-regulation of the attention* component is at work as paying attention to the breath requires *sustained attention* skills (the capability to maintain the focus of our attention on a stimulus over a prolonged amount of time). Once one notices that the mind wanders, attention-*switching* skills (flexibility of attention to shift the focus from one stimulus to another), as well as *inhibition* abilities (capacity to inhibit secondary elaborative processing of the thoughts, images, sounds, and sensations encountered), are required. The *orientation to experience* component is about how the person approaches what is present. During a meditation practice, for example, this concerns the relation to what is present when the person brings his or her attention to the moment (e.g. the breath) and as his or her mind wanders. Jon Kabat-Zinn identifies seven specific

attitudes that form a foundation for mindfulness namely non-judging, patience, beginner's mind, trust, non-striving, acceptance, and letting go (Kabat-Zinn, 1990).

2. Measuring mindfulness

The consensual definition of mindfulness with this two-component model provided a theoretical and conceptual basis for instrument development. Thus, from 2004 onwards, at least eleven "mindfulness" questionnaires were developed each supposed to measure the concept of mindfulness and/or its dimensions. The principal "mindfulness" questionnaires developed over the years are presented in Table 1.

Table 1. "Mindfulness" questionnaires and measured dimensions.

Name	**Year**	**Authors**	**Country**	**Number of items**	**Measured dimensions**
Freiburg Mindfulness Inventory **(FMI)**	2001	(Buchheld et al.)	Germany	30	**1 dimension** Mindfulness
Mindful Attention and Awareness Scale **(MAAS)**	2003	(Brown and Ryan)	USA	15	**1 dimension** Attention-awareness
Kentucky Inventory of Mindfulness Skills **(KIMS)**	2004	(Baer et al.)	USA	39	**4 dimensions** Observing Describing Act with awareness Accept without judgment
Five Facet Mindfulness Questionnaire **(FFMQ)**	2006	(Baer et al.)	USA	39	**5 dimensions** Observing Describing Act with awareness Accept without judgment Non-reactivity to inner experience
Toronto Mindfulness Scale **(TMS)**	2006	(Lau et al.)	Canada	13	**2 dimensions** Curiosity Decentering
Experience questionnaire **(EQ)**	2007	(Fresco et al.)	USA	20	**1 dimension** Decentering
Cognitive and Affective Mindfulness Scale-Revised **(CAMS-R)**	2007	(Feldman et al.)	USA	12	**1 dimension** Mindfulness

Philadelphia Mindfulness Scale **(PHLMS)**	2008	(Cardaciotto et al.)	USA	20	**2 dimensions** Present-moment awareness Acceptance
Southampton Mindfulness Questionnaire **(SMQ)**	2010	(Chadwick et al.)	UK	16	**1 dimension** Mindful responding to distressing thoughts and images
Mindfulness Process Questionnaire **(MPQ)**	2012	(Erisman and Roemer)	USA	7	**1 dimension** Mindfulness
Comprehensive Inventory of Mindfulness Experiences **(CHIME)**	2014	(Bergomi et al.)	Switzerland (German)	37	**8 dimensions** Inner awareness Outer awareness Acting with awareness Accepting without judgment Openness to experience Decentering/nonreact Insightful understanding Relativity of thoughts

The use of questionnaires to measure mindfulness is widespread in scientific research in the field to such an extent that two of the ten most cited publications in the field correspond to the development of “mindfulness” questionnaires (MAAS and FFMQ) (Baminiwatta and Solangaarachchi, 2021). Today, with 15 years of hindsight several issues concerning “mindfulness” questionnaires are worth mentioning. Firstly, Grossman mentions that one should be careful not to call “mindfulness” questionnaires instruments that do not measure the same thing (Grossman, 2019). Indeed, depending on the “mindfulness” questionnaire, mindfulness is defined and operationalized differently. For example, some instruments measure only one aspect, namely the self-regulation of the attention dimension of mindfulness (perception of being inattentive), whereas other questionnaires assess this dimension as well as the orientation to experience dimension. However, this latter dimension is operationalized differently depending on the questionnaire (non-judgment for the FFMQ, openness to experience for the FMI, curiosity and decentering for the TMS, or experiential avoidance for the PHLMS) (Choi et al., 2021). Secondly, Grossman (2019) supposes that respondents who do not have any experience with mindfulness even do not correctly understand or interpret semantically some items of the questionnaires (e.g. I make judgments about whether my thoughts are good or bad). This hypothesis is confirmed by semantic analyses in the field of mindfulness which show that in the lay

literature, the term mindfulness is associated with the attentional dimension of mindfulness but not with the notion of acceptance (Choi et al., 2021). This last dimension probably becomes understandable to a person if he or she has had the experience of focusing attention on an object such as breathing and has observed that his or her mind wanders and that he or she brings his or her attention back to the present moment with a caring attitude towards himself or herself. Given the above, “mindfulness” questionnaires should be used cautiously. Rather than being called a measure of broad "mindfulness", each questionnaire should precisely mention the specific dimension(s) it intend to measure (e.g. inattention).

Apart from the use of questionnaires, several authors mention that it is essential to measure or capture mindfulness in other ways (Grossman, 2019, Van Dam et al., 2018). Biological approaches have attempted to characterize mindfulness in particular through brain imaging and these studies give interesting preliminary results but are often not enough specific to be a way to characterize mindfulness. Qualitative methods offer the possibility to better understand what people consider to be a consequence of mindfulness practice (i.e. as an experienced meditator or as a participant in a mindfulness-based intervention). Language-based measures of mindfulness (e.g. increased use of acceptance-implying language – see Collins et al., 2009), behavioral changes (e.g. changes in eating behavior), or changes reported by relatives could also be other ways to capture possible changes related to mindfulness.

3. Introduction of mindfulness in Western medicine

Mindfulness was introduced in Western medicine in the late 1970s by Jon Kabat-Zinn who trained and achieved a Ph.D. in molecular biology at the Massachusetts Institute of Technology (MIT) (Boston) and at the same time became interested in and practiced meditation. Later on, faced with people suffering from chronic pain for which traditional medicine was limited, and drawing on his meditation practice and Buddhist teachings, he developed an 8-week program at that time called the Stress Reduction and Relaxation Program. In 1979, he founded the Stress Reduction Clinic at the University of Massachusetts Medical School. The Stress Reduction and Relaxation Program became afterward the Mindfulness-Based Stress Reduction (MBSR) program (Kabat-Zinn, 1990).

More than 40 years ago, the introduction of mindfulness into the field of medicine was revolutionary. At that time, efforts were focused on the diagnosis and treatment of disorders and symptoms. By developing the first secular mindfulness-based intervention in Western medicine, Jon Kabat-Zinn opened the door to a different kind of medicine on two levels. Firstly, a strong emphasis was placed on the mind-body link. Psychological and emotional factors are recognized as key factors in health,

illness, and healing. Secondly, the notion of 'participatory' medicine is central. Patients are no longer passive recipients of treatment but have an active role in managing their health by discovering and using their resources to learn.

In concrete terms, MBSR consists of 8 weekly sessions lasting 2.5 hours and is conducted in a group setting. The sessions include mindfulness meditation practices (formal and informal practices) and group reflections. The first mindfulness meditation practice in a MBSR group consists of eating a raisin mindfully. This exercise takes about 5-10 minutes. A sultana is placed in the palm of each participant's hand. They are then asked to focus their attention on the raisin with curiosity and interest as if they were seeing such an object for the first time. The instructions will lead the participants to observe the raisin first visually (color, shape, surface, etc.), to feel the weight of the raisin in the hand, and then to bring the raisin to the ear to listen, to the nostrils to smell, to explore it with the lips and finally to put it in the mouth and explore it with the tongue. Next, participants are invited to place the raisin between their teeth and chew, paying attention to the taste. Finally, when everyone decides to do so, the raisin is swallowed and participants are invited to notice as it passes down the throat and “into the stomach”. Throughout this exploration, participants are invited to become aware of their mind wandering, to note where their attention has been, and to bring their attention back to the experience related to the raisin. This first exercise is a prototypical one that allows us to become aware of the fact that our mind wanders and that it is possible to bring our attention back to the present moment as often as necessary. This training of the mind will continue throughout the sessions. Throughout the sessions, participants will carry out different types of practice (e.g. body scan, sitting meditation, walking meditation). During the first sessions, participants are asked to focus their attention on an object such as breathing, and to bring it back when they observe that their attention is no longer focused on the chosen object (e.g. breathing). Thereafter, practices integrate open mindfulness meditation practices (e.g. being present in what is there in the moment without a particular object of attention).

Meditation practices are used as a means to address certain universal characteristics of human functioning. It is a kind of training of the mind to recognize habitual patterns of reactivity that are often factors in maintaining human distress. Between sessions, participants are required to do mindfulness meditation practices at home (audio recordings are provided). With the in-session meditation practice, group discussion, and at-home mindfulness meditation practices, participants experience the possibility to 'step aside' and learn to respond rather than react automatically to thoughts, feelings, emotions, sensations, or circumstances experienced. Over time and gradually, people develop a new attitude to their experience.

The first scientific studies evaluating the impact of MBSR (then called the Stress Reduction and Relaxation Program) were carried out with patients suffering from chronic pain (Kabat-Zinn, 1982, Kabat-Zinn et al., 1985). Since then, a large number of studies have been conducted in a variety of populations with chronic health problems and results indicate an improvement in quality of life and mental health (e.g. anxiety, depression symptoms) (for a review of the literature see Bohlmeijer et al., 2010).

B. Development of Mindfulness-Based Cognitive Therapy (MBCT)

The initial results shown by Jon Kabat-Zinn and collaborators were of great interest to those working in the field of mental health. Thus, from the end of the 1990s, two types of intervention for patients suffering from psychiatric disorders emerged. On the one hand, some therapies *integrate aspects of mindfulness* into their interventions, such as Dialectical Behavior Therapy for patients with borderline personality disorder (DBT - Linehan, 1993) or Acceptance and Commitment Therapy (ACT - Hayes et al., 1999) and on the other hand, interventions *based on mindfulness* have been developed. Mindfulness-Based Cognitive Therapy (MBCT - Segal et al., 2002) for the prevention of depressive relapse was the first mindfulness-based intervention in the field of psychiatry.

Mindfulness-Based Cognitive Therapy (MBCT - Segal et al., 2002) was created by psychologists-psychotherapists with a large background in cognitive psychology and trained in Cognitive-Behavioral Therapy (Zindel Segal from Canada, and Mark Williams and John Teasdale from the United Kingdom). The creation of MBCT has been decisive for the scientific research field as the developers were also among the first to use a randomized controlled trial (RCT) methodology to evaluate the effect of the intervention (Teasdale et al., 2000). MBCT has been specifically developed to prevent a depressive relapse. Major depressive disorder[1] is one of the most common mental health conditions among the adult population with a one-year prevalence of 7.2% and a lifetime prevalence of 10.8% (Lim et al., 2018). In addition to the fact that major depressive disorder is frequent, another specificity is its

[1] According to the Diagnostic and Statistical Manual of Mental disorders (American Psychiatric Association, 2013), a major depressive episode is met when at least 5 of the following symptoms are present nearly every day during the same two-week period and there is a significant change compared to previous functioning: depressed mood, loss of interest/pleasure, weight loss or gain, insomnia or hypersomnia, psychomotor agitation or retardation, fatigue or loss of energy, feeling worthless or excessive/inappropriate guilt, decreased concentration, thoughts of death/suicide (depressed mood and/or loss of interest/pleasure must be present).

recurrent nature. Indeed, Solomon et al. (2000) show that the cumulative probability of recurrence is 25% at 1 year, 42% at 2 years, and 60% at 5 years. The authors show a link between the number of depressive episodes and the frequency of recurrence, with the risk of recurrence increasing by 16% with each depressive episode. Thus a person who has experienced 5 depressive episodes is twice as likely to relapse as a person who has only experienced one episode.

Authors who developed MBCT have based the intervention on two major theoretical backgrounds concerning cognitive vulnerability factors related to depression. The first one is the *differential activation hypothesis* which specifically highlights the link between mood and depressive thoughts (Teasdale, 1988). According to this vulnerability model, certain patterns of processing are established when a person experiences a depressive episode. Once the person recovers, the association between depressed mood and negative thinking patterns is inactivated. In most individuals, a transient mood shift does not lead to any change, whereas in people who have already experienced a depressive episode, this slight decrease in mood is likely to cause a reactivation of the negative thinking patterns typical of depression. In other words, a person who has experienced a depressive episode has a lower activation threshold for the cognitive-emotional associations in case of a transient mood shift which in turn might exacerbate depressed mood and constitute a risk of full relapse (see Lau et al., 2004, for further details). The second cognitive vulnerability factor is the *ruminative response styles theory* (Nolen-Hoeksema, 1991) which specifically highlights the link between depressive rumination and the maintenance of depressed mood. The process of rumination can be defined as a set of thoughts that direct and monopolize the attention of the person experiencing a depressive episode. The person ruminates on the symptoms, their causes, and consequences (e.g. thinking about feeling tired, wondering why one feels so bad, and not being able to work anymore). This response style to low mood is detrimental as it hinders problem-solving and triggers and maintains depressive states (Watkins and Roberts, 2020).

In concrete terms, MBCT is a manualized program of 8-weekly group sessions of 2 hours each as well as a silent half or full-day retreat between sessions 6 and 7. It is aimed at people who have experienced major depressive episodes but are no longer depressed at the time of participation. MBCT combines the general structure and main mindfulness practices of the MBSR program with cognitive-behavioral strategies for the prevention of depressive relapse. The sessions include mindfulness meditation practices, group reflections, and cognitive-behavioral exercises and participants are invited to practice mindfulness at home between sessions. The themes of the 8 sessions are mentioned in Table 2.

Table 2. Themes of the 8 MBCT sessions

Sessions	Themes
Session 1 :	Awareness and automatic pilot
Session 2 :	Living in our heads
Session 3 :	Gathering the scattered mind
Session 4 :	Recognizing aversion
Session 5 :	Allowing/Letting be
Session 6:	Thoughts are not facts
A day of mindful practice	
Session 7:	How can I best take care of myself?
Session 8:	Maintaining and extending new learnings

All sessions include mindfulness meditation practices and Cognitive-behavioral therapy (CBT) exercises related to the theme of the session. The mindfulness meditation practices will learn participants to become aware of the nature of the wandering mind and to identify the very early signs of depression (symptoms and/or thought patterns). As mentioned above, practicing mindfulness meditation is a kind of attentional training (becoming aware that the mind is wandering and bringing attention back to what is present) combined with the progressive development of a new orientation towards experience (e.g. attitude of curiosity, benevolence, acceptance). Home practice are recommended about 30 minutes a day. CBT elements include exercises highlighting the link between core emotions, feelings, and thoughts, the influence of mood on interpretation, identifying early signs of relapse, defining action plans, etc. All of these elements aim to prevent relapse by "nipping in the bud" the first signs of depressive relapse and taking action to remain in good health.

1. Preventing depressive relapse

As MBCT has been developed to prevent depressive relapse in the context of unipolar depressive mood disorder, the first studies in the field of MBCT were randomized controlled trials (RCTs) aiming to explore whether MBCT had an impact on relapse rates. Authors compared adding MBCT groups to Treatment as Usual groups (TAU corresponds to undertaking what is usually done to take care of oneself) with TAU alone groups. Subjects included in the trials were off pharmacological treatment, were in remission, and had experienced at least three depressive episodes in the past (in some studies a sub-group of people having experienced two previous episodes was also included). The follow-up period was 12 months. It should be noted that the first RCTs were designed and conducted by the founders of MBCT (Ma and Teasdale, 2004, Teasdale et al., 2000) but subsequently, studies conducted by research groups independent of the founders of MBCT (Bondolfi et al., 2010, Godfrin and van

Heeringen, 2010) which is important to hinder the allegiance bias. A first systematic review and meta-analysis including four RCTs comparing MBCT added to treatment as usual (TAU) to TAU alone showed that adding participation in an MBCT group significantly reduced relapse rates as it halved the rate of depressive relapse; 32% of patients with 3 or more past episodes of major depressive episodes relapsed in the 12 months following MBCT + TAU as compared with 60% of patients in the TAU alone groups (Chiesa and Serretti, 2011). A more recent systematic review and network meta-analysis on 17 RCTs including 2'077 participants confirmed that adding MBCT to TAU was more effective than TAU alone in preventing depressive relapse (up to 26 months) (McCartney et al., 2021). Moreover, the authors also showed that results indicate that there was an advantage of adding MBCT to TAU over TAU alone or placebo regarding the time to relapse of depression as MBCT delays the time to relapse. After the first trials comparing MBCT to TAU, authors compared MBCT to an "active" control groups. MBCT groups were compared to groups that were not based on mindfulness such as cognitive psychological education (e.g. mindfulness was replaced by education) or maintenance antidepressant therapy and MBCT was shown as having similar relapse rates than "active" control groups (see McCartney et al., 2021, for a meta-analysis).

Although numerous studies show positive results for MBCT, to date, the question remains who could benefit most from it? A few avenues have been explored so far. MBCT is most suitable for people who are more vulnerable to relapse such as those with more previous major episodes (Ma and Teasdale, 2004, Teasdale et al., 2000), with childhood abuse (Kuyken et al., 2015), with unstable remission (Segal et al., 2010) or with more residual symptoms before treatment (Kuyken et al., 2016). Recently, Cohen et al. (2023) explored from the multicentric PREVENT study data (Kuyken et al., 2015) whether demographic, clinical, or psychological measures could predict who had better relapse prevention outcomes over 24 months. Analyses could only be done on the antidepressant (ADM) arm. The authors showed that for people who were predicted to have a poor prognosis if staying on ADM, the relapse rate was high and therefore MBCT represents a clinically beneficial alternative.

Given the effectiveness of MBCT in preventing unipolar depressive relapse/recurrence, this intervention is now included in the clinical recommendations of the National Institute for Health and Care Excellence (National Institute for Health and Care Excellence (NICE), 2022 – see Chapter 1.8 Preventing relapse). Excerpt from NICE guidelines:

1.8.5 For people who have remitted from depression when treated with antidepressant medication alone, but who have been assessed as being at higher risk of relapse, consider:

- *continuing with their antidepressant medication to prevent relapse, maintaining the dose that led to full or partial remission, unless there is good reason to reduce it (such as side effects) or*

- *a course of psychological therapy (group CBT or mindfulness-based cognitive therapy [MBCT]) for people who do not wish to continue on antidepressants (follow the recommendations on stopping antidepressants) or*
- *continuing with their antidepressant medication and a course of psychological therapy (group CBT or MBCT).*

1.8.6 For people starting group CBT or MBCT for relapse prevention, offer a course of therapy with an explicit focus on the development of relapse prevention skills and what is needed to stay well. This usually consists of 8 sessions over 2 to 3 months with the option of additional sessions in the next 12 months.

As mentioned above, taking part in an MBCT group is a mental health recommendation. The question of availability and access to this type of intervention is therefore crucial. In this perspective, a web-based application (Mindful Mood Balance – MMB) has been developed to offer remotely the 8-week self-paced MBCT program. Results of an RCT trial including partially remitted participants on a 12-month follow-up period, showed that adding the use of MMB to usual depression care reduced depressive symptomatology and relapse rate compared to usual depression care alone (Segal et al., 2020).

2. Impact on cognitive functioning

An important first step was to validate the efficacy of MBCT in preventing depressive relapse and then to compare the effectiveness of MBCT with other interventions. Beyond these aspects, several researchers have postulated that there could be a link between MBCT and cognitive functioning. This hypothesis is essentially based on the data showing that people recovering from a major depressive episode may present residual cognitive deficits (e.g. memory, attention, executive functions) that could be factors of vulnerability to relapse and the fact that the practice of mindfulness requires cognitive functions such as attentional capacities (see the definition of mindfulness, point I.A.1.).

Cognitive impairments during a depressive episode are well known. Indeed, a recent literature review of studies published from 2009 to 2019 demonstrated that during a major depressive episode more than 75% of the studies included evidenced a deficit in information processing speed (slowing) and verbal and visual memory and that more than 50% of the studies reported attentional deficits (essentially alertness) and executive deficits (inhibition, verbal fluency, working memory particularly when the task required articulatory rehearsal mechanisms) (Kriesche et al., 2022). The results concerning sustained attention and switching abilities are not unanimous, with some studies reporting deficits while others do not.

The question of whether cognitive impairments are a cause or a consequence of depression is still discussed. Different points of view can be considered (Hammar et al., 2022). Cognitive deficits can be seen as state-dependent meaning that they normalize once the mood normalizes. Cognitive deficits can be seen as a scar meaning that impairments persist even after remission and can be related to the number of episodes. Finally, cognitive deficits can be seen as a trait (neurocognitive vulnerability) meaning that they exist before depression and consist of a vulnerability factor. It is important to mention that the literature on cognitive deficits in depression has some limitations. Indeed, the definition of cognitive functions (e.g. executive functions can be seen as unidimensional or multidimensional), the measurement tools used and/or the clinical characteristics vary greatly between studies and make synthesis difficult. Nevertheless, the authors of the above-mentioned literature review, Kriesche et al. (2022) showed that the studies indicate only partial improvement in cognitive functioning during remission of the depressive episode. Deficits in attention, memory (verbal and visual), and working memory persist, albeit to a lesser extent. The executive abilities (cognitive flexibility and verbal fluency) however are comparable to those of control participants (Kriesche et al., 2022). Based on these observations regarding cognitive functioning during and after a depressive episode, several authors have been interested in knowing whether MBCT could have an impact on cognitive functioning (see study 1 which is presented in the present work). A systematic review of the effects of MBSR or MBCT on measures of cognitive functioning showed no effect on attentional or executive functioning, contrary to the hypothesis mentioned above (Lao et al., 2016). However, as mentioned above, several factors that limit comparisons, namely the wide variety of measurement instruments used to measure cognitive functions and the diverse populations included in the studies.

In addition to the cognitive functions mentioned so far, the ability to recall autobiographical memories (autobiographical memory) during a major depressive episode has also been the subject of numerous studies. The authors have focused in particular on the specificity deficit (or the tendency to recall over-general memories) meaning the difficulty in retrieving a specific memory. Most of the time, the Autobiographical Memory Test (AMT) is used to measure this deficit. People are given a cue word (e.g. holidays) and are asked to recall a specific memory meaning something that occurred once and lasted no more than a day. When people are depressed, the autobiographical memories retrieved from the cue word will be an over-general memory (e.g. "I've always loved holidays"; or extended memory (e.g. "recently, I spent four days in Corsica") rather than specific (e.g. "on my last holiday, I forgot my camera on the table of a lovely restaurant"). From a theoretical point of view, the recall of an over-general memory can be difficult due to three processes: capture and rumination (focused attention preventing the retrieval of specific memories), functional avoidance (avoidance of details to reduce emotional

distress), and executive control (difficulty maintaining the working memory necessary to carry out the retrieval process) (CaRFAX model - Williams, 2006). A recent meta-analysis indicates that the specificity deficit is present during a depressive episode and also persists during remission, although to a lesser extent compared with the general population (Weiss-Cowie et al., 2023). These results are in line with the theoretical conception that recalling general memories is a cognitive trait (cognitive style) that is a factor of vulnerability to depression. In consequence, several authors have been interested in knowing whether MBCT could have an impact on the over-general recovery of autobiographical memories. Let's mention that one of the authors of the test (Mark Williams) is also one of the developers of MBCT. This probably explains why this cognitive deficit has been studied more specifically in the field of MBCT. The fact that almost only one test (AMT) was used to evaluate the deficit of specificity recall of autobiographical memories makes comparisons easier. An individual patient data meta-analysis shows that there is no impact of MBCT on the specificity deficit (see study 2 in the present work).

3. Participants' views on MBCT

In addition to the quantitative studies mentioned above, more and more authors are interested in analyzing data from a qualitative point of view. Studies using qualitative methodology in the field of MBCT aim to explore and understand the richness and complexities of the participant's experience when participating in an MBCT group. Compared to quantitative methodology, the qualitative approach is a holistic way of understanding the contributions of an MBCT group to the prevention of depressive relapse. These two approaches are often complementary. A recent meta-analysis of the qualitative studies in the domain of MBCT focused on better understanding the therapeutic processes (how people experience MBCT), benefits and challenges of MBCT, and how MBCT works to prevent relapse into depression (Williams et al., 2022). Twenty-one studies were included. The qualitative data collection was done either directly after the MBCT group or during the follow-up. The results showed three overarching themes:

Becoming skilled and taking action. MBCT supports participants to learn about mindfulness practice and different kinds of practice can be experienced. In consequence, this permits participants to engage in mindfulness practice and to find the type and duration of practice that suits them best. MBCT enables participants to develop an awareness of inner experiences (thoughts, sensations, emotions) and create a distance (stepping back) from experience and in particular from ruminations. MBCT helps to experience the impermanence of thoughts and emotions. Finally, this theme also includes having a sense of agency and control rather than feeling powerless or hopeless concerning depression and the first signs (premises) of relapse and being able to be active in dealing with it.

Acceptance. Participants to MBCT described having developed acceptance toward depression-related or difficult/unpleasant thoughts and feelings with the ability to turn toward bodily sensations rather than away. Acceptance was mentioned concerning depression as an illness. Participants in MBCT reported the development of self-acceptance meaning increasing self-compassion, self-esteem, and self-care. The importance of sharing difficulties in a group in a climate of trust was also mentioned as an essential experience and helped to feel a sense of community. Finally, some participants mentioned changes in interpersonal relations following MBCT such as feeling more relaxed, more closeness, and more responsive communication.

Ambivalence and variability. Some difficulties were mentioned by participants concerning the group format of MBCT. The difficulties mentioned were about relating and connecting with others, social comparisons, and being affected by the shared experience. Other difficulties concerned mindfulness practices themselves. These could give rise to distressing experiences (even if those were transient). The role of the initial expectations for MBCT has also been mentioned. Some had high expectations such as having a cure for depression and being able to reduce or avoid medication. Furthermore, for some, there was ambivalence in engaging in an approach that required time and effort.

Although some of the elements mentioned above have already been included in quantitative studies (e.g. measurement of the dimension of accepting without judging), others have been little taken into account to date (e.g. agency or expectations) and deserve to be in the future.

4. Possible mechanisms of change

Currently, one of the areas of study that are attracting the most interest from the scientific community is the study of the mechanisms and moderators underlying mindfulness interventions (Baminiwatta and Solangaarachchi, 2021). Since the development of mindfulness-based approaches, several authors have proposed theoretical models suggesting mechanisms of action that could explain the beneficial effects observed in connection with mindfulness training. Among the models issued from the clinical field of mindfulness, three models deserve some particular attention:

- Intention Attention Acceptance Model (IAA) (Shapiro et al., 2006)
- Mindfulness-to-Meaning Theory (Garland et al., 2009, Garland et al., 2015)
- Monitor and Acceptance Theory (MAT) (Lindsay and Creswell, 2017)

Even if we will not discuss the links between mindfulness and neuroscience in this work, two other models issued from this field deserve some attention (see Tang et al., 2015, for a review on the link between mindfulness and neurosciences).

- Mechanisms of action from a conceptual and neural perspective (Hölzel et al., 2011)
- Self-awareness, self-regulation, and self-transcendence (S-ART) (Vago and Silbersweig, 2012)

Although each model is a unique contribution to the understanding of the mechanisms at play in mindfulness practices, we wish here to highlight the components that have been identified in several models ('trans-model/theory' components).

Intention/motivation. Shapiro et al (2006) and Vago et al. (2012) note that intention is an essential component of mindfulness. In other words, what is our motivation for being present moment after moment, "why" do we cultivate mindfulness. Shapiro et al. emphasize the dynamic and evolving nature of intention that leads someone to practice mindfulness. Intention can, for example, start with wishing to get better self-regulation, better self-knowledge, and ultimately, tend to approach a form of freedom.

Awareness/monitoring. Many models identify the dimension of awareness, i.e. the capacity to observe what is present in the moment. For some authors, this is called "monitoring" (Lindsay and Creswell, 2017), "body awareness" (Hölzel et al., 2011), or "mindful attention" (Garland et al., 2015). Being aware enables us to observe the content of consciousness such as sensations, thoughts or emotions and their transient nature. This awareness is an intentional movement that welcomes what is there. The notion of awareness is often considered a base from which regulatory processes operate.

Attention regulation. Attention regulation is the process that is present in all the models. This refers to the ability to maintain focus on a task (sustained attention) while inhibiting distractions and remaining focused (executive function). It involves cognitive processes that control the allocation of attentional resources to relevant stimuli or tasks. During mindfulness practices, one cultivates sustained attention to the present moment (e.g. attention on the breath) while noticing when the mind wanders and bringing the attention back to the present moment.

Attitude/orientation to experience. The practice of mindfulness invites cultivating an open and receptive attitude of non-judgment, acceptance, and self-compassion. This dimension is present in the models proposed by Shapiro et al (2006) and Lindsay et al. (2017). It should be noted that it corresponds also to the second component of the scientific definition of mindfulness (Bishop et al., 2004). A*ttitude is "*how" a person is present in the experience of the moment.

Changing perspective/step aside. Several models mention that the practice of mindfulness allows us to take a step to the side and interrupt our automatic functioning. Shapiro et al. (2006) calls this "reperceiving", Garland et al. (2015) "changing perspective and self-transcendence", Hölzel et al. (2011) "change in perspective on the self", Vago et al. (2012) "non-attachment and de-centering".

According to Shapiro et al. (2006), repercieving is a meta-mechanism of action overarching mechanisms such as self-regulation, values clarification, cognitive, emotional, and behavioral flexibility and exposure.

Self-regulation. The ability to modulate self-processing comprises the regulation of emotions, behaviors, and mental processing (e.g. self-critical rumination). This dimension is almost present in all theoretical models in different ways. Emotion regulation is particularly emphasized in the models supported by neuroscience findings (Hölzel et al., 2011 , Vago and Silbersweig, 2012) as a mechanism of action in mindfulness meditation. Shapiro et al. (2006) mention that intention and attention may facilitate self-regulation and could be a mediating factor for health and Lindsay et al. (2017) suppose that monitoring and acceptance could contribute to self-regulation.

Numerous studies have concretely assessed which mechanisms could mediate the changes observed in connection with participation in a mindfulness-based intervention. Unfortunately, the rigor of the studies does not allow for inter-study comparisons. Nevertheless, several studies have been carried out to synthesize the literature and highlight certain mechanisms, but the conclusions remain partial. For example, the systematic review and meta-analysis of mediation studies (MBSR and MBCT) by Gu et al (2015) identified two mechanisms of action for changes regarding anxiety and depressive symptoms, stress, and negative affect namely “mindfulness” and “repetitive thinking”. In a systematic review of people with physical and/or psychological conditions (MBSR and MBCT), Alsubaie et al., (2017) identified a change in “mindfulness” as a mechanism of action (see comments regarding measuring “mindfulness” in section I.A.2.). Other mechanisms of action such as self-compassion, a change in positive affect, and an effect on cognitive and emotional reactivity have been mentioned as good candidates but require more study before they can be considered as mediators of the effects observed (MacKenzie et al., 2018).

C. Expansion of mindfulness in the field of psychiatry

In the field of psychiatry, mindfulness-based interventions (MBIs) have been developed for various diseases. In the present work, we will focus on bipolar disorders and Attention-Deficit/Hyperactivity Disorder (ADHD). This is an opportunity to consider the steps for the emergence of such interventions.

1. MBCT for bipolar disorder

Bipolar disorders[2] is a severe, complex, and chronic mental health disorder with a lifetime prevalence between 0.6-1.0% for bipolar I and 0.4-1.1% for bipolar II (Merikangas et al., 2011). Bipolar disorder is characterized by recurring episodes of depression, (hypo)mania and mixed states with interepisode remission. However, achieving complete and lasting recovery is not common. Residual symptoms, impaired psychosocial functioning, cognitive deficits, or reduced quality of life often persist. According to the 2018 guidelines for the management of patients with bipolar disorder (Yatham et al., 2018), pharmacological treatment is the preferred option for individuals dealing with bipolar disorder. However, its effectiveness is hindered by challenges like inadequate adherence over the long term, inadequate response, or the emergence of intolerable side effects. To address this, the integration of psychosocial approaches is recommended. Psychoeducation (first-line) and cognitive behavioral therapy (CBT) (second-line), family-focused therapy (FFT) (second-line), interpersonal and social-

[2] According to the Diagnostic and Statistical Manual of Mental disorders (American Psychiatric Association, 2013), there are two main types of **Bipolar Disorder**:

Bipolar I. Most people diagnosed with bipolar I will have episodes of both depression (see footnote 1) and mania though an episode of depression is not necessary for a diagnosis. A manic episode corresponds to a distinct period of abnormally and persistently elevated, expansive, or irritable mood and abnormally and persistently goal-directed behavior or energy, lasting at least 1 week and present most of the day, nearly every day (or any duration if hospitalization is necessary). During the period of mood disturbance and increased energy or activity, three (or more) of the following symptoms inflated self-esteem or grandiosity, decreased need for sleep, more talkative than usual or pressure to keep talking, flight of ideas or subjectively racing thoughts, distractibility, increase in goal-directed activity of psychomotor agitation, excessive involvement in activities with high potential for painful consequences have persisted (four if the mood is only irritable) to a significant degree and represent a noticeable change from usual behavior. The mood disturbance is sufficiently severe to cause marked impairment in social or occupational functioning or to necessitate hospitalization to prevent harm to self or others, or there are psychotic features.

Bipolar II. People diagnosed with bipolar II experience episodes of depression (see footnote 1) and hypomania. A hypomanic episode corresponds to a distinct period of abnormally and persistently elevated, expansive, or irritable mood and abnormally and persistently increased activity or energy, lasting at least 4 consecutive days and present most of the day, nearly every day. During the period of mood disturbance and increased energy or activity, three (or more) of the following symptoms: inflated self-esteem or grandiosity, decreased need for sleep, more talkative than usual or pressure to keep talking, flight of ideas or subjectively racing thoughts, distractibility, increase in goal-directed activity of psychomotor agitation, excessive involvement in activities with high potential for painful consequences have persisted (four if the mood is only irritable), represent a noticeable change from usual behavior, and have been present to a significant degree. The episode is not severe enough to cause marked impairment in social or occupational functioning or to necessitate hospitalization.

rhythm therapy (IPSRT) (third-line), and peer support (third-line) are recommended. To date, MBCT is not yet among the recommendation as there is insufficient evidence (Yatham et al., 2018).

Conclusions regarding the possible benefit of mindfulness for people with bipolar disorder have been held back because people suffering from bipolar disorder were systematically excluded from the studies. Indeed, the scientific community was cautious as they did not know whether meditation could be a risk to promoting a hypomanic or manic phase. Several case reports mentioning a psychotic-manic episode after participating in intensive yoga/meditation sessions (e.g. weekend, retreat) have been published (Chan-Ob and Boonyanaruthee, 1999, Sherrill et al., 2017, Yorston, 2001). In light of these observations, it's only at a later stage that MBCT was offered to patients suffering from bipolar disorder.

The first studies evaluating the effectiveness of MBCT for people suffering from unipolar depressive disorder were published in the early 2000s and gradually studies have included people with bipolar disorder in samples of people with unipolar disorder (Kenny and Williams, 2007, Miklowitz et al., 2009, Williams et al., 2008). The authors of these studies demonstrated a reduction in depressive and anxiety symptoms. A few years later, open, non-randomized, non-controlled feasibility studies involving only people with bipolar disorder were conducted (Mirabel-Sarron et al., 2009, Weber et al., 2010). These studies made minor adaptations to the original 8-week MBCT with mainly the addition of psychoeducative elements related to (hypo)mania. Other authors developed an MBCT protocol with major adaptations to the original MBCT (Deckersbach et al., 2012). Compared to the original MBCT, this protocol added 4 sessions (12 sessions in total), including psychoeducation about depression, anxiety, irritability, and (hypo)mania and the first formal practices are mindful movements instead of body scan. Bodyscans and sitting meditation are introduced afterward and shorter in duration than in the original MBCT. Informal practices as in the original MBCT are proposed early in the program. Three minutes of breathing space (short mindfulness practice) is introduced a bit earlier than in the original MBCT. A main difference with the original MBCT is that the second half of the program emphasized self-compassion, compassion for others, and empathy. Required home practice is shorter than in the original MBCT as are the in session practices.

In 2020, a systematic review and meta-analysis of 3 RCTs and 7 non-RCTs was carried out (Xuan et al., 2020). The authors noted discrepancies between the studies. There was heterogeneity in the symptoms presented by participants at baseline, with some in remission and others presenting residual symptoms, and the MBCT group was most often the standard 8-session program but was twice an adapted MBCT version. Considering the 3 RCTs, two studies included only people with bipolar disorder (Ives-Deliperi et al., 2013, Perich et al., 2013), whereas Williams et al. (2008) also included

people with unipolar and bipolar disorder. The work published by Ives-Deliperi et al. (2013) is primarily a controlled fMRI investigation but also reported an impact of MBCT on “mindfulness”, anxiety, and emotion regulation. Perich et al. (2013) compared participants in an MBCT group with control participants (TAU) with a follow-up of 12 months. The results showed no difference between the MBCT group and the TAU group in terms of relapse rate/recurrence of a thymic episode (depressive or hypo/manic) or in terms of time to relapse. It is important to mention that the analyses were carried out on the intent-to-treat sample, whereas the group of participants who completed the study was quite small (MBCT = 34; TAU = 25). In addition to recurrence and time to relapse, the results of the systematic review and meta-analysis indicate an effect of MBCT on depressive and anxiety symptoms (Xuan et al., 2020). Indeed, pre-post comparisons of the MBCT group show a reduction in these symptoms but no effect was reported on hypomanic symptoms. To date, too few studies with a solid methodology and a large sample size have been carried out. It is too early to reach a definitive conclusion regarding the impact of MBCT on people suffering from bipolar disorder. The protocol of a multicentre randomized controlled trial has recently been published (Hanssen et al., 2019).

Concerning cognitive functioning among people with bipolar disorder, a recent review of the literature highlights that numerous studies have identified deficits both during thymic decompensation episodes and during periods of euthymia (Keramatian et al., 2021). Thus a wide variety of cognitive disorders have been observed, with some people showing moderate deficits or deficits in certain specific cognitive functions and others with no deficits at all. However, deficits in verbal memory and executive functioning are among the most significant in comparison with other cognitive functions. Some clinical variables such as the presence of psychotic symptoms or the use of certain pharmacological treatments (e.g. valproate) could modulate the deficits, but the data in the literature are not yet sufficient to be able to confirm this. The authors of the literature review highlight that it appears that the level of cognitive functioning is predictive of daily functioning and could have an impact on the severity of symptoms (Keramatian et al., 2021). To the best of our knowledge, only two studies including people with bipolar disorder measured the impact of MBCT on cognitive functioning (Ives-Deliperi et al., 2013, Stange et al., 2011). The authors showed improvement in executive functioning and memory (Stange et al., 2011) and better performances in working memory, spatial memory, and verbal fluency (Ives-Deliperi et al., 2013). To date, there is not enough data to conclude whether there is a clear impact of MBCT on cognitive functioning in bipolar disorder.

2. Mindful Awareness Practices program (MAP) and an Adapted MBCT for Attention-Deficit/Hyperactivity Disorder (ADHD)

The development of mindfulness interventions in the field of Attention-Deficit/Hyperactivity Disorder (ADHD) is a good illustration of an extention of MBI for another psychiatric disorder than mood disorders.

Attention-Deficit/Hyperactivity Disorder (ADHD)[3] is a neurodevelopmental disorder with some symptoms being present before the age of 12 years that interfere with functioning or development. The disorder persists in many cases into adulthood (about 65%) with a prevalence of ADHD in adulthood of around 2.5% (Song et al., 2021). The clinical presentation of ADHD is characterized by three core symptoms: a) inattention (e.g. trouble staying focused on tasks, little attention to details, easily distracted, forgetfulness) and/or hyperfocus (hyperconcentration when the subject is of interest to the person or when there are immediate reinforcers - e.g. video games), b) hyperactivity (restlessness or agitation) and c) impulsivity. These core symptoms are compounded by emotional dysregulation (e.g. irritability, frustration, anger) (Hirsch et al., 2018), as well as excessive mind wandering (mental restlessness) and difficulties in behavioral self-regulation (disordered executive

[3] According to the Diagnostic and Statistical Manual of Mental disorders (American Psychiatric Association, 2013), an **Attention-Deficit/Hyperactivity Disorder** (ADHD) is present when a persistent pattern of inattention and/or hyperactivity-impulsivity that interferes with functioning or development is present (Several inattentive or hyperactive-impulsive symptoms were present prior to age 12 years).

Inattention is present when 6 (or more) of the following symptoms have persisted for at least 6 months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic/occupational activities: often fails to give close attention to details or makes careless mistakes, often has difficulty sustaining attention in tasks or play activities, often does not seem to listen when spoken to directly, often does not follow through on instructions and fails to finish schoolwork, chores, or duties in the workplace, often has difficulty organizing tasks and activities, often avoids, dislikes, or is reluctant to engage in tasks that require sustained mental effort, often loses things necessary for tasks or activities, often easily distracted by extraneous stimuli, often forgetful in daily activities.

Hyperactivity and impulsivity are present when 6 (or more) of the following symptoms have persisted for at least 6 months to a degree that is inconsistent with developmental level and that negatively impacts directly on social and academic/occupational activities. Hyperactivity: often fidgets with or taps hands or feet or squirms in seat, often leaves seat in situations when remaining seated is expected, Often runs about or climbs in situations where it is inappropriate, often unable to play or take part in leisure activities quietly, is often “on the go” acting as if “driven by a motor”, often talks excessively. Impulsivity: often blurts out an answer before a question has been completed, often has trouble waiting his/her turn, often interrupts or intrudes on others.

functions – lack of inhibition and poor working memory) (Kooij et al., 2019). The clinical presentations of people with ADHD are particularly heterogeneous, as are the neurobehavioral deficits in domains of sustained attention or vigilance, executive functioning, working memory, and self-regulation.

The European consensus statement on diagnosis and treatment for adult ADHD recommends a multimodal and multidisciplinary approach that includes psychoeducation, pharmacotherapy, and cognitive-behavioral therapy (Kooij et al., 2019). Psychoeducation involves providing information and education about ADHD, its symptoms, and its impact on daily life. It has been shown that psychoeducational groups for adults with ADHD and their significant others improve the quality of their relationships, general life satisfaction, and psychological well-being (Hirvikoski et al., 2017). Regarding pharmacotherapy, the first-line treatment recommendations for adults with ADHD are amphetamines (e.g. lisdexamfetamine or methylphenidate) (Cortese et al., 2018). These are the most effective and best-tolerated treatments for adults. Finally, concerning cognitive-behavioral therapy, the authors of a recent meta-analysis indicate that CBT interventions have a significant effect on ADHD core symptoms (inattention, hyperactivity, and impulsivity) which predicted a reduction of depressive and anxiety symptoms (Liu et al., 2023). CBT has also been shown to have a positive impact on self-esteem and quality of life. In addition to these treatments, the European consensus statement on diagnosis and treatment for adult ADHD mentions that there is some support for MBCT as a potential intervention (Kooij et al., 2019).

As mentioned in the definition of mindfulness (see point I.A.1.), an MBI enables participants to learn to be more aware of attention movements and identify the moments when attention is lost. In consequence on could postulate that an MBI could help people with ADHD to enhance their attentional abilities (attentional stability, improved executive attention such as flexibility and attentional control), improve their emotional self-regulation (improved emotional awareness, reappraisal of negative emotions, decreased reactivity), and behavioral regulation (new response choices and new adaptive behaviors). Moreover, mindfulness practices may also help participants with ADHD to step back (change perspective), develop self-compassion, and help with interpersonal communication. These learnings could help to better handle the symptoms of the disorder such as emotional dysregulation, excessive mind wandering, and difficulties in behavioral self-regulation.

To date, two types of mindfulness-based programs (a specifically developed MBI for ADHD and an adapted MBCT) have been studied in people with ADHD. On the one hand, the group led by Lidia Zylowska (USA) developed the Mindful Awareness Practices program (MAP - Zylowska et al., 2008) that has been inspired by MBSR and MBCT and integrates elements of ACT and ADHD psychosocial approaches. On the other hand, a group of clinicians/researchers led by Anne Speckens (Netherlands)

slightly adapted MBCT. Authors have replaced the psychoeducation sections about depression with psycho-education about ADHD and have also incorporated some elements of the MAP such as the fact that meditation periods are built up more gradually than in MBCT, mindful awareness in daily life is emphasized, mindful listening and speaking. These two interventions differ in the duration of formal practices with practices duration of 5-15 minutes in the MAP and up to 30 minutes in the adapted MBCT (as in the original MBCT). Moreover, the MAP but not the adapted MBCT included appreciation loving-kindness meditation at the end of each session, and in the adapted MBCT but not in the MAP, there is a silent practice day as in the original MBCT. Both interventions propose daily at-home practices. The themes of the sessions in each program are listed in Table 3.

Table 3. Themes of MAP and the adapted MBCT

	MAP	**Adapted MBCT**
Session 1	Introduction to ADHD and Mindfulness: Reframing of ADHD	Automatic pilot
Session 2	Mindful Awareness of ADHD Patterns: What Is My ADHD Like?	Dealing with barriers
Session 3	Mindful Awareness of Sound, Breath, and Body	Mindfulness of the breath
Session 4	Mindful Awareness of Body Sensations	Staying present
Session 5	Mindful Awareness of Thoughts	Allowing and letting be
Session 6	Mindful Awareness of Emotions	Mindful communication
Silent day	NO	YES
Session 7	Mindful Awareness of Presence and Interactions	Taking care of yourself
Session 8	Mindful Awareness as a Life Journey	The rest of your life

Feasibility trials were conducted in 2008 for the MAP on 32 adolescents and adults with ADHD (Zylowska et al., 2008) and in 2014 for the adapted MBCT on 11 adults with ADHD (Hepark et al., 2014). The results of this latter work were only published in Dutch and a larger feasibility study was published recently on 31 adults with ADHD (Janssen et al., 2020). These trials showed that the intervention was feasible and highlighted the need to further examine the effectiveness of MBIs with RCTs. Since these first trials, several studies evaluating the impact of MBIs with adult ADHD have been conducted. Several meta-analyses or literature reviews have been published these recent years. Xue et al. (2019) included 11 studies and aimed to explore the effect of MBIs, compared to controls, on ADHD core symptoms (mainly measured with CAARS – Connors' Adult ADHD rating scale and ASRS – Adult ADHD Self-Report Scale). Authors evidenced a large effect size suggesting that MBIs significantly reduce core

symptoms compared to a control group. Results showed that the effect was larger on inattention than hyperactivity/impulsivity. Authors remain cautious as there is heterogeneity across the included studies (e.g. type of control group, type of MBI, age of the participants). Another systematic review looked at the efficacy of MBIs in ADHD beyond ADHD's core symptoms (Poissant et al., 2019). The results showed that MBIs increased mindfulness skills, self-compassion, and positive mental health. These benefits were maintained for up to 6 months. As mentioned by Xue et al., and Poissant et al. the quality of the studies was variable with many studies presenting potential bias. Finally, Oliva et al. (2021) did a review to evaluate the efficacy of MBIs in ADHD core symptoms but took also into account the features associated with the diagnosis. Their meta-analysis included 10 studies. As previous systematic reviews and meta-analyses, Oliva et al. confirmed the effect of MBIs on ADHD core symptoms. When subgroup analyses were performed, MBIs had a small advantage compared to active control groups (e.g. psychoeducation, skills training) on attentional symptoms but not on hyperactivity/impulsivity symptoms. Given the few studies included, these results have to be confirmed in the future. Results also evidenced that people with ADHD participating in MBIs increase mindfulness skills but only if participants are compared to an inactive control group.

Some studies measured cognitive functions such as attention or executive functioning before and after an MBI in adults with ADHD. To date, there are not enough studies using the same cognitive functioning task or the same kind of control condition to enable meta-analyses (Kretschmer et al., 2022). The most used task is the Attention Network Test which enables measuring alerting, orienting, and executive control. Results show no impact on alerting and orienting whereas there seems to be a change in executive control but this change is not specific to MBI. Data from the Continuous Performance Task that enable measuring sustained and selective attention seem to go in the direction of a reduction in motor impulsivity (fewer commission errors – giving a response where none was expected). Executive functioning was measured with different tasks. Results suggest that MBI has a positive impact on executive functioning. A benefit of MBI on executive/cognitive functioning has also been evidenced in the systematic review done by Poissant et al. (2019). Nevertheless, further studies are needed to be able to conclude clearly about the effect of MBI on cognitive functioning.

II. Collection of publications

Article 1

Jermann, F., Van der Linden, M., Gex-Fabry, M., Guarin, A., Kosel, M., Bertschy, G., Aubry, J.-M., Bondolfi, G. (2013). Cognitive Functioning in Patients Remitted from Recurrent Depression: Comparison with Acutely Depressed Patients and Controls and Follow-up of a Mindfulness-Based Cognitive Therapy Trial. *Cognitive Therapy and Research, 37(5),* 1004-1014.

This study was part of an RCT study designed to evaluate the efficacy of MBCT in preventing depressive relapse (Bondolfi et al., 2010). The originality of this work is that it is both a cross-sectional and longitudinal study. We compared the cognitive functioning of people in remission from at least three depressive episodes (n=36) with people in depression (n=20) and control participants (n=20). People in remission participated in an MBCT+TAU group (n=18) or TAU alone (n=18) and their cognitive functioning was also measured after 3 and 9 months. Cognitive functioning was assessed using tasks (autobiographical memory, executive functioning) and questionnaires (rumination, dysfunctional attitudes, attention/awareness).

The results show that people in remission displayed a cognitive functioning similar to control participants for autobiographical memory, executive functioning, and attention/awareness. They had however more dysfunctional attitudes, ruminative habits, and depressive symptoms. Levels of dysfunctional attitudes were similar to those of acutely depressed people. Changes with MBCT+TAU compared to TAU were only present for dysfunctional attitudes and these decreased after 3 months and even more after 9 months.

Take home message: MBCT+TAU has an impact on dysfunctional attitudes. One hypothesis is that the MBCT group enables people to recognize this type of thinking and disidentify and disengage from it.

Cogn Ther Res (2013) 37:1004–1014
DOI 10.1007/s10608-013-9544-1

ORIGINAL ARTICLE

Cognitive Functioning in Patients Remitted from Recurrent Depression: Comparison with Acutely Depressed Patients and Controls and Follow-up of a Mindfulness-Based Cognitive Therapy Trial

F. Jermann · M. Van der Linden · M. Gex-Fabry · A. Guarin · M. Kosel · G. Bertschy · J. -M. Aubry · G. Bondolfi

Published online: 9 May 2013

Abstract Mindfulness-Based Cognitive Therapy (MBCT) is a promising intervention to prevent depressive relapse. Yet beyond efficacy studies, little is known regarding the mechanisms that could be modified through MBCT. Objectives of the present study were twofold: determine whether cognitive functioning was altered among patients remitted from depression at admission in a MBCT trial; and document possible changes during the trial and follow-up. In a cross-sectional perspective, cognitive functioning (autobiographical memory, shifting capacities, dysfunctional attitudes, mindful attention awareness and rumination habits) was first compared between 36 patients remitted from depression, 20 acutely depressed patients and 20 control participants. In a longitudinal perspective, changes in the remitted sample were explored during a MBCT plus Treatment As Usual versus Treatment As Usual randomized controlled trial and 9-month follow-up. Performances of remitted patients were similar to the ones of control participants for autobiographical memories, shifting capacities, and mindful attention awareness, whereas levels of rumination and dysfunctional attitudes were significantly elevated. Participation in the MBCT program was accompanied with a significant decrease of dysfunctional attitudes that continued up to 9-month postintervention. No other change was observed that was specific to MBCT. Results suggest that MBCT might help people to identify dysfunctional attitudes at a very early stage and to avoid engaging further in these attitudes.

Keywords Mindfulness · Depression · Remission · Cognitive functioning

F. Jermann (✉) · M. Gex-Fabry · A. Guarin · M. Kosel · J.-M. Aubry · G. Bondolfi
Department of Mental Health and Psychiatry, Geneva University Hospital, rue de Lausanne 20, 1201 Geneva, Switzerland
e-mail: Francoise.Jermann@hcuge.ch

M. Van der Linden
Cognitive Psychopathology and Neuropsychology Unit, University of Geneva, Geneva, Switzerland

G. Bertschy
Department of Psychiatry and Mental Health, INSERM U 666, Strasbourg University Hospital, Strasbourg, France

Introduction

Ten years ago, Mindfulness-Based Cognitive Therapy (MBCT; Segal et al. 2002a) was developed to prevent depressive relapse. Since then, four randomized controlled trials (RCT) have compared MBCT + TAU (Treatment As Usual) to TAU only (Bondolfi et al. 2010; Godfrin and van Heeringen 2010; Ma and Teasdale 2004; Teasdale et al. 2000). A recent meta-analysis of these studies (Chiesa and Serretti 2011) concluded that 32 % of patients with 3 or more past depressive episodes relapsed in the 12 months following MBCT compared to 60 % of patients with TAU only. All four studies demonstrated that MBCT significantly delayed relapse compared to TAU. Other studies showed that MBCT leads to relapse/recurrence rates that are comparable to those of patients with maintenance antidepressant medication, suggesting that MBCT could be an alternative to pharmacotherapy (Kuyken et al. 2008; Segal et al. 2010).

Beyond the need to establish the efficacy of a new treatment, the psychological and cognitive mechanisms that may be modified by mindfulness treatments or account for observed benefits require clarification (e. g. Bishop et al. 2004; Grossman et al. 2004). Better identifying

mechanisms of action could help to adapt existing interventions (e.g. increasing or decreasing the time allocated to mindfulness practices). One of the known impacts of Mindfulness-Based Therapies is their positive effect on anxiety and depressive symptomatology (see Hofmann et al. 2010 for a meta-analysis). Moreover, practicing mindfulness may have an impact on the regulation of attention. This could happen through meditation exercises during which meditators repeatedly train to focus their attention for a prolonged period on specific aspects such as breathing (sustained attention). When they notice that their mind is wandering (monitoring faculties), they observe this happening without elaborating the encountered content (inhibition capacities) and bring their attention back to their focus point (shifting abilities). In a recent literature review, Chiesa et al. (2011) showed that better attentional performances are observed in people with extensive experience of mindfulness practice (e.g. experienced Buddhist meditation practitioners) and that practicing mindfulness meditation entails significant long-term benefits for most attentional aspects (sustained, selective and executive attention).

Only few behavioural studies explored the longitudinal impact of mindfulness training (e.g. mindfulness retreat, Mindfulness-Based Stress Reduction program – MBSR) on cognitive functioning and results are mixed. For example, Chambers et al. (2008) showed a significant increase in sustained attention for participants in a 10-day retreat compared to controls, whereas Anderson et al. (2007) did not evidence attentional changes (sustained, selective attention or shifting abilities) in participants in a 8-week MBSR program compared to controls. Recently, several neuroscientific studies showed that mindfulness training causes structural and functional changes in brain structures that could be related to attentional processing (e.g. anterior cingulate cortex) (see Hölzel et al. 2011 for a review).

Regarding the acute phase of depression, it has often been reported that patients present a wide range of cognitive dysfunctions in domains such as attention, memory and executive functions. More specifically in relation to the aspects explored in the present article, literature consistently demonstrates that depressed patients show overgeneral autobiographical memories recall deficit (see Williams et al. 2007 for a review), impaired shifting abilities (Murphy et al. 1999), elevated dysfunctional attitudes which are rigid maladaptive schemes (Beck 1967), and increased rumination habits that correspond to repeatedly focusing on symptoms, causes and consequences of sad mood (Nolen-Hoeksema 1991).

Concerning patients in remission, the literature is less extensive than for acutely depressed patients and results are often less unanimous. However, regarding the specific cognitive functions addressed in the present study, studies have shown that patients in remission present an overgeneral autobiographical memory recall deficit (Williams et al. 2007). Moreover, it has consistently been shown that dysfunctional attitudes and ruminative habits could be cognitive vulnerability factors to relapse in remitted patients (Segal et al. 2006; Teasdale 1988).

To date, little is known about whether a therapy like MBCT could impact on cognitive functioning in patients remitted from depression. Williams et al. (2000) showed that MBCT participants recalled more specific autobiographical memories after the programme than before, compared to TAU participants. They postulated that MBCT may have an impact on autobiographical memory by training participants to be attentive to specific aspects of their environment (making encoding more specific may make retrieval more specific) and encouraging them to allow mental content to occur without avoiding it (reducing functional avoidance). MBCT participants also learn to respond differently to possible rumination episodes, which may also affect autobiographical memory. Recently, Hargus et al. (2010) have explored suicidal depressed patients' memories and found that at post-assessment, MBCT patients recalled more specific memories of the warning signs of their suicidal crises and showed more meta-awareness (capacity to distinguish the self from the content of thoughts and emotions) than TAU participants. Altogether, these results seem to indicate that MBCT has an impact on autobiographical memory. Studies investigating the influence of MBCT on other cognitive capacities, such as attention or executive functioning, have been rare. Recently, Bostanov et al. (2012) showed, with an event-related brain potential technique, that remitted patients who took part in MBCT increased their concentration abilities compared to a waiting list group. In a study examining a form of mindfulness training derived from MBCT for healthy participants, Heeren et al. (2009) found no improvement after MBCT for various tasks measuring executive functioning (inhibition, flexibility) compared to non-MBCT participants. Finally, recent studies have shown that depressive symptomatology decreases over time in MBCT participants (Godfrin and van Heeringen 2010; Kuyken et al. 2008; Michalak et al. 2008), whereas mindfulness capacities increase (Michalak et al. 2008) and quality of life improves (Godfrin and van Heeringen 2010; Kuyken et al. 2008).

The general objectives of the present study were two-fold: determine whether cognitive functioning was actually altered among patients remitted from depression, in a cross-sectional perspective, and investigate the possible impact of MBCT on these functions, in a longitudinal perspective. More specifically, we hypothesized that mindfulness meditation would increase a particular aspect of attention, namely shifting abilities that correspond to the

capacity to engage and disengage one's attention. It was expected that mindfulness practices would lead participants to be more frequently aware of the present moment in their daily life. It was postulated that new ways of dealing with thoughts and emotions would render autobiographical memories recall less general, and diminish dysfunctional attitudes and ruminative habits. As participants entering the MBCT trial were in remission, no effect was expected on depression severity.

The present study was designed as part of a RCT that compared the efficacy of MBCT + TAU and TAU for relapse prevention in patients remitted from recurrent depression. Cognitive functions were first measured in remitted patients at inclusion in the MBCT trial (baseline measures) and compared with the ones of acutely depressed patients and controls. The impact of MBCT was then explored in remitted participants who entered the trial and were assessed again after 3 and 9 months.

Method

Participants

Remitted Participants in the MBCT Trial

Sixty remitted patients (17 men) with at least three past depressive episodes participated in the MBCT efficacy trial (Bondolfi et al. 2010). Inclusion criteria were: history of recurrent major depression according to DSM-IV (Diagnostic and Statistical Manual of Mental Disorders; American Psychiatric Association 1994), assessed with the Structured Clinical Interview for DSM-IV (First et al. 1996); remission at the time of inclusion (Montgomery-Asberg Depression Rating Scale score $\leq$13—MADRS; Montgomery and Asberg 1979); and off antidepressant medication. Exclusion criteria were: history of schizophrenia or schizoaffective disorder, current substance abuse, eating disorder, obsessive compulsive disorder, organic mental disorder, pervasive developmental disorder, borderline personality disorder or dysthymia with onset before age 20. Twenty-nine patients were randomly allocated to TAU and thirty-one patients were allocated to MBCT plus TAU. The research team was blind to group assignment.

Study flow chart, as well as detailed information about power analysis, MBCT program and study procedures have been provided in our earlier publication (Bondolfi et al. 2010). Briefly, MBCT participants attended 8 weekly 2-h sessions and TAU participants had unrestricted access to any type of treatment or help service. Instructors were four senior CBT psychotherapists all having undergone at least one training program taught and supervised by one of the developers of MBCT (Z. Segal). Instructors' adherence to the MBCT protocol was evaluated with the MBCT adherence scale (MBCT-AS; Segal et al. 2002b) and was shown to be high (see Bondolfi et al. 2010 for more details). Patient attendance rates were high and MBCT participants practiced mindfulness exercises regularly (see Bondolfi et al. 2010 for more details).

Patients were monitored for relapse during the 8-week intervention and 1-year follow-up. Five participants dropped out during the study (3 patients participated in less than 4 MBCT sessions; 2 patients decided to withdraw after 3 and 5 months, respectively). The occurrence of relapse or recurrence meeting DSM-IV criteria for major depressive episode was assessed with the depression module of the Structured Clinical Interview for DSM-IV (First et al. 1996). Relapse/recurrence was confirmed by a senior psychiatrist listening to the audiotaped assessments. During the trial, relapse rates were 29 % in the MBCT + TAU group (n = 9/31) and 34 % in the TAU group (n = 10/29) (see Bondolfi et al. 2010 for more details). All participants who relapsed (n = 19) were excluded from the investigation because relapse would have been a confounder when investigating change in cognitive functioning in relation with MBCT participation. On the one hand, time to relapse differed in the MBCT + TAU and TAU groups (see Bondolfi et al. 2010). On the other hand, re-occurrence of a depressive episode was expected to directly influence cognitive measures. The final sample thus included 36 remitted patients (n = 18 MBCT + TAU, 6 men; n = 18 TAU, 5 men; mean number of past episodes was 4.5, SD 2.2). See remitted sample characteristics in Table 1. Mean age in the MBCT + TAU group was 45.4 years (SD 11.6) and mean number of years of education was 15.6 (SD 3.8); mean age in the TAU group was 48.2 (SD 9.4) and mean number of years of education was 15.1 (SD 3.0).

Depressed Participants

Twenty acutely depressed patients (5 men) were recruited in an adult university psychiatric out-patient clinic specialized in the treatment of depression (Depression Program). All patients were diagnosed by experienced psychiatrists during routine clinical treatment for major depressive episodes according to DSM-IV criteria. Exclusion criteria were bipolar disorder, ongoing substance abuse and/or a neurological problem that would impair cognitive functioning. None of the patients were in remission. Mean number of past episodes was 2.4 (SD 2.2), with less than 3 episodes in 70 % of the sample. All patients except one were taking antidepressant medication at the time of testing (4 with SSRIs [selective serotonin reuptake inhibitor], 6 with SNRIs [serotonin-norepinephrine reuptake inhibitor], 3 with TCAs [tricyclic antidepressant], 1 with a MAOI [monoamine

Table 1 Cross-sectional comparison of acutely depressed patients, patients remitted from depression and never depressed controls with respect to age, years of education, cognitive tasks and questionnaires

	Depressed (n = 20)		Remitted (n = 36)		Controls (n = 20)		One-way ANOVA	
	Mean	SD	Mean	SD	Mean	SD	F(2,73)	*p* value
Sample characteristics								
Age	46.1	8.3	46.8	10.5	45.9	8.8	0.08	0.93
Years of education	12.6	5.0	15.4	3.4	14.0	3.4	3.5	0.036
Cognitive tasks								
Autobiographical memory test (AMT; proportion of memories)								
Categoric	0.34	0.23	0.19	0.17	0.17	0.19	5.2	0.007
Specific	0.62	0.22	0.74	0.17	0.76	0.20	3.3	0.042
Plus-minus task (PM)								
Shift cost (%)	63.0	58.3	20.1	13.7	30.7	27.4	10.3	<0.001
Questionnaires								
MADRS	25.8	4.4	4.6	4.4	0.5	0.8	266.9	<0.001
BDI-II	34.7	12.2	8.4	8.5	2.7	2.7	82.1	<0.001
MAAS	50.8	13.7	66.7	11.2	71.3	9.1	18.5	<0.001
DAS	130.7	40.4	115.6	30.9	98.5	17.1	5.3	0.007
RRQ								
Rumination	46.3	5.5	37.6	8.7	30.6	7.4	21.2	<0.001
Reflection	35.9	8.8	44.6	7.9	40.0	8.7	7.3	0.001

oxidase inhibitor], 1 with a combination of NSM [norepinephrine-serotonin modulator] and TCA, 2 with a combination of NSM and SNRI, 1 with a combination of MAOI and TCA and 1 with a combination of TCA and mood stabilizer). Five patients were taking benzodiazepines, 3 patients had antipsychotic medication (prescribed to reduce anxiety) and 5 patients were on both kinds of drugs.

Never-Depressed Control Participants

Twenty comparison participants (5 men) were recruited in the same cultural community by word of mouth in order to match depressed participants in terms of gender, age and education. They had never previously suffered from clinical depression according to DSM-IV criteria and had no prior neurological impairment or history of substance abuse as assessed by a clinical psychologist during an interview.

Characteristics of patients and controls in the 3 groups are provided in Table 1. There were no differences for age (see Table 1) and gender ($X^2 = 0.29$; $p = 0.86$). Remitted participants had a significantly longer education than depressed patients (Fisher's LSD post hoc test, $p < 0.05$), but there was no difference between remitted and control participants ($p = 0.19$) and between depressed and control participants ($p = 0.26$). As expected from the study design, remitted participants had experienced more depressive episodes than acutely depressed patients ($t(54) = 3.4$; $p < 0.01$).

Tasks

Plus-Minus (PM—adapted from Jersild 1927 and Spector and Biederman 1976)

The PM task was used to evaluate shifting abilities. Its reliability and validity have been demonstrated in clinical samples (e.g. ecstasy-polydrug users—Montgomery et al. 2005) and non-clinical participants (Miyake et al. 2000). Participants were given a sheet of paper with three lists of 30 two-digit numbers (numbers 10–99). On the first list, participants were instructed to add 7 to each number and write down their answers. On the second list, they were instructed to subtract 7 from each number. On the third list, participants had to alternate between adding 7 and subtracting 7. Participants were instructed to complete each list quickly and accurately. Times for completion were measured in seconds with a stopwatch and errors were counted. The cost of shifting was calculated as a percentage, i.e. the time needed to complete the alternating list divided by the mean time needed to complete the addition and subtraction lists.

Autobiographical Memory Test (AMT—Williams and Broadbent 1986)

Each participant was given 12 cue words one at a time: six cue words were positive (e.g. happy, relaxed) and six cue words were negative (e.g. hopeless, sad). Three sets of 6 positive and 6 negative words were compiled so that the sets could be counterbalanced across participants. Each set was matched for word frequency and level of arousal. For each cue word, participants were asked to recall a specific autobiographical memory, i.e. something that happened once in a particular place at a particular time and lasted no longer than 24 h. Responses were scored according to the following categories: a) the memory was categoric (happened more than once); b) the memory was extended (happened once but lasted more than 24 h); c) the memory was specific; d) no memory. The proportions of categoric, extended and specific memories were computed for responses triggered by positive and negative cue words. As proportion of extended memories were low (means <0.08), these were not submitted to statistical analyses. All memories were audiotaped and scored by two raters. Inter-rater reliability was good (kappa = 0.71, based on scoring 720 memories) and raters resolved discrepancies through discussion.

Questionnaires

Montgomery-Asberg Depression Rating Scale (MADRS—Montgomery and Asberg 1979)

The MADRS is a widely used clinician rated depression rating scale. Ten items are rated from 0 to 6. Total score ranges from 0 to 60 with higher score representing more severe depressive symptoms. The French version used in this study was translated by Pellet et al. (1980).

Beck Depression Inventory II (BDI-II—Beck et al. 1996)

The BDI-II is a widely used self-report inventory for assessing the severity of depressive symptoms. Twenty-one items are rated on a 4-point Likert scale (range 0–3). Total score ranges from 0 to 63, with higher score representing more severe depressive symptoms. The French version used in this study was developed by the Editions du Centre de Psychologie Appliquée (Beck et al. 1998) and has shown strong reliability and validity in both clinical (depressed) and non-clinical samples.

Mindful Attention Awareness Scale (MAAS—Brown and Ryan 2003)

The MAAS is a 15-item scale that measures the tendency to be attentive and aware of present moment experience in daily life in people who have no specific experience with mindfulness meditation. Items are rated on a 6-point Likert scale ranging from 1 (almost always) to 6 (almost never). Total score ranges from 15 to 90 with higher score representing more present attention and awareness. The English version was developed among non-clinical adults. The French version was validated in a non-clinical adult sample by Jermann et al. (2009). Internal consistency of the French MAAS was good (Cronbach's alpha 0.84).

Dysfunctional Attitude Scale (DAS—Weissman and Beck 1978)

The DAS measures the dysfunctional beliefs that are often related to depression. Forty items are rated on a 7-point Likert scale (range 1–7). Total score ranges from 40 to 280 with higher score representing more dysfunctional attitudes. The French version was established by Bouvard et al. (1994). Internal consistency of the French DAS was good (Cronbach's alpha 0.79 for depressed patients and 0.86 for control participants).

Rumination/Reflection Questionnaire (RRQ—Trapnell and Campbell 1999)

The RRQ measures two aspects: rumination (recurrent negative thoughts about self, but without reference to depressed mood) and self-reflection (positive thoughts about self motivated by intellectual curiosity rather than distress). Items are rated on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Scores range from 12 to 60 for each subscale with higher scores corresponding to higher tendencies for rumination or self-reflection. The English version was developed in student samples. The French version was validated by Jermann et al. (2010) in a sample of young adults. Internal consistency of the French RRQ was good to excellent (Cronbach's alpha 0.87 for rumination and 0.92 for self-reflection).

Procedure

All participants were evaluated with the same tasks and order of questionnaires. Evaluations started with the MADRS, followed by the AMT, RRQ, PM, DAS and MAAS. At the end of the evaluation, participants completed the BDI-II. Depressed and control participants were evaluated on a single occasion. Remitted patients who entered the MBCT trial were evaluated on three occasions: at baseline (T1), after 3 months (T2, 90 ± 14 days) and 9 months (T3, 278 ± 20 days).

The study protocol and informed consent form received approval from the ethics committee of the Geneva University Hospitals. All participants signed the consent form

before the evaluation started. They received a financial compensation of CHF 50.- (about 50 USD) for their participation.

Statistical Analysis

One-way analysis of variance (ANOVA) was used to test for differences between the 3 groups, without and with adjustment for education level. Significant differences were further investigated with Fisher's LSD post hoc tests. Change over time was analysed with repeated measures ANOVA, which considered group (MBCT + TAU vs. TAU), time (T1 to T3) and time by group interaction. Associations between number of past depressive episodes and outcome variables were tested with the Spearman rank-order correlation coefficient.

Results

Cross-Sectional Assessment: Remitted versus Acutely Depressed and Control Participants

Means and standard-deviations (SD) of all cognitive measures and questionnaires are shown in Table 1.

Severity of Depressive Symptoms and Rumination

As expected, significant differences between groups were observed for the MADRS, BDI-II and RRQ (Table 1).

Regarding depressive symptomatology, post hoc tests showed that remitted patients displayed significantly lower scores than depressed patients (Fisher's LSD post hoc test, $p < 0.001$ for the MADRS; $p < 0.001$ for the BDI-II), but higher scores than control participants (MADRS, $p < 0.001$; BDI-II, $p < 0.05$).

On the rumination subscale of the RRQ, remitted patients similarly displayed lower scores than acutely depressed patients ($p < 0.001$) but higher scores than control participants ($p < 0.01$). On the reflection subscale, however, remitted patients displayed higher scores than depressed patients ($p < 0.001$) and control participants ($p = 0.05$), with no significant difference between the latter two groups ($p = 0.12$).

Mindfulness and Dysfunctional Attitudes

One-way ANOVAs showed significant differences for the MAAS and DAS (Table 1).

Both remitted patients and control participants displayed higher scores of mindful attention/awareness in daily life than acutely depressed patients (Fisher's LSD post hoc test, $p < 0.001$). No significant difference was observed between remitted and control participants ($p = 0.16$).

Regarding dysfunctional attitudes, remitted and depressed patients did not significantly differ ($p = 0.09$). Both remitted patients ($p = 0.05$) and acutely depressed patients ($p < 0.01$) had more dysfunctional attitudes than control participants.

Cognitive Tasks: Autobiographical Memory and Shifting Abilities

Groups significantly differed with respect to the AMT proportions of categoric and specific memories and shift cost in the Plus-Minus task (Table 1).

Regarding autobiographical memory, both remitted patients and control participants recalled less categoric memories (Fisher's LSD post hoc test, $p < 0.01$ and $p < 0.01$, respectively) but more specific memories ($p < 0.05$ and $p < 0.05$, respectively) than depressed patients. Remitted patients did not show a significant autobiographical memory deficit compared with control participants (categoric memories $p = 0.78$; specific memories $p = 0.72$).

In the PM task, remitted patients ($p < 0.001$) and control participants ($p < 0.01$) presented less shift cost than depressed patients. Executive capacity of shifting was not significantly impaired in remitted patients, as compared to control participants ($p = 0.27$).

Effects of Education and Number of Past Depressive Episodes

Because groups significantly differed with respect to education, statistical analyses were repeated after adjustment for years of education. All group differences in Table 1 remained statistically significant, except for the AMT proportion of specific memories ($p = 0.11$).

As number of past depressive episodes was significantly higher in remitted participants than in acutely depressed patients, we explored associations between number of episodes and MADRS, BDI-II, RRQ, MAAS, DAS, AMT proportions of categoric and specific memories, and shift cost in the Plus-Minus task. In either remitted or acutely depressed patients, no significant correlation was observed.

Longitudinal Assessment During MBCT Trial and Follow-up

Means and standard-deviations (SD) of all cognitive measures and questionnaires at baseline, 3 and 9-month follow-up are shown in Table 2.

Table 2 Time course of cognitive tasks and questionnaires for 36 participants in a 8-week MBCT + TAU versus TAU trial

Tasks and questionnaires		Time 1 baseline		Time 2 after 3 months		Time 3 after 9 months		Repeated measures ANOVAs					
		Mean	SD	Mean	SD	Mean	SD	Time F(2,68)	p value (η_p^2)	Group F(1,34)	p value (η_p^2)	Interaction F(2,68)	p value (η_p^2)
Autobiographical memory test (AMT; proportion of memories)													
Categoric	MBCT + TAU	0.15	0.15	0.20	0.21	0.17	0.14	0.43	0.66	0.07	0.80	1.00	0.37
	TAU	0.22	0.19	0.18	0.15	0.15	0.19		(0.01)		(0.002)		(0.03)
Specific	MBCT + TAU	0.78	0.15	0.74	0.22	0.76	0.17	0.66	0.52	0.02	0.89	1.53	0.22
	TAU	0.70	0.19	0.76	0.18	0.80	0.25		(0.02)		(0.001)		(0.04)
Plus-minus task (PM)													
Shifting cost (%)	MBCT + TAU	18.2	12.7	21.8	14.2	21.0	12.7	0.70	0.50	0.20	0.66	2.08	0.13
	TAU	21.8	13.3	13.6	17.8	21.5	9.7		(0.02)		(< 0.01)		(0.06)
MADRS	MBCT + TAU	5.4	4.8	5.7	4.9	5.2	5.7	0.87	0.42	4.39	0.04	0.34	0.71
	TAU	3.8	4.0	4.0	5.8	2.0	2.3		(0.03)		(0.11)		(0.01)
BDI-II	MBCT + TAU	9.8	9.8	9.3	6.2	6.7	6.6	4.45	0.02	4.07	0.05	0.14	0.87
	TAU	6.9	6.9	5.7	8.1	2.4	2.9		(0.12)		(0.11)		(< 0.01)
MAAS	MBCT + TAU	63.5	10.5	63.9	9.5	63.9	9.3	0.01	0.99	4.06	0.05	0.04	0.97
	TAU	69.9	11.2	69.7	9.7	69.8	10.8		(< 0.001)		(0.11)		(< 0.01)
DAS	MBCT + TAU[a]	123.3	36.4	105.7	30.2	93.6	30.8	12.4	<0.001	0.01	0.93	5.05	0.01
	TAU	110.6	24.5	105.6	25.8	104.1	26.0		(0.28)		(< 0.001)		(0.14)
RRQ													
Rumination	MBCT + TAU	41.2	5.4	36.2	9.5	34.9	7.7	4.53	0.01	4.88	0.03	0.66	0.52
	TAU	34.0	9.9	31.9	11.0	31.1	8.7		(0.12)		(0.13)		(0.02)
Reflection	MBCT + TAU	45.0	8.9	41.6	10.2	42.4	9.8	5.12	0.01	0.04	0.84	2.93	0.06
	TAU	44.3	7.1	44.3	7.1	42.0	7.8		(0.13)		(0.001)		(0.08)

[a] Missing data for one participant at time 1 and one participant at time 3

Severity of Depressive Symptoms and Rumination

Regarding the clinician-rated MADRS, ANOVA results indicated a significant group effect, with higher depression severity in the MBCT + TAU than TAU group. No time effect or time by group interaction was detected (Table 2). For the self-rated BDI-II, a trend toward higher severity in the MBCT + TAU group was also found. Depression severity decreased significantly over time, but no time by group interaction was observed (Table 2).

For the RRQ, MBCT + TAU participants had higher rumination scores than TAU participants. Both groups showed fewer rumination and reflection habits over time (Table 2), with no significant time by group interaction for rumination, and a trend toward different time courses according to group for reflection.

Mindfulness and Dysfunctional Attitudes

Regarding attention/awareness of the present moment, a trend toward a group effect was observed (Table 2), with MBCT + TAU participants showing lower MAAS scores than TAU participants. No significant time or time by group interaction was detected.

For dysfunctional attitudes, a significant time effect and time by group interaction were observed, in the absence of a main group effect (Table 2). Planned comparisons showed that DAS scores decreased from Time 1 to Time 2 ($t(16) = 2.91$; $p < 0.05$) and from Time 2 to Time 3 ($t(16) = 2.59$; $p < 0.05$) in the MBCT + TAU group. No significant change over time occurred in the TAU group. Groups did not significantly differ with respect to baseline DAS score ($t(33) = 0.99$; $p = 0.33$).

Cognitive Tasks: Autobiographical Memory and Shifting Abilities

No significant time, group or time by group interaction was observed for categoric memories, specific memories and PM task (Table 2).

Discussion

Studies that evaluate cognitive changes following MBCT and compare performances of remitted, acutely depressed and control participants have been scarce. The present study considered cognitive functioning, as examined with tasks (autobiographical memories, shifting), and questionnaires (rumination, dysfunctional attitudes, frequency of attention/awareness), both in cross-sectional and longitudinal perspectives. Patients in remission from chronic depression (at least 3 previous episodes) at inclusion in a MBCT + TAU vs. TAU trial displayed cognitive functioning similar to that of control participants for several aspects, such as autobiographical memories, shifting capacities and mindful attention/awareness. They differed from controls, however, by having more dysfunctional attitudes, rumination habits and depressive symptoms. Compared with acutely depressed patients, remitted patients had similar levels of dysfunctional attitudes, although they recalled fewer overgeneral memories, showed better shifting capacities, displayed fewer depressive symptoms, fewer rumination habits and more mindful attention/awareness in daily life. Interestingly, they scored higher on the reflection subscale, possibly in relation with a high motivation to enter the trial.

The influence of MBCT was explored over the 2-month intervention and 9-month follow-up. Whereas a significant decrease was observed for self-rated symptoms (BDI-II), depression severity, as measured with the MADRS, remained stable over time, with scores in the range expected for remitted patients with 1 or 2 mild symptoms, or without symptom but still considering that they are not back to their normal selves (Zimmerman et al. 2004). Shifting abilities and autobiographical memory did not change over time, whether in the MBCT + TAU or TAU groups. There was no evidence that MBCT had any specific impact on ruminative habits (RRQ) and attention-awareness to the present moment (MAAS). This latter result should be interpreted in the light of ongoing discussions about the validity of instruments used to assess mindfulness. As mentioned by Grossman (2011), the MAAS might present limitations in terms of validity and sensitivity to change, in addition to difficulties in semantic interpretation of the items and possible response bias related to experience with mindfulness practice.

Specific change with MBCT was detected on a single aspect of cognitive functioning, namely dysfunctional attitudes, which were significantly higher in remitted and acutely depressed patients than in controls. Level of dysfunctional attitudes (DAS) significantly decreased during the intervention and continued decreasing up to 9 months after starting the MBCT program. Decreased dysfunctional attitudes and unchanged rumination in the present study are in contrast with Ramel et al. (2004), who showed reduced rumination but no change in dysfunctional attitudes after MBSR. Differences between interventions could account for discrepant results. MBCT is a program specifically tailored for previously depressed patients to help them identify thought contents that are often present in depressive states (automatic thoughts). MBSR is a more general stress management intervention that does not explicitly focus on thoughts associated with depression and might not allow participants to dis-identify with them. Many studies have questioned the stability of dysfunctional attitudes during the course of depression. Most of them showed a state dependence of DAS scores (e.g. Ingram et al. 1998; Zuroff et al.

1999), but some did not (e.g. Beevers and Miller 2004; Peselow et al. 1990; Zuroff et al. 1999). To account for inconsistent results, Zuroff et al. (1999) proposed a state-trait vulnerability model, in which vulnerable people present a greater availability of dysfunctional attitudes (traits) that are more or less accessible depending on the severity of depressive symptoms (state). The present study suggests that availability of dysfunctional attitudes might be similar in remitted and depressed patients, with remitted patients particularly vulnerable to relapse when low mood triggers these beliefs and makes them more accessible. MBCT meditation practices may help people identify such thoughts (availability) at a very early stage and observe them without engaging with them (decreased accessibility).

The present study also shed some light on the MBCT efficacy trial, from which the remitted sample was part (Bondolfi et al. 2010). Whereas MBCT + TAU significantly delayed the time to relapse compared with TAU alone, both groups relapsed at similar rates over the 1-year follow-up. When compared to other studies (Bishop et al. 2004; Godfrin and van Heeringen 2010; Teasdale et al. 2000), socio-demographic characteristics and depressive history of patients in Bondolfi et al. (2010) were quite similar. However, none of the three previous efficacy studies explored cognitive functioning. The hypothesis that MBCT might be particularly efficient for people presenting cognitive deficits remains to be addressed.

Limitations and Future Studies

The present investigation presents limitations that should be acknowledged. Firstly, the remitted sample took part in a trial that did not show the expected relapse prevention effect (Bondolfi et al. 2010). It might be argued that probability of observing cognitive changes was low. However, as instructors' adherence to the protocol was elevated, participants' attendance rate was high and practice of mindfulness exercises was regular (see Bondolfi et al. 2010), MBCT might nevertheless have had an impact on cognitive functioning. Statistical power is a second limitation. In the cross-sectional part of the study, small to moderate differences between groups might have been undetected because of small sample size, in particular for acutely depressed patients and control participants. In the longitudinal part of the study, power to detect small to moderate changes over time was also limited. A third limitation is associated with task selection and sequence. On the one hand, a paper–pencil task like the PM may not have been sensitive enough to detect changes. In the future, it will be important to measure change with MBCT on tasks that are known to be related to mood disorders (e.g. memory bias toward negative content, affective shifting), and specifically to depression vulnerability (Mathews and MacLeod 2005). On the other hand, counterbalancing the order of tasks and questionnaires might be considered in the future, in order to control for a possible sequence effect. Fourthly, it should be noted that no structured diagnostic interview was used in depressed patients, even though attending psychiatrists had a long experience with DSM-IV criteria. Furthermore, comorbidity was not investigated systematically. It might have led to heterogeneity in patient samples, and a moderating role of comorbid disorders, e.g. anxiety, cannot be excluded. Moreover, all but one acutely depressed patient were taking psychotropic medications at the time of testing, so that drug effects on cognitive functioning cannot be excluded. Finally, number of depressive episodes significantly differed in the remitted and acutely depressed patients and might be a confounding factor when examining differences between groups. Future studies are awaited to disentangle the effect of group and depression chronicity, as some data indicate that a larger number of depressive episodes might be associated with increasing impairment of cognitive performances (e.g. Kessing 1998). Taking into account other possible confounders and moderating factors will be another challenge.

Conclusion

In summary, the present study suggests that MBCT might have a specific impact on dysfunctional attitudes. Changes were not only observed immediately after group sessions but continued up to 9 months, in line with the hypothesis of MBCT-initiated long-term changes. Because of methodological limitations, these results nevertheless await replication and confirmation. At the clinical level, when conducting MBCT groups, clinicians often observe changes in patients during the 8-week program and participant feedback confirms the observed changes. At the research level, further work is needed to measure these gains and identify the processes through which they happen.

Acknowledgments This study was supported by a grant from the Swiss National Science Foundation (Grant no. 3200BO-108432 to Guido Bondolfi, Gilles Bertschy, Jean-Michel Aubry and Martial Van der Linden). The authors would like to thank the MBCT instructors L. Bizzini, L. Myers Arrazola and B. Weber, as well as C. Gonzalez for her help in data collection. They would also like to thank Sandra Ter Pelle for her expert technical support in preparing this manuscript.

Conflict of interest There is no conflict of interest in this research.

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders: DSM-IV* (4th ed.). Washington: American Psychiatric Association.

Anderson, N. D., Lau, M. A., Segal, Z. V., & Bishop, S. R. (2007). Mindfulness-based stress reduction and attentional control. *Clinical Psychology and Psychotherapy, 14*(6), 449–463. doi:10.1002/cpp.544.

Beck, A. T. (1967). *Depression: causes and treatment*. Philadelphia: University of Pennsylvania Press.

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. San Antonio: Psychological Corporation.

Beck, A. T., Steer, R. A., & Brown, G. K. (1998). *BDI -II, Inventaire de dépression de Beck*. Paris: Ed. du Centre de Psychologie Appliquée.

Beevers, C. G., & Miller, I. W. (2004). Perfectionism, cognitive bias, and hopelessness as prospective predictors of suicidal ideation. *Suicide and Life-threatening Behavior, 34*(2), 126–137. doi:10.1521/suli.34.2.126.32791.

Bishop, S. R., Lau, M. A., Shapiro, S., Carlson, L., Anderson, N. D., Carmody, J., et al. (2004). Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice, 11*(3), 230–241. doi:10.1093/clipsy.bph077.

Bondolfi, G., Jermann, F., Van der Linden, M., Gex-Fabry, M., Bizzini, L., Weber-Rouget, B., et al. (2010). Depression relapse prophylaxis with mindfulness-based cognitive therapy: Replication and extension in the Swiss health care system. *Journal of Affective Disorders, 122*(3), 224–231. doi:10.1016/j.jad.2009.07.007.

Bostanov, V., Keune, P. M., Kotchoubey, B., & Hautzinger, M. (2012). Event-related brain potentials reflect increased concentration ability after mindfulness-based cognitive therapy for depression: a randomized clinical trial. *Psychiatry Research, 199*(3), 174–180. doi:10.1016/j.psychres.2012.05.031.

Bouvard, M., Cottraux, J., Charles, S., Ciadella, P., Guerin, J., & Aimard, G. (1994). Etude de validation sur une population française de l'échelle d'attitudes dysfonctionnelles de Weissman et Beck (DAS forme A). *Journal de Thérapie Comportementale et Cognitive, 4*(4), 127–135.

Brown, K. W., & Ryan, R. M. (2003). The benefits of being present: mindfulness and its role in psychological well-being. *Journal of Personality and Social Psychology, 84*(4), 822–848.

Chambers, R., Lo, B., & Allen, N. B. (2008). The impact of intensive mindfulness training on attentional control, cognitive style, and affect. *Cognitive Therapy and Research, 32*(3), 303–322. doi:10.1007/s10608-007-9119-0.

Chiesa, A., & Serretti, A. (2011). Mindfulness based cognitive therapy for psychiatric disorders: A systematic review and meta-analysis. *Psychiatry Research, 187*(3), 441–453. doi:10.1016/j.psychres.2010.08.011.

Chiesa, A., Calati, R., & Serretti, A. (2011). Does mindfulness training improve cognitive abilities? A systematic review of neuropsychological findings. *Clinical Psycholy Review, 31*(3), 449–464. doi:10.1016/j.cpr.2010.11.003.

First, M. B., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (1996). *Structured clinical interview for DSM-IV Axis I disorders - Patient edition (SCID-I/P, Version 2.0)*. New York: New york State Psychiatric Institute, Biometrics Research Department.

Godfrin, K. A., & van Heeringen, C. (2010). The effects of mindfulness-based cognitive therapy on recurrence of depressive episodes, mental health and quality of life: A randomized controlled study. *Behaviour Research and Therapy, 48*(8), 738–746. doi:10.1016/j.brat.2010.04.006.

Grossman, P. (2011). Defining mindfulness by how poorly I think I pay attention during everyday awareness and other intractable problems for psychology's (re)invention of mindfulness: comment on Brown et al. (2011). *Psychological Assessment, 23*(4), 1034-1040; discussion 1041-1036. doi: 10.1037/a0022713.

Grossman, P., Nieman, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits. *A meta-analysis. Journal of Psychosomatic Research, 57*, 35–43. doi:10.1016/S0022-3999(03)00573-7.

Hargus, E., Crane, C., Barnhofer, T., & Williams, J. M. G. (2010). Effects of mindfulness on meta-awareness and specificity of describing prodromal symptoms in suicidal depression. *Emotion, 10*(1), 34–42. doi:10.1037/a0016825.

Heeren, A., Van Broeck, N., & Philippot, P. (2009). The effects of mindfulness on executive processes and autobiographical memory specificity. *Behaviour Research Therapy, 47*(5), 403–409. doi:10.1016/j.brat.2009.01.017.

Hofmann, S. G., Sawyer, A. T., Witt, A. A., & Oh, D. (2010). The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. *Journal of Consulting and Clinical Psychology, 78*(2), 169–183. doi:10.1037/a0018555.

Hölzel, B. K., Lazar, S. W., Gard, T., Schuman-Olivier, Z., Vago, D. R., & Ott, U. (2011). How does mindfulness meditation work? Proposing mechanisms of action from a conceptual and neural perspective. *Perspectives on Psychological Science, 6*(6), 537–559. doi:10.1177/1745691611419671.

Ingram, R. E., Miranda, J., & Segal, Z. V. (1998). *Cognitive vulnerability to depression*. New York: Guilford Press.

Jermann, F., Billieux, J., Larøi, F., d'Argembeau, A., Bondolfi, G., Zermatten, A., et al. (2009). Mindful attention awareness scale (MAAS): Psychometric properties of the French translation and exploration of its relations with emotion regulation strategies. *Psychological Assessment, 21*(4), 506–514. doi:10.1037/a0017032.

Jermann, F., Billieux, J., Bizzini, L., Van der Linden, M., & Bondolfi, G. (2010). *Rumination-Reflection Questionnaire (RRQ) : Psychometric properties of the French translation and exploration of the relationships between the RRQ and depressive symptoms and mindfulness*. Paper presented at the VI World Congress of Behavioural and Cognitive Therapies (WCBCT), Boston.

Jersild, A. T. (1927). Mental set and shift. *Archives of Psychology, 14*, 89.

Kessing, L. V. (1998). Cognitive impairment in the euthymic phase of affective disorder. *Psychological Medicine, 28*(5), 1027–1038.

Kuyken, W., Byford, S., Taylor, R. S., Watkins, E., Holden, E., White, K., et al. (2008). Mindfulness-based cognitive therapy to prevent relapse in recurrent depression. *Journal of Consulting and Clinical Psychology, 76*(6), 966–978. doi:10.1037/a0013786.

Ma, S. H., & Teasdale, J. D. (2004). Mindfulness-based cognitive therapy for depression: Replication and exploration of differential relapse prevention effects. *Journal of Consulting and Clinical Psychology, 72*(1), 31–40. doi:10.1037/0022-006X.72.1.31.

Mathews, A., & MacLeod, C. (2005). Cognitive vulnerability to emotional disorders. *Annual Review of Clinical Psychology, 1*, 167–195. doi:10.1146/annurev.clinpsy.1.102803.143916.

Michalak, J., Heidenreich, T., Meibert, P., & Schulte, D. (2008). Mindfulness predicts relapse/recurrence in major depressive disorder after mindfulness-based cognitive therapy. *Journal of Nervous and Mental Disease, 196*(8), 630–633. doi:10.1097/NMD.0b013e31817d0546.

Miyake, A., Friedman, N. P., Emerson, M. J., Witzki, A. H., Howerter, A., & Wager, T. D. (2000). The unity and diversity of executive functions and their contributions to complex "Frontal Lobe" tasks: A latent variable analysis. *Cognitive Psychology, 41*(1), 49–100. doi:10.1006/cogp.1999.0734.

Montgomery, S. A., & Asberg, M. (1979). A new depression scale designed to be sensitive to change. *The British Journal of Psychiatry, 134*, 382–389.

Montgomery, C., Fisk, J. E., Newcombe, R., & Murphy, P. N. (2005). The differential effects of ecstasy/polydrug use on executive components: shifting, inhibition, updating and access to semantic

memory. *Psychopharmacology (Berl), 182*(2), 262–276. doi:10.1007/s00213-005-0065-9.

Murphy, F. C., Sahakian, B. J., Rubinsztein, J. S., Michael, A., Rogers, R. D., Robbins, T. W., et al. (1999). Emotional bias and inhibitory control processes in mania and depression. *Psychological Medicine, 29*(6), 1307–1321.

Nolen-Hoeksema, S. (1991). Responses to depression and their effects on the duration of depressive episodes. *Journal of Abnormal Psychology, 100*(4), 569–582.

Pellet, J., Bobon, D. P., Mormont, I., Lang, F., & Massardier, A. (1980). *Etude de princeps de validation française de la MADRS, sous-échelle Dépression de la CPRS Comptes-rendus du Congrès de psychiatrie et de neurologie de langue française Reims, 25–28 juin*. Paris: Masson.

Peselow, E. D., Robins, C., Block, P., & Barouche, F. (1990). Dysfunctional attitudes in depressed patients before and after clinical treatment and in normal control subjects. *The American Journal of Psychiatry, 147*(4), 439–444.

Ramel, W., Goldin, P. R., Carmona, P. E., & McQuaid, J. R. (2004). The effects of mindfulness meditation on cognitive processes and affect in patients with past depression. *Cognitive Therapy and Research, 28*(4), 433–455. doi:10.1023/B:COTR.0000045557.15923.96.

Segal, Z. V., Teasdale, J. D., Williams, J. M. G., & Gemar, M. C. (2002a). The mindfulness-based cognitive therapy adherence scale: Inter-rater reliability, adherence to protocol and treatment distinctiveness. *Clinical Psychology and Psychotherapy, 9*, 131–138. doi:10.1002/cpp.320.

Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2002b). *Mindfulness-based cognitive therapy for depression: a new approach to preventing relapse*. New York: Guilford Press.

Segal, Z. V., Kennedy, S., Gemar, M., Hood, K., Pedersen, R., & Buis, T. (2006). Cognitive reactivity to sad mood provocation and the prediction of depressive relapse. *Archives of General Psychiatry, 63*(7), 749–755. doi:10.1001/archpsyc.63.7.749.

Segal, Z. V., Bieling, P., Young, T., MacQueen, G., Cooke, R., Martin, L., et al. (2010). Antidepressant monotherapy vs sequential pharmacotherapy and mindfulness-based cognitive therapy, or placebo, for relapse prophylaxis in recurrent depression. *Archives of General Psychiatry, 67*(12), 1256–1264. doi:10.1001/archgenpsychiatry.2010.168.

Spector, A., & Biederman, I. (1976). Mental set and mental shift revisited. *The American Journal of Psychology, 89*(4), 669–679. doi:10.2307/1421465.

Teasdale, J. D. (1988). Cognitive vulnerability to persistent depression. *Cognition and Emotion, 2*(3), 247–274. doi:10.1080/02699938808410927.

Teasdale, J. D., Segal, Z. V., Williams, J. M. G., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology, 68*(4), 615–623. doi:10.1037/0022-006X.68.4.615.

Trapnell, P. D., & Campbell, J. D. (1999). Private self-consciousness and the five-factor model of personality: Distinguishing rumination from reflection. *Journal of Personality and Social Psychology, 76*(2), 284–304. doi:10.1037/0022-3514.76.2.284.

Weissman, A. N., & Beck, A. T. (1978). *Development and validation of the dysfunction attitude scale: A preliminary investigation*. Toronto: Paper presented at the Proceedings of the meeting of the American Education Research Association.

Williams, J. M. G., & Broadbent, K. (1986). Autobiographical memory in suicide attempters. *Journal of Abnormal Psychology, 95*(2), 144–149. doi:10.1037/0021-843X.95.2.144.

Williams, J. M. G., Teasdale, J. D., Segal, Z. V., & Soulsby, J. (2000). Mindfulness-based cognitive therapy reduces overgeneral autobiographical memory in formerly depressed patients. *Journal of Abnormal Psychology, 109*(1), 150–155. doi:10.1037/0021-843X.109.1.150.

Williams, J. M. G., Barnhofer, T., Crane, C., Herman, D., Raes, F., Watkins, E., et al. (2007). Autobiographical memory specificity and emotional disorder. *Psychological Bulletin, 133*(1), 122–148. doi:10.1037/0033-2909.133.1.122.

Zimmerman, M., Posternak, M. A., & Chelminski, I. (2004). Defining remission on the Montgomery-Asberg depression rating scale. *The Journal of Clinical Psychiatry, 65*(2), 163–168. doi:10.4088/JCP.v65n0204.

Zuroff, D. C., Blatt, S. J., Sanislow, C. A, I. I. I., Bondi, C. M., & Pilkonis, P. A. (1999). Vulnerability to depression: Reexamining state dependence and relative stability. *Journal of Abnormal Psychology, 108*(1), 76–89. doi:10.1037/0021-843x.108.1.76.

Article 2

Hitchcock, C., Rudokaite, J., Haag, C., Patel, S.D., Smith, A.J., Kuhn, I., Jermann, F., Ma, S.H., Kuyken, W., Williams, J.M., Watkins, E., Bockting, C.L.H., Crane, C., Fisher, D., Dalgleish, T. (2022). Autobiographical memory style and clinical outcomes following mindfulness-based cognitive therapy (MBCT): An individual patient data meta-analysis. *Behaviour Research and Therapy, 151*, 104048.

Reduced autobiographical memory specificity is an established depressive cognitive risk factor. This study aimed to evaluate whether MBCT impacts the ability to recall specific autobiographical memories among formerly depressed persons.

An individual patient data (IPD) meta-analysis (MA) methodology was used. This means that the raw data from 7 studies (880 people) were analyzed at an individual level rather than relying solely on summarized results. This approach allows a more precise estimation of treatment effects.

The results show that memory specificity does not change following MBCT. Moreover, the baseline specificity deficit is not a predictor of response to MBCT. Finally, post-intervention memory specificity did not predict the risk of relapse during follow-up.

Take home message: There is no impact of MBCT on the autobiographical memory specificity deficit, nor is it a predictor of relapse or depressive symptoms during follow-up.

Behaviour Research and Therapy 151 (2022) 104048

Contents lists available at ScienceDirect

Behaviour Research and Therapy

journal homepage: www.elsevier.com/locate/brat

Autobiographical memory style and clinical outcomes following mindfulness-based cognitive therapy (MBCT): An individual patient data meta-analysis

Caitlin Hitchcock [a,i,1,*], Judita Rudokaite [a,1], Christina Haag [a], Shivam D. Patel [a], Alicia J. Smith [a], Isla Kuhn [b], Francoise Jermann [c], S. Helen Ma [a], Willem Kuyken [d], J. MarkG. Williams [d], Edward Watkins [e], Claudi L.H. Bockting [f], Catherine Crane [d], David Fisher [g], Tim Dalgleish [h]

[a] MRC Cognition and Brain Sciences Unit, University of Cambridge, UK
[b] School of Clinical Medicine, University of Cambridge, UK
[c] Department of Psychiatry, Geneva University Hospital, USA
[d] Department of Psychiatry, University of Oxford, UK
[e] Psychology, University of Exeter, UK
[f] Amsterdam Medical University Centres and Centre for Urban Mental Health, University of Amsterdam, the Netherlands
[g] MRC Clinical Trials Unit, University College London, UK
[h] MRC Cognition and Brain Sciences Unit, University of Cambridge, Cambridgeshire and Peterborough NHS Foundation Trust, UK
[i] Melbourne School of Psychological Sciences, University of Melbourne, Australia

ARTICLE INFO

Keywords:
Autobiographical memory
Mindfulness
Cogntive therapy
Treatment response
Individual patient data meta-analysis

ABSTRACT

The ability to retrieve specific, single-incident autobiographical memories has been consistently posited as a predictor of recurrent depression. Elucidating the role of autobiographical memory specificity in patient-response to depressive treatments may improve treatment efficacy and facilitate use of science-driven interventions. We used recent methodological advances in individual patient data meta-analysis to determine a) whether memory specificity is improved following mindfulness-based cognitive therapy (MBCT), relative to control interventions, and b) whether pre-treatment memory specificity moderates treatment response. All bar one study evaluated MBCT for relapse prevention for depression. Our initial analysis therefore focussed on MBCT datasets only($n = 708$), then were repeated including the additional dataset($n = 880$). Memory specificity did not significantly differ from baseline to post-treatment for either MBCT and Control interventions. There was no evidence that baseline memory specificity predicted treatment response in terms of symptom-levels, or risk of relapse. Findings raise important questions regarding the role of memory specificity in depressive treatments.

Tackling recurrent depression is a key global priority. Chronic and remitting depressive presentations are associated with higher mortality and increased severity of physical health conditions (e.g., cardiovascular disease; Hare, Toukhsati, Johansson, & Jaarsma, 2013) and thus increase burden on healthcare systems. We do have effective medications and psychological interventions for chronic depression (National Institute for Health and Care Excellence, 2009). However, symptoms commonly recur when antidepressant medication is ceased (Shelton, 2001). Similarly, over 50% of acutely depressed individuals treated with psychological interventions still experience later relapse (Kessler, Zhao, Blazer, & Swartz, 1997). There is some evidence that both psychological relapse prevention interventions such as Mindfulness-Based Cognitive Therapy (MBCT) and continuation of antidepressants into remission may reduce future recurrence of depression (Breedvelt et al., in press). Identification of patient-level cognitive factors which may promote or interfere with the efficacy of such interventions and modulate treatment responsiveness may help explain why gold-standard interventions do not work for everyone. Here, we use individual-patient data

* Corresponding author. Melbourne School of Psychological Sciences, University of Melbourne, Australia.
E-mail address: Caitlin.hitchcock@unimelb.edu.au (C. Hitchcock).
[1] Joint first author.

https://doi.org/10.1016/j.brat.2022.104048
Received 14 April 2021; Received in revised form 10 January 2022; Accepted 20 January 2022
Available online 28 January 2022

meta-analysis to evaluate one patient-level cognitive factor with established links to the course of depression – the specificity versus generality of recollected autobiographical memories – and its interactions with MBCT.

Reduced ability to recall specific, detailed memories for autobiographical events is an established marker of recurrent depression that is prototypically measured using a cognitive paradigm – the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986). On the AMT, depressed individuals tend to recall their personal past in overgeneralized summaries (e.g., '*I never did well at school*'), rather than isolating specific, single-incident events (e.g., '*I failed my final-year maths exam*') (Williams et al., 2007). Reduced specificity in autobiographical memory underlies the overgeneralized, negative self-beliefs which drive depression(Hitchcock, Rees, & Dalgleish, 2017), is associated with increased frequency of depressive episodes and suicide attempts (Kuyken & Brewin, 1995; Williams & Broadbent, 1986), continues to characterize patients in remission (Mackinger, Pachinger, Leibetseder, & Fartacek, 2000) and predicts the course of depression, including relapse (for aggregate data meta-analysis see Sumner, Griffith, & Mineka, 2010; recently updated by Hallford, Rusanov, Yeow, & Barry, 2020).

The role of autobiographical memory specificity in determining outcomes following MBCT for recurrent depression is interesting for several reasons. On the one hand, MBCT intentionally fosters the ability to attend to specific aspects of the internal (e.g., bodily sensations) and external (e.g., auditory) environment, as well as cultivating a sense of 'being in the moment'. This repeated focus on concrete, specific details may therefore train the use of a more specific (as opposed to abstract) processing mode, which experimental studies suggest can increase recall of specific autobiographical memories and other cognitive information (Watkins & Teasdale, 2001). On the other hand, MBCT provides training in decentering – psychologically stepping back (Manjaly & Iglesias, 2020)– from the generalised autobiographical themes that populate the mind in those vulnerable to depression in the form of ruminations or thoughts about the past. The combination of this re-orientation away from the generic past and the focus on enhancing the salience of the specifics of current experience, suggest that MBCT may operate by shifting the cognitive processing style that is indexed by memory specificity. The literature exploring these possibilities is minimal. There is prior published evidence that memory specificity does improve following MBCT (Williams, Teasdale, Segal, & Soulsby, 2000). However, this finding has not been well replicated (Jermann et al., 2013). Similarly mixed findings pertain to other interventions for depression including cognitive behavioural therapy (CBT) and anti-depressant medication (McBride, Segal, Kennedy, & Gemar, 2007).

Individual differences in the pre-treatment ability to retrieve specific memories may also influence clinical outcome following MBCT. Because MBCT trains the ability to narrow in on specific experiences, those individuals with a relatively stronger pre-treatment tendency to focus on specific details of personal experience may develop more efficient MBCT skills, or alternatively, experience ceiling effects of treatment, such that those with lower pre-treatment specificity have more to gain from developing MBCT skills. Furthermore, a large degree of narrative discourse in treatment draws upon specific autobiographical memories. Participants share recent experiences to elicit support from the group, or seek advice from the teacher (e.g., regarding an uncomfortable homework practice). Again, there is little prior research in this area. To date, although there is some evidence showing that memory specificity does predict spontaneous symptom change (Hallford et al., 2020), its relationship to treatment change remains unexamined.

A key reason why the role of memory specificity in predicting or modulating treatment outcome has remained unexplored is the low statistical power of individual clinical trials to examine predictor and moderation effects robustly. Traditional meta-analysis cannot overcome these limitations as only aggregate data are synthesized (Fisher, Copas, Tierney, & Parmar, 2011; Riley et al., 2020). In contrast, individual patient data meta-analysis (IPD-MA) synthesizes participant-level data across multiple studies, providing the statistical capability to explore individual characteristics and how these interact with treatment effects. When considering exploratory hypotheses, secondary analysis of relevant existing data can indicate whether investment in primary data collection is warranted. To date, IPA-MA has focussed almost exclusively on demographic and baseline clinical characteristics which may influence treatment response (Kuyken et al., 2016) and has been vastly under-used for exploring cognitive moderators of clinical outcomes. Here we extend the use of IPD-MA to an experimental cognitive variable – memory specificity as measured with the AMT. To facilitate further IPD-MA consideration of such cognitive variables we include our annotated statistical code as Supplementary Material.

Using state-of-the-art IPD-MA methods (Riley et al., 2020) with data from randomized controlled trials comparing MBCT with a control condition, we therefore evaluated: 1) Does treatment for depression a) induce a change in autobiographical memory specificity on the AMT? And b) is any such change greater following MBCT relative to control interventions? 2) Does the specificity of autobiographical memory at baseline predict treatment response a) for all interventions (a predictor effect)? And b) is this effect different for MBCT relative to control interventions (a moderation effect)?

Our preregistered ambition (Hitchcock et al., 2019) had been to extend the investigation of memory specificity beyond MBCT to examine CBT more broadly. However, we found only one relevant non-MBCT dataset and so our focus is on MBCT. Nevertheless, we also present analyses including the additional CBT dataset, in line with our protocol.

1. Method

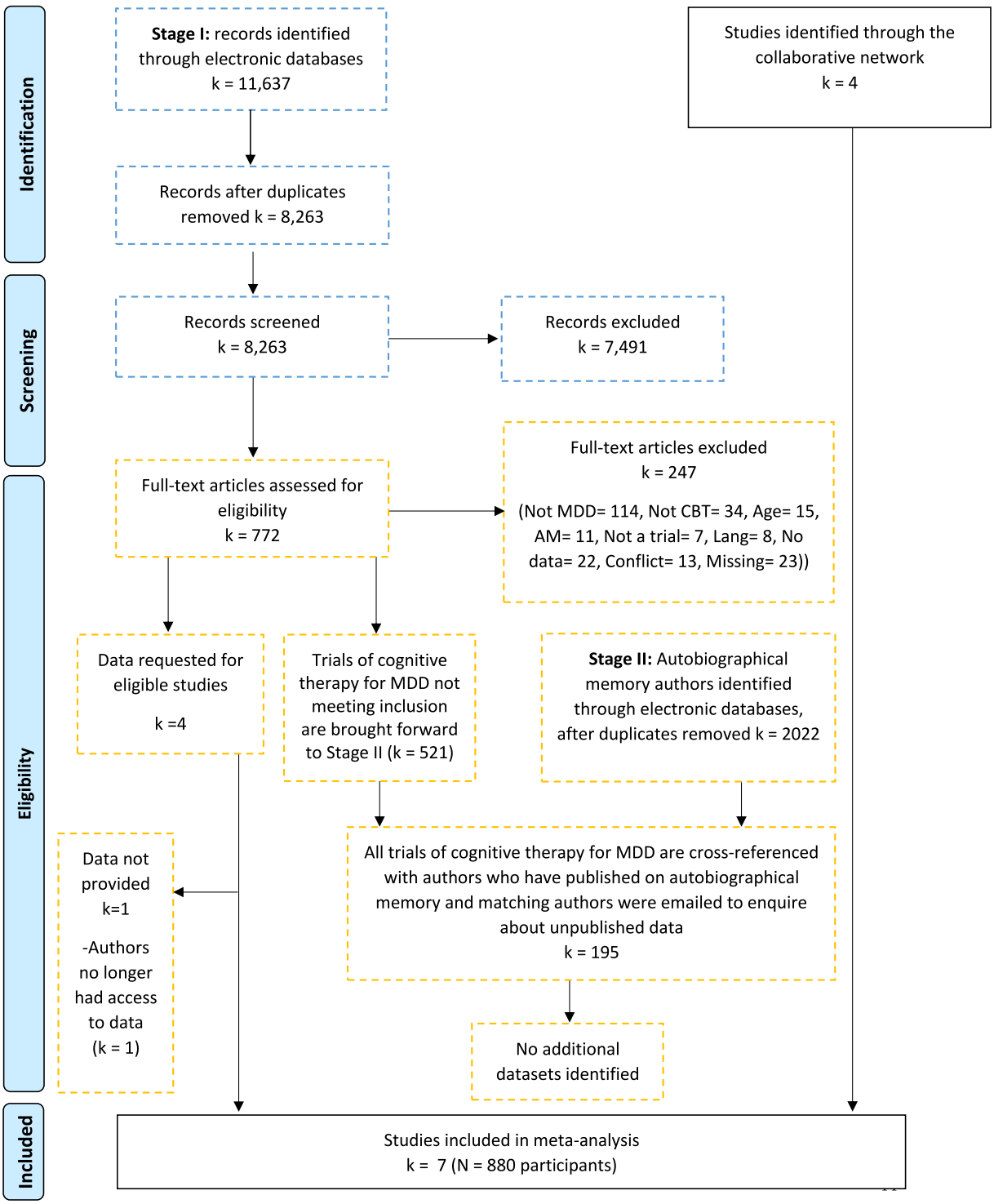
1.1. Preregistration

This meta-analysis accords to PRISMA guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009) and was preregistered with PROSPERO (CRD42018109673). Methodological details were published in a protocol paper prior to analysis (Hitchcock et al., 2019). Power calculation for meta-analysis is notoriously difficult, as the final *N* is necessarily dependent on existing data, and extra data cannot be collected if sample size is low. Instead of formal power analysis, recent recommendations (Tiernay et al., 2021) advocate for an approach whereby the percentage of available data that is obtained is considered as the most reliable indicator of the merit of completing IPD-MA. We were able to obtain 95.4% of available (including unpublished) data, which in accordance with recommendations, suggests that results are likely to be reliable.

1.2. Identification of included studies

The full search strategy and inclusion criteria are detailed in the published protocol(Hitchcock et al., 2019). Briefly, inclusion criteria were randomized trials measuring autobiographical memory specificity, prior to delivery of a cognitive or cognitive-behavioural therapy (from hereon CBTs) for adults with clinician-diagnosed Major Depressive Disorder (MDD).

A multi-stage search process was used (Fig. 1). First, a collaborative network of experts provided access to four previously unpublished datasets which met inclusion criteria. This was supplemented by a two-stage formal search. In the first stage, searches were completed in PsycINFO, Medline, Web of Science, Cochrane database and WHO trials database from 1986 to February 2019 (search terms in Supplementary Materials). Two researchers completed screening, with high (91%) inter-rater agreement for inclusion. In the second stage, searches in Medline, PsycINFO and Web of Science produced a list of authors who have ever published on autobiographical memory and depression. This list was then cross-referenced with results of the primary search. For studies with an author who also had an autobiographical memory paper, corresponding authors were emailed to enquire about unpublished



Note. MDD = diagnosis of major depressive disorder, Not CBT = no CBT in the study, Age = did not meet age criteria, AM = study aims to improve autobiographical memory, Lang= language other than English; no data = trial protocol/data collection ongoing, conflict = article mutually excluded by both raters, but for different reasons; Missing= unable to locate full text

Fig. 1. *Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) Individual Patient Data Study Selection Proces*
Note: MDD = diagnosis of major depressive disorder, Not CBT = no CBT in the study, Age = did not meet age criteria, AM = study aims to improve autobiographical memory, Lang = language other than English; no data = trial protocol/data collection ongoing, conflict = article mutually excluded by both raters, but for different reasons; Missing = unable to locate full text.

autobiographical memory data. Included studies were rated for risk of bias (Table 1) by two independent researchers using the Revised Cochrane Risk of Bias Tool (Higgins et al., 2016). Inter-rater reliability was good, 71.4%, rising to 100% after discussion.

1.3. Memory specificity measure

Each of the identified studies had used the Autobiographical Memory Test (AMT; Williams & Broadbent, 1986) to measure memory

Table 1
Summary of studies included in the individual patient data meta-analysis.

Study reference	Country	Type of CBT	n	Comparison condition	n	AM measure	Depression measure(s)	Follow-up Assessments	Cochrane Risk of Bias
Teasdale et al. (2000)*	UK, Canada	MBCT	76	TAU	69	AMT	BDI-I, Hamilton	12m	No concerns
Ma et al. (2004)*	UK	MBCT	37	TAU	38	AMT	BDI-I, Hamilton	3m	No concerns
Kuyken et al. (2008)*	UK	MBCT	61	ADM	62	AMT	BDI-II, Hamilton	3m, 6m, 9m, 12m, 15m	No concerns
Williams et al. (2014)*	UK	MBCT	108	TAU CPE	56 110	AMT	BDI-II, Hamilton	3m, 6m, 9m, 12m	Some concerns with deviations from intended interventions
Crane et al. (2012)	UK	MBCT	16	TAU	15	AMT	BDI-II	None	No concerns
Jermann et al. (2013)	Switzerland	MBCT	31	TAU	29	AMT	BDI-II	6m, 9m, 12m	No concerns
Spinhoven et al. (2006)	The Netherlands	Cognitive Therapy	88	TAU	84	AMT	BDI-I, Hamilton	12m	Some concerns with deviations from intended interventions

Note. * identified by the collaborative network. Follow-up assessments are in addition to post-intervention assessment and are time since post-intervention. MBCT = Mindfulness-based cognitive therapy; TAU = Treatment as usual which was typically administration of antidepressant medication but may have also included supplemental psychosocial interventions or no tailored intervention for depression; ADM = antidepressant medication; CPE= Cognitive Psycho-Education; AMT = proportion of specific memories on the Autobiographical Memory Test; BDI=Beck Depression Inventory; Hamilton = Hamilton Rating Scale for Depression. The Teasdale et al. (2000) dataset was identified by the collaborative network but the dataset also subsumed data from Williams et al. (2000) which was identified during the electronic search.

specificity. The AMT is a cued-recall task in which individuals are provided with a cue word of positive, negative, or neutral emotional valence, and asked to provide a memory of a specific event that comes to mind in response to that cue. As the number of cue words varied between studies, we calculated the proportion of specific memories for each study by dividing the number of specific memories correctly recalled by the total number of cue words. The AMT is the most widely used measure of memory specificity, and possesses adequate psychometric properties (Griffith et al., 2012).

1.4. Analysis approach

As full analysis code for each model is included in the Supplementary Materials, the key model features are summarised here. Analysis followed recent statistical recommendations(Riley et al., 2020) pertaining to state-of-the-art procedures for examining interactions between treatment effect and participant-level covariates in IPD-MA. Analyses were conducted in R using the *nlme* and *lme4* packages for mixed effects models, and the *coxme* and *survival* packages for survival analysis. As one-stage models yield less biased estimates of effect and maximize power (Riley et al., 2020), we completed one-stage random effects models employing restricted maximum likelihood estimation, in which data from all studies were analysed simultaneously in a single statistical model. Data structure nested individuals within trials. Heterogeneity is indexed via T^2, which we obtained by modelling a random slope for the predictor of interest. By modelling a random slope, heterogeneity is then interpretable as the variance of the random effects distribution on the observed effect of the predictor, such that T^2 reflects the between-study variance in the effect (Cornell et al., 2014), and a value of 0 represents no heterogeneity. When exploring post-treatment outcomes, baseline score for those outcomes were included as a covariate.

Models investigating memory specificity as a moderator included random slopes for the interaction to estimate and account for heterogeneity across trials. We allowed heterogenous variances per trial in line with recent recommendations (de Jong et al., 2020). Each predictor (i.e., specificity, baseline symptoms) was individually investigated for interaction with treatment type. When examining interactions, memory specificity was trial-mean centred to separate within- and across-trial effects. In this context, within-trial interactions provide an estimate of interaction at the participant-level while across-trial interactions estimate the interaction at the trial-level. That is, the within-trial interaction quantifies the degree to which participant-specific variations in memory specificity at baseline interact with the participant-specific effects of intervention. Instead, the across-trial interaction captures the degree to which the overall level of memory specificity at baseline in the RCT is related to the overall effect of the intervention. In analysis, across-trial interactions were covaried to adjust for aggregation bias. All interaction terms reported in the text are for the within-trial interaction, and across-trial interaction terms are presented in figures for information only.

As one-stage models do not give weighted estimates of individual trials as in two-stage (or aggregate) models, forest plots present individual study effect sizes with the pooled estimates from the one-stage models, with marker size reflecting sample size. Intent-to-treat analysis was completed using multilevel multiple imputation at within-study level. Missing outcome data was imputed via a multivariate imputation model using baseline scores on the predictor variables (see Supplementary Materials). As results remained the same, per-protocol analyses using observed data are reported. Because all but one of the returned trials involved MBCT for depression prevention, analyses were first completed on data from these six MBCT trials ($n = 708$), and repeated to include the one preventative cognitive therapy study ($n = 880$). We emphasise analysis involving only the MBCT trials as the preventative cognitive therapy study was substantially different to the other identified studies in terms of both methods and risk of bias.

2. Results

2.1. Overview of included studies

Included studies (Crane, Winder, Hargus, Amarasinghe, & Barnhofer, 2012; Jermann et al., 2013; Kuyken et al., 2008; Ma & Teasdale, 2004; Spinhoven et al., 2006; Teasdale et al., 2000; Williams et al., 2014) are presented in Table 1. Authors of one eligible trial no longer had access to the data (McBride et al., 2007). Data were therefore received from seven studies, $N = 880$. All trials delivered group-based CBTs in eight weekly sessions, however, participants allocated to CBTs were not prohibited from taking psychotropic medication. The published papers reported that treatment-as-usual (TAU) was typically administration of antidepressant medication, but may have also included supplemental psychosocial interventions, or no tailored intervention for depression at all. For Williams et al. (2014) both TAU and Cognitive Psycho-Education arms were included in the control condition. All studies employed the Beck Depression Inventory (BDI; Beck, Steer, Ball, & Ranieri, 1996) for depressive symptoms, and MDD diagnostic status was determined via structured clinician-administered

interviews. There were some concerns regarding bias (Higgins et al., 2016) for two studies, primarily due to our efforts to locate unpublished autobiographical memory data which were not reported in the main trial paper.

2.2. Does memory specificity change following treatment for depression?

Data on memory specificity on the AMT pre- and post-treatment are presented in Supplementary Materials (Table S1).We evaluated whether memory specificity improved from baseline to post-intervention by modelling memory specificity as a function of time. A one-stage model with random intercept for trial suggested that, across all interventions, specificity did not differ between baseline and post-treatment, $b = 0.02$, SE = 0.01, $t(1219) = 1.35$, $p = .18$. There was low between-study heterogeneity in the effect, $T^2 = 0.001$.

We next examined the effect of type of intervention (MBCT vs. control) on memory specificity at post-treatment using a one-stage model with random intercept for trial and random slope for treatment, applying an adjustment for specificity at baseline (Fig. 2a). Results provided no support for an effect of treatment type on change in specificity, $b = 0.02$, SE = 0.01, $t(570) = 1.49$, $p = .14$. There was low between-study heterogeneity in the effect of treatment type, $T^2 = 0.001$. As there was no significant interaction between memory specificity and treatment type, interaction terms were not included in the final models. Thus, findings suggest that autobiographical memory specificity did not improve following either MBCT or control interventions, in trials examining relapse prevention.

Data for memory specificity at follow-up assessments were not available; thus, we were unable to evaluate longer-term effects of treatment on memory specificity. We did repeat the above analyses predicting the proportion of categoric (i.e., non-specific) memories (Williams et al., 2000). Results remained non-significant, *ps* > .10.

2.3. Does baseline autobiographical memory specificity predict treatment response?

Predictor effect. Results (Fig. 3a) provided no support for an effect of baseline memory specificity on post-treatment symptoms (covarying for baseline symptoms), $b = -0.65$, SE = 1.73, $t(565) = 0.38$, $p = .71$. Between-study heterogeneity was low, $T^2 = 0.004$. A significant main effect of treatment type suggested that participants receiving MBCT experienced lower depressive symptoms at post-treatment, relative to control participants, $b = -2.33$, SE = 0.80, $t(565) = -2.92$, $p = .004$.

Three studies measured symptoms at follow-up. Again, there was no support for an effect of baseline memory specificity, adjusting for depressive symptoms at baseline, on depressive symptoms at three-months ($n = 378$), $b = -0.57$, SE = 2.85, $t(372) = -0.20$, $p = .84$, $T^2 = 7.032$, six-months ($n = 364$), $b = 1.78$, SE = 2.41, $t(358) = 0.74$, $p = .46$, $T^2 = 2.213$, or twelve-months ($n = 449$) post-treatment, $b = -2.86$, SE = 3.70, $t(442) = -0.77$, $p = .44$, $T^2 = 30.706$. As before, because the interaction terms between memory specificity and treatment were not significant they were not included in the final models.

All six MBCT datasets indexed time until depressive relapse. Thus, we completed a Cox survival model to determine whether memory specificity at pre-treatment predicted risk-of-relapse, rather than depressive status at post-treatment. A one-stage survival model with separate baseline hazard shape per study provided no support for memory specificity at pre-treatment predicting relapse, Hazard ratio = 1.04, SE = 0.48, $p = .93$, $T^2 = 0.53$.

Moderator effect. To determine whether memory specificity on the AMT at baseline significantly predicted later depression for MBCT relative to other interventions, a one-stage model predicting post-treatment symptoms estimated the interaction between baseline memory specificity and treatment type, applying a baseline symptom adjustment. We modelled a random intercept for trial and random slopes for the interaction terms to obtain T^2.

We found no support for differential predictive effects of baseline memory specificity for MBCT versus control interventions (Fig. 4a) – no significant interaction was observed, $b = 0.04$, SE = 6.12, $t(563) = 0.01$, $p = .99$,. There was a large degree of between-study heterogeneity, $T^2 = 121.60$.

Similarly, no significant interactions were observed when predicting symptoms at: three-months, $b = -4.06$, SE = 5.60, $t(370) = -0.72$, $p = .47$; six-months, $b = 0.31$, SE = 5.99, $t(356) = 0.05$, $p = .96$; or twelve-months follow-up, $b = -3.40$, SE = 5.29, $t(356) = -0.64$, $p = .52$.

Exploratory analyses. As memory specificity has been found to predict spontaneous change in symptoms[12], we explored whether post-treatment memory specificity predicted risk-of-relapse across the follow-up period but found no support for this, Hazard ratio = 0.55, SE = 0.45, $p = .18$, $T^2 = 0.391$.

We did not explore whether change in memory specificity mediated treatment response because: a) the critical criterion that MBCT differentially improves the putative specificity mediator (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001; Lemmens, Müller, Arntz, & Huibers, 2016) was not met; b) there were insufficient follow-up clinical data; and c) robust methods are not yet developed for mediation analysis in IPD.

2.4. Analysis involving all studies

All analyses were repeated to include the cognitive therapy study. Results remained the same (Figs. 2b, 3b and 4b, and Supplementary Materials).

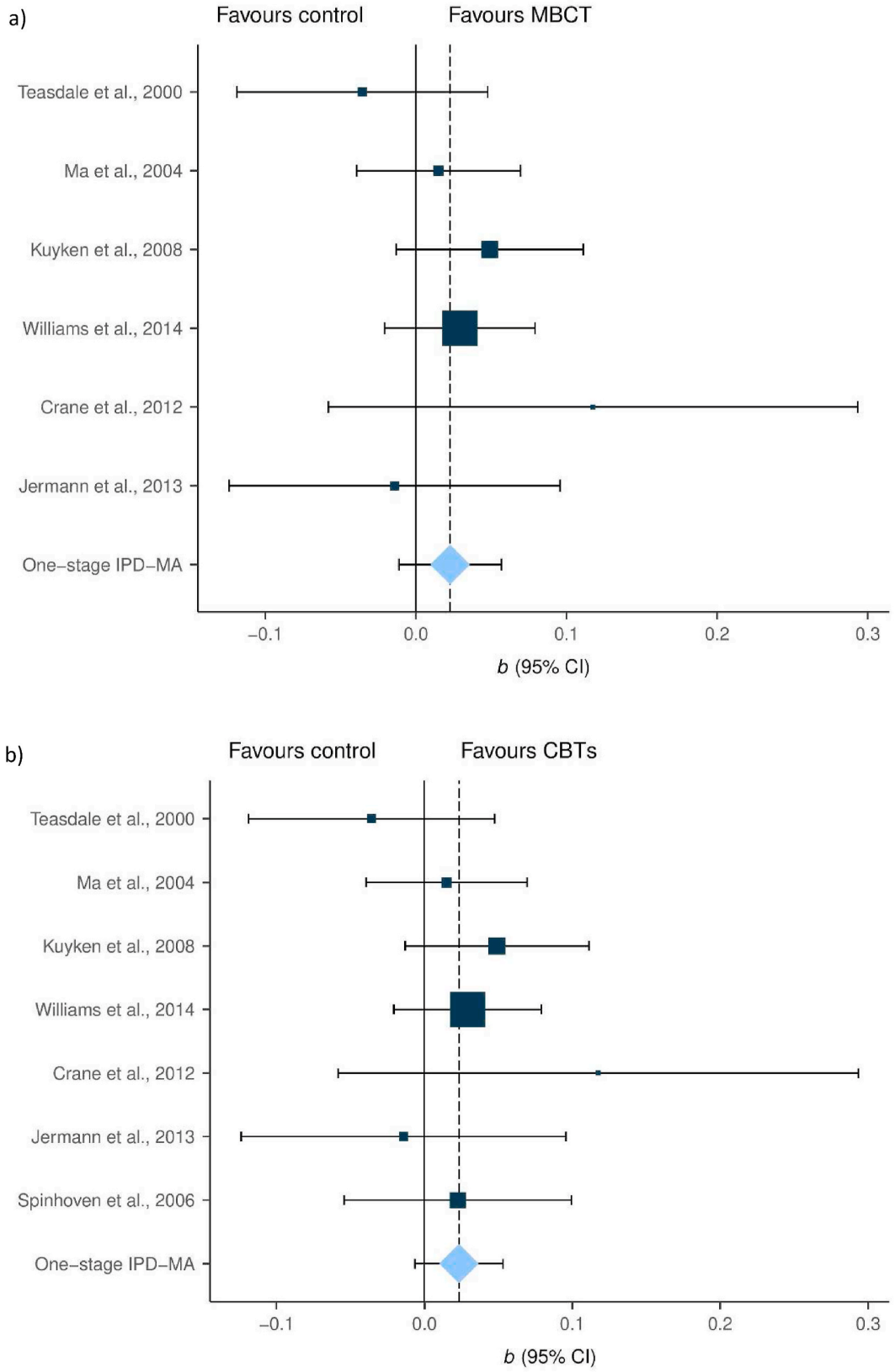
3. Discussion

Using IPD-MA, we explored whether an established depressive cognitive risk factor –reduced autobiographical memory specificity measured using The Autobiographical Memory Test (AMT), improves following treatment for recurrent major depression, and whether any such improvements are greater following MBCT, an evidence-based preventive intervention that involves elements that should enhance cognitive specificity. We also evaluated whether individuals' pre-treatment levels of memory specificity influenced their response to intervention and whether any such relationships are stronger in those receiving MBCT.

We found no support for a general effect of treatment on memory specificity, with a neglible effect size for the difference in specificity between baseline to post-treatment across intervention types. However, we found no support that memory specificity at baseline predicted either future self-report symptoms of depression or risk-of-relapse. There was similarly no support for post-intervention memory specificity predicting later depression, although the effect size was in the anticipated direction, and this analysis had reduced power, relative to other analyses. Analyses synthesising IPD from studies across all cognitive therapies yielded by our literature search, in line with our protocol (Hitchcock et al., 2019), yielded the same results.

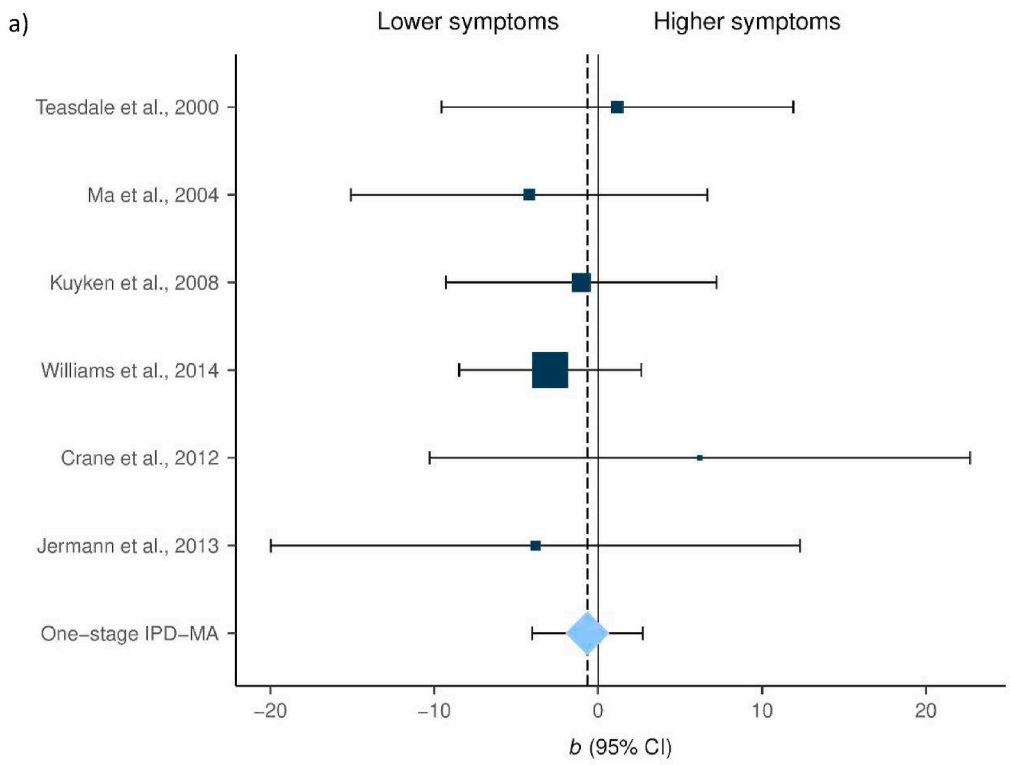
These findings contrast with the seminal and influential prior study which reports differential effects of MBCT on memory specificity (Williams et al., 2000; cited >780 times). Critically, the data from this seminal study were included in our analysis. The majority of our data were previously unpublished which highlights the potential influence of publication bias for prior individual studies on guiding science in this domain. Indeed, publication bias was identified in the recent aggregate meta-analysis (Hallford et al., 2020).

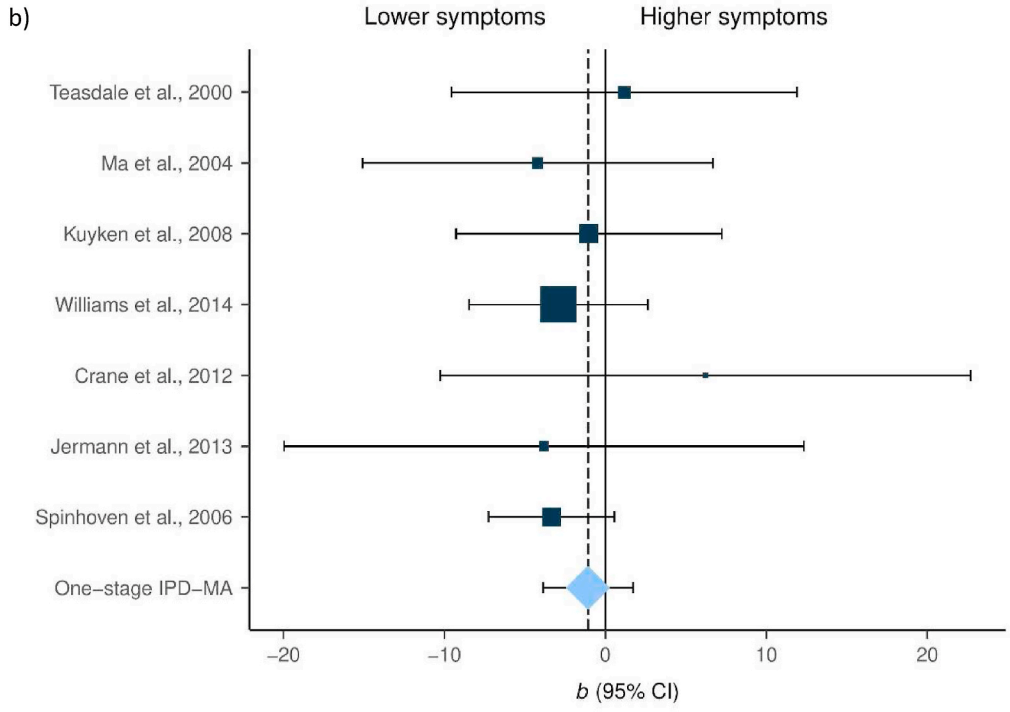
Our finding that post-intervention specificity was not significantly associated with future symptoms also contrasts somewhat with naturalistic studies indicating a small but significant predictive role for specificity in determining depressive course in prior meta-analyses (Hallford et al., 2020; Sumner et al., 2010). A key difference between current and prior results is that here we synthesized treatment trials, while prior meta-analyses used samples who were not engaged in



Note. CBTs= cognitive behavioral therapies. Marker indicates the effect size (*b*) for treatment type and associated 95% confidence interval. Trial marker size reflects trial sample size.

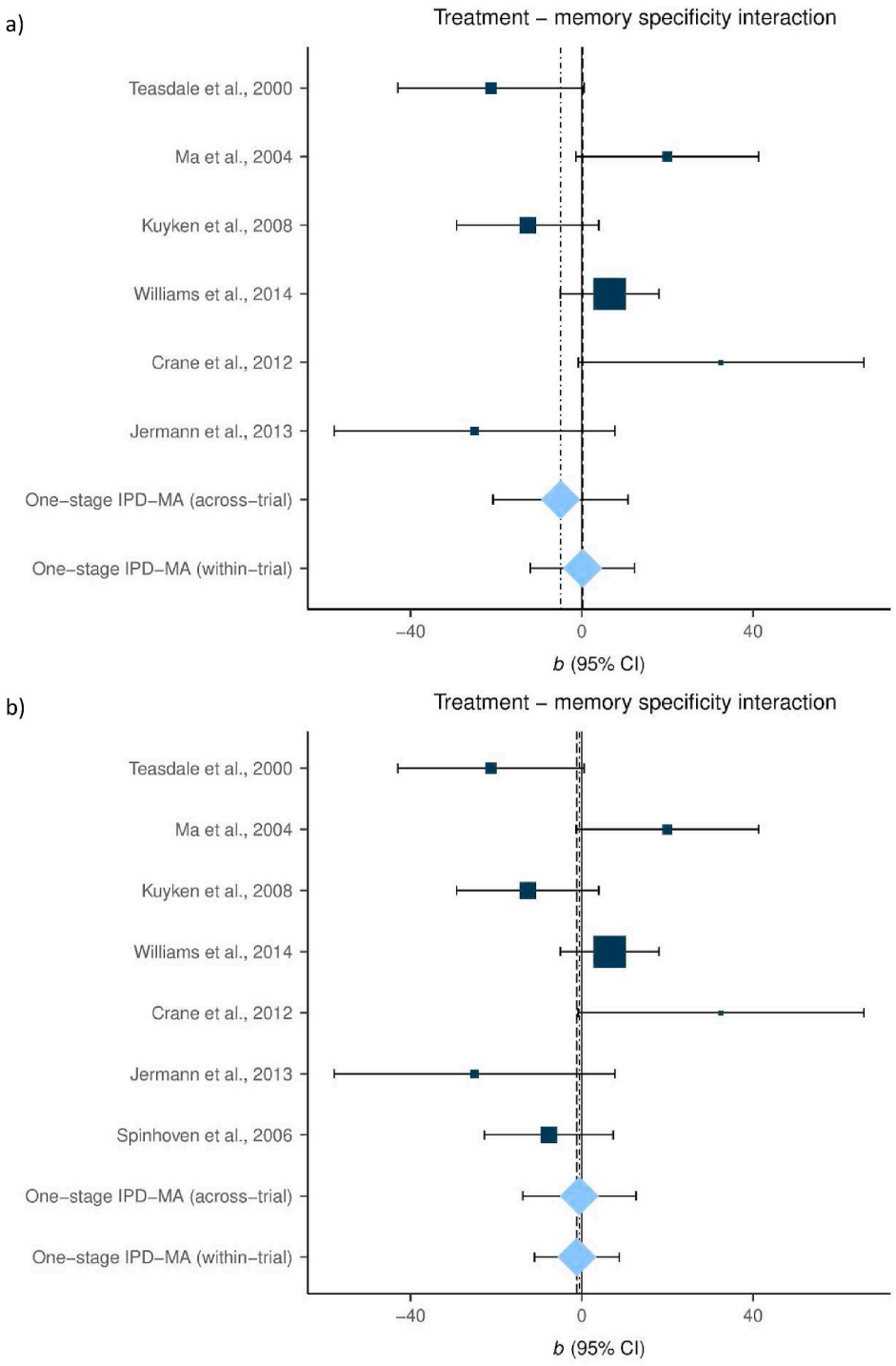
Fig. 2. *Forest plot for the effect of treatment versus control on memory specificity for: a) MBCT studies only; and b) all studiesNote.* CBTs = cognitive behavioural therapies. Marker indicates the effect size (*b*) for treatment type and associated 95% confidence interval. Trial marker size reflects trial sample size.





Note. The models were statistically non-significant but the pattern of effects was in the direction of higher memory specificity predicting lower depressive symptoms at post-treatment. Marker indicates the effect size (*b*) and associated 95% confidence interval. Trial marker size reflects trial sample size

Fig. 3. *Forest plot of the effects of baseline memory specificity on post-treatment depressive symptoms for: a) MBCT studies only; and b) all studiesNote.* The models were statistically non-significant but the pattern of effects was in the direction of higher memory specificity predicting lower depressive symptoms at post-treatment. Marker indicates the effect size (*b*) and associated 95% confidence interval. Trial marker size reflects trial sample size.



Note. Models were statistically non-significant. The interaction effects between treatment (control vs. MBCT/CBTs) and memory specificity at baseline pertain to the mean difference in depressive symptoms at post-treatment on the within- and the across-trial levels, respectively, controlling for baseline depressive symptoms. Individual study markers are within-trial interactions. The marker size of the individual trials reflects their sample size.A negative *b* value indicates that those with higher specificity at baseline would do better in MBCT/CBTs. A positive *b* value indicates that those with higher specificity would do better in comparison conditions.

Fig. 4. *Forest plot for baseline memory specificity as a moderator of the effect of treatment on post-treatment depressive symptoms for: a) MBCT studies only; and b) all studiesNote.* Models were statistically non-significant. The interaction effects between treatment (control vs. MBCT/CBTs) and memory specificity at baseline pertain to the mean difference in depressive symptoms at post-treatment on the within- and the across-trial levels, respectively, controlling for baseline depressive symptoms. Individual study markers are within-trial interactions. The marker size of the individual trials reflects their sample size.A negative *b* value indicates that those with higher specificity at baseline would do better in MBCT/CBTs. A positive *b* value indicates that those with higher specificity would do better in comparison conditions.

treatment. It may be that the overall effect of treatment wipes out any predictive effect of individual differences in specificity identified in naturalistic studies. Another possibility is that in the prior naturalistic studies, reduced memory specificity was related to later relapse simply because worse depression severity correlates with both reduced memory specificity and worse later depression severity/relapse. However, the prior aggregate meta-analyses (Hallford et al., 2020) did control for baseline depressive symptoms, suggesting this is unlikely to be the case. Future research is therefore needed to clarify the conditions in which memory specificity predicts depressive prognosis.

We also completed the first examination of memory specificity as a moderator of treatment response. Again, we found no evidence that pre-treatment memory specificity influenced symptoms at post-treatment differentially for individuals who received MBCT. This result remained the same when synthesising across MBCT and a cognitive therapy study. One possibility is that the role of memory specificity in treatment response and later relapse may be minimal, contrary to theoretical speculations. Alternatively, because the AMT indexes retrieval of specific events, and does not capture sensory-perceptual and contextual detail, it may be a relatively blunt tool to assay the finer, specific detail which is arguably important during therapy.

There are limits on how widely we can generalise our findings. Overall, the number and quality of identified studies was low, and all studies were conducted in the UK or Europe. We are able to conclude that there is no support for memory specificity moderating the effects of MBCT, or being differentially reduced by MBCT. However we cannot generalise our conclusions to CBTs more broadly due to the absence of available data. Similarly, all MBCT studies were aimed at relapse prevention and effects may be evident in treatment programmes which seek to reduce current symptoms. In making use of individual participant data, we were able to overcome any potential issues with the individual studies having relatively mild mean levels of impairment in memory specificity (due to participants being remitted from depression), as use of individual data points meant we were able to examine effects across the spectrum of specificity. However, findings may differ in samples selected on the basis of low memory specificity. Finally, some studies did not prohibit medication-use within the MBCT arm, making it difficult to draw conclusions about the effect of MBCT alone. Future primary research on the role of memory specificity in response to other CBT approaches which draw more heavily upon autobiographical memory (e.g., cognitive therapy for depression or trauma-focussed CBT) may be warranted.

In sum, our findings provide no support for any differential impact of MBCT on memory specificity nor for any moderating role of specificity on MBCT outcomes. Specificity did not improve overall following intervention but there was no support for post-intervention specificity predicting depression prognosis. These results raise important questions regarding the role of memory specificity in treatments for depression. Future research on memory specificity will need to explore a potentially mediating role in broader CBT outcomes, to ensure the most effective use of basic science to enhance clinical practice.

Author statement

CH and TD conceived the study. EW contributed to study design. IK completed the literature search. JR and SP completed study screening, data extraction and risk of bias rating. AS completed study screening and data extraction. FJ, SM, WK, JW, CB, and CC provided datasets and advised on data harmonisation. CH, JR, and CHaag completed data analysis. DF provided supervision of data analysis. CH, JR, and TD wrote the first draft of the manuscript and all authors provided critical revisions.

Declaration of competing interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property.

Acknowledgements

This work was supported by an Economic and Social Research Council award to Dr Hitchcock (ES/R010781/1).

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.brat.2022.104048.

References

Beck, A. T., Steer, R. A., Ball, R., & Ranieri, W. F. (1996). Comparison of Beck depression inventories-IA and-II in psychiatric outpatients. *Journal of Personality Assessment, 67*. https://doi.org/10.1207/s15327752jpa6703_13

Breedvelt, J., Brouwer, M., Harrer, M., Semkovska, M., Ebert, D., Cuijpers, P., et al (in press). To taper or top-up? Preventative psychological interventions as alternative and add-on to antidepressant medication to prevent depressive relapse: A systematic review and meta-analysis. British Journal of Psychiatry.

Cornell, J. E., Mulrow, C. D., Localio, R., Stack, C. B., Meibohm, A. R., Guallar, E., et al. (2014). Random-effects meta-analysis of inconsistent effects: A time for change. *Annals of Internal Medicine, 160*(4), 267–270.

Crane, C., Winder, R., Hargus, E., Amarasinghe, M., & Barnhofer, T. (2012). Effects of mindfulness-based cognitive therapy on specificity of life goals. *Cognitive Therapy and Research, 36*(3), 182–189. https://doi.org/10.1007/s10608-010-9349-4

Fisher, D., Copas, A., Tierney, J., & Parmar, M. (2011). A critical review of methods for the assessment of patient-level interactions in individual participant data meta-analysis of randomized trials, and guidance for practitioners. *Journal of Clinical Epidemiology, 64*(9), 949–967. https://doi.org/10.1016/j.jclinepi.2010.11.016

Griffith, J. W., Sumner, J. A., Raes, F., Barnhofer, T., Debeer, E., & Hermans, D. (2012). Current psychometric and methodological issues in the measurement of overgeneral autobiographical memory. *Journal of Behavior Therapy and Experimental Psychiatry, 43*, S21–S31.

Hallford, D. J., Rusanov, D., Yeow, J., & Barry, T. (2020). Overgeneral and specific autobiographical memory predict the course of depression: An updated meta-analysis. https://psyarxiv.com/gjwsb/.

Hare, D. L., Toukhsati, S. R., Johansson, P., & Jaarsma, T. (2013). Depression and cardiovascular disease: A clinical review. *European Heart Journal, 35*(21), 1365–1372. https://doi.org/10.1093/eurheartj/eht462

Higgins, J. P., Sterne, J. A., Savovic, J., Page, M. J., Hróbjartsson, A., Boutron, I., & Eldridge, S. (2016). A revised tool for assessing risk of bias in randomized trials. *Cochrane Database of Systematic Reviews, 10*(Suppl 1), 29–31.

Hitchcock, C., Rees, C., & Dalgleish, T. (2017). The devil's in the detail: Accessibility of specific personal memories supports rose-tinted self-generalizations in mental health and toxic self-generalizations in clinical depression. *Journal of Experimental Psychology: General, 146*(9), 1286–1295. https://doi.org/10.1037/xge0000343

Hitchcock, C., Rudokaite, J., Patel, S., Smith, A., Kuhn, I., Watkins, E., et al. (2019). Role of autobiographical memory in patient response to cognitive behavioural therapies for depression: Protocol of an individual patient data meta-analysis. *BMJ Open, 9*(6), Article e031110. https://doi.org/10.1136/bmjopen-2019-031110

Jermann, F., Van der Linden, M., Gex-Fabry, M., Guarin, A., Kosel, M., Bertschy, G., & Bondolfi, G. (2013). Cognitive functioning in patients remitted from recurrent depression: Comparison with acutely depressed patients and controls and follow-up of a mindfulness-based cognitive therapy trial. *Cognitive Therapy and Research, 37*(5), 1004–1014. https://doi.org/10.1007/s10608-013-9544-1

de Jong, V. M. T., Moons, K. G. M., Riley, R. D., Tudur Smith, C., Marson, A. G., Eijkemans, M. J. C., et al. (2020). Individual participant data meta-analysis of intervention studies with time-to-event outcomes: A review of the methodology and an applied example. *Research Synthesis Methods, 11*(2), 148–168. https://doi.org/10.1002/jrsm.1384

Kessler, R. C., Zhao, S., Blazer, D. G., & Swartz, M. (1997). Prevalence, correlates, and course of minor depression and major depression in the national comorbidity survey. *Journal of Affective Disorders, 45*(1–2), 19–30. https://doi.org/10.1016/S0165-0327(97)00056-6

Kraemer, H. C., Stice, E., Kazdin, A., Offord, D., & Kupfer, D. (2001). How do risk factors work together? Mediators, moderators, and independent, overlapping, and proxy risk factors. *American Journal of Psychiatry, 158*(6), 848–856. https://doi.org/10.1176/appi.ajp.158.6.848

Kuyken, W., & Brewin, C. R. (1995). Autobiographical memory functioning in depression and reports of early abuse. *Journal of Abnormal Psychology, 104*(4), 585. https://doi.org/10.1037/0021-843X.104.4.585

Kuyken, W., Byford, S., Taylor, R. S., Watkins, E., Holden, E., White, K., … Mullan, E. (2008). Mindfulness-based cognitive therapy to prevent relapse in recurrent depression. *Journal of Consulting and Clinical Psychology, 76*(6), 966. https://doi.org/10.1037/a0013786

Kuyken, W., Warren, F. C., Taylor, R. S., et al. (2016). Efficacy of mindfulness-based cognitive therapy in prevention of depressive relapse: An individual patient data meta-analysis from randomized trials. *JAMA Psychiatry, 73*(6), 565–574. https://doi.org/10.1001/jamapsychiatry.2016.0076

Lemmens, L. H. J. M., Müller, V. N. L. S., Arntz, A., & Huibers, M. J. H. (2016). Mechanisms of change in psychotherapy for depression: An empirical update and evaluation of research aimed at identifying psychological mediators. *Clinical Psychology Review, 50*, 95–107. https://doi.org/10.1016/j.cpr.2016.09.004

Mackinger, H. F., Pachinger, M. M., Leibetseder, M. M., & Fartacek, R. R. (2000). Autobiographical memories in women remitted from major depression. *Journal of Abnormal Psychology, 109*(2), 331–334. https://doi.org/10.1037/0021-843X.109.2.331

Manjaly, Z.-M., & Iglesias, S. (2020). A computational theory of mindfulness based cognitive therapy from the "Bayesian Brain" perspective. *Frontiers in Psychiatry, 11* (404). https://doi.org/10.3389/fpsyt.2020.00404

Ma, S. H., & Teasdale, J. D. (2004). Mindfulness-based cognitive therapy for depression: Replication and exploration of differential relapse prevention effects. *Journal of Consulting and Clinical Psychology, 72*(1), 31–40. https://doi.org/10.1037/0022-006X.72.1.31

McBride, C., Segal, Z., Kennedy, S., & Gemar, M. (2007). Changes in autobiographical memory specificity following cognitive behavior therapy and pharmacotherapy for major depression. *Psychopathology, 40*(3), 147–152. https://doi.org/10.1159/000100003

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting Items for systematic Reviews and meta-analyses: The PRISMA statement. *PLoS Medicine, 6*(7), Article e1000097. https://doi.org/10.1371/journal.pmed.1000097

National Institute for Health and Care Excellence. (2009). Depression in adults: The treatment and management of depression in adults. Retrieved from https://www.nice.org.uk/guidance/CG90.

Riley, R. D., Debray, T. P. A., Fisher, D., Hattle, M., Marlin, N., Hoogland, J., … Ensor, J. (2020). Individual participant data meta-analysis to examine interactions between treatment effect and participant-level covariates: Statistical recommendations for conduct and planning. *Statistics in Medicine, 39*(15), 2115–2137. https://doi.org/10.1002/sim.8516

Shelton, R. C. (2001). Steps following attainment of remission: Discontinuation of antidepressant therapy. *Primary Care Companion to the Journal of Clinical Psychiatry, 3*(4), 168–174. https://doi.org/10.4088/pcc.v03n0404

Spinhoven, P., Bockting, C. L. H., Schene, A. H., Koeter, M. W. J., Wekking, E. M., & Williams, J. M. G. (2006). Autobiographical memory in the euthymic phase of recurrent depression. *Journal of Abnormal Psychology, 115*(3), 590–600. https://doi.org/10.1037/0021-843X.115.3.590

Sumner, J. A., Griffith, J. W., & Mineka, S. (2010). Overgeneral autobiographical memory as a predictor of the course of depression: A meta-analysis. *Behaviour Research and Therapy, 48*(7), 614–625. https://doi.org/10.1016/j.brat.2010.03.013

Teasdale, J. D., Segal, Z. V., Williams, J. M. G., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology, 68* (4), 615. https://doi.org/10.1037/0022-006X.68.4.615

Watkins, E., & Teasdale, J. D. (2001). Rumination and overgeneral memory in depression: Effects of self-focus and analytic thinking. *Journal of Abnormal Psychology, 110*. https://doi.org/10.1037/0021-843x.110.2.333

Williams, J. M. G., Barnhofer, T., Crane, C., Herman, D., Raes, F., Watkins, E. R., et al. (2007). Autobiographical memory specificity and emotional disorder. *Psychological Bulletin, 133*, 122–148. https://doi.org/10.1037/0033-2909.133.1.122

Williams, J. M., & Broadbent, K. (1986). Autobiographical memory in suicide attempters. *Journal of Abnormal Psychology, 95*(2), 5. https://doi.org/10.1037/0021-843X.95.2.144

Williams, J. M. G., Crane, C., Barnhofer, T., Brennan, K., Duggan, D. S., Fennell, M. J. V., … Russell, I. T. (2014). Mindfulness-based cognitive therapy for preventing relapse in recurrent depression: A randomized dismantling trial. *Journal of Consulting and Clinical Psychology, 82*(2), 275–286. https://doi.org/10.1037/a0035036

Williams, J. M. G., Teasdale, J. D., Segal, Z. V., & Soulsby, J. (2000). Mindfulness-based cognitive therapy reduces overgeneral autobiographical memory in formerly depressed patients. *Journal of Abnormal Psychology, 109*(1), 150–155. https://doi.org/10.1037/0021-843X.109.1.150

Article 3

Weber, B., Sala, L., Gex-Fabry, M., Docteur, A., Gorwood, P., Cordera, P., Bondolfi, G., Jermann, F., Aubry, J.-M., & Mirabel-Sarron, C. (2017). Self-Reported Long-Term Benefits of Mindfulness-Based Cognitive Therapy in Patients with Bipolar Disorder. *Journal of Alternative and Complementary Medicine, 23*(7), 534-540.

This study is the result of a collaboration between the University Hospitals of Geneva and the Hôpital Sainte-Anne in Paris. The aim was to determine the long-term benefits and the frequency of mindfulness practices following participation in an MBCT group. The sample consisted of 71 bipolar patients (71.8% bipolar I).

We developed a questionnaire evaluating the overall benefit in terms of relapse prevention, perceived changes related to MBCT as well as the type of mindfulness practice, frequency, and average duration. 29.6% of participants completed the survey less than 2 years after the end of the MBCT group, 42.3% between 2 and 4 years after the end of the group, and 28.2% more than 4 years after the end of the group.

The results show that the overall benefit of MBCT in preventing relapse to depression or hypomania was only moderate (5/10 and 6/10 respectively on a 1(not at all) to 10 (enormously) scale), while participants reported persistent changes in terms of their way of life or philosophy. The most frequent positive changes as a direct consequence of MBCT participation were "being aware that I can help improve my own health" and "being able to care for myself". Approximately half of the participants in the survey mentioned having a formal or informal mindfulness practice at least once a week for between 10 and 30 minutes.

Take home message: One of the long-term consequences of MBCT for participants suffering from bipolar disorder is the perception of a sense of self-efficacy. Having a sense of self-efficacy is essential as it improves the ability to cope better with difficult situations.

THE JOURNAL OF ALTERNATIVE AND COMPLEMENTARY MEDICINE
Volume 23, Number 7, 2017, pp. 534–540

DOI: 10.1089/acm.2016.0427

Self-Reported Long-Term Benefits of Mindfulness-Based Cognitive Therapy in Patients with Bipolar Disorder

Béatrice Weber, MA,[1,2] Loretta Sala, PhD,[3] Marianne Gex-Fabry, PhD,[1] Aurélie Docteur, PhD,[3] Philip Gorwood, MD, PhD,[3,4] Paolo Cordera, MA,[2] Guido Bondolfi, MD, PhD,[2] Françoise Jermann, PhD,[1,2] Jean-Michel Aubry, MD, PhD,[1] and Christine Mirabel-Sarron, MD, PhD[3]

Abstract

Objectives: This study focused on patients with bipolar disorder (BD), several years after their participation in mindfulness-based cognitive therapy (MBCT). It aimed at documenting sustained mindfulness practice, perceived long-term benefit from the program, and changes regarded as direct consequences of the intervention.

Design: This cross-sectional survey took place at least 2 years after MBCT for 70.4% of participants.

Location: It was conducted in two specialized outpatient units for BDs that are part of the Geneva University Hospitals (Switzerland) and the Sainte-Anne Hospital in Paris (France).

Subjects: Eligibility criteria were a diagnosis of BD according to DSM-IV and participation in at least four MBCT sessions. Response rate was 66.4%. The final sample included 71 outpatients (71.8% bipolar I, 28.2% bipolar II).

Outcome measures: A questionnaire retrospectively assessed patient-perceived change, benefit from MBCT, and current mindfulness practice.

Results: Proportions of respondents who practiced mindfulness at least once a week were 54.9% for formal practice (body scan, sitting meditation, mindful walking, or movements) and 57.7% for informal practice (mindful daily activities). Perceived benefit for the prevention of relapse was moderate, but patients acknowledged long-lasting effects and persistent changes in their way of life. Formal mindfulness practice at least once a week tended to be associated with increased long-lasting effects ($p = 0.052$), whereas regular informal practice and mindful breathing were significantly associated with persistent changes in daily life ($p = 0.038$) and better prevention of depressive relapse ($p = 0.035$), respectively. The most frequently reported positive change was increased awareness of being able to improve one's health.

Conclusions: Despite methodological limitations, this survey allowed documenting mindfulness practice and perceived sustained benefit from MBCT in patients with BD. Participants particularly valued increased awareness that they can influence their own health. Both informal and formal practices, when sustained in the long term, might promote long-lasting changes.

Keywords: mindfulness-based cognitive therapy, bipolar disorder, mindfulness practice, long-term benefit, relapse prevention, mood disorder

[1]Mood Disorders Unit, Division of Psychiatric Specialties, Department of Mental Health and Psychiatry, Geneva University Hospitals, Geneva, Switzerland.
[2]Anxiety Disorders Program, Division of Liaison Psychiatry and Crisis Intervention, Department of Mental Health and Psychiatry, Geneva University Hospitals, Geneva, Switzerland.
[3]CMME (Hôpital Sainte-Anne), Université Paris Descartes, Paris, France.
[4]INSERM U894, Center of Psychiatry and Neurosciences, Paris, France.

Introduction

There is growing evidence that major psychiatric disorders are progressive, with better prognosis and response to standard treatment at earlier stages of the illness than at later stages. Initially developed for potentially serious or chronic physical disorders, staging models are increasingly applied in psychiatry,[1,2] and bipolar disorders (BD) in particular.[3–5] A systematic review of several staging models addressed their potential relevance for understanding the BD trajectory and, ultimately, aiding in the selection of stage-specific interventions.[6] According to such models, patients in the latest stages of the bipolar illness are less likely to respond favorably to pharmacological treatment and risk of relapse is about twofold higher than in the earlier stages.[7] Adherence to long-term treatment is another central issue in BD. Thus, adjunctive psychosocial interventions are increasingly recommended and studies supporting their efficacy have been recently reviewed.[8,9]

Mindfulness-based cognitive therapy (MBCT) is an 8-week group program, which integrates mindfulness practice and cognitive therapy, initially developed with the objective to prevent depressive relapse in unipolar depression.[10] According to the U.K. National Institute for Health and Care Excellence (NICE) guidelines, it is currently a recommended intervention for relapse prevention in patients who have experienced more than two prior depressive episodes.[11] Because long-term morbidity data in BD indicate that the time spent in depression is about 35%, compared to 9% in hypomanic or manic episodes,[12] a few studies tested the feasibility and usefulness of MBCT in BD, mainly as adjunctive therapy.[13–15] The first randomized controlled trial of MBCT efficacy in a small sample of patients in remission from BD showed decreased residual depression and anxiety symptoms after the intervention.[16] A later trial compared the efficacy of MBCT and treatment as usual over a 12-month follow-up period in a large sample of subjects with BD ($n=95$). MBCT was associated with a reduction of anxiety, but no difference between groups was observed for depressive and manic symptoms, and time to recurrence or number of recurrences.[17] Recently, a 3-week online mindfulness-based intervention was introduced to address the specific needs of patients in the late stages of BD.[18] Preliminary data supported its feasibility and effectiveness in terms of improved quality of life immediately after the intervention, but the program warrants further development and testing.

A few studies examined MBCT effects on cognitive functioning and brain activity in BD. Following MBCT, participants in an open trial reported improvement of cognitive functioning (executive functioning, memory, and ability to initiate and complete tasks) that correlated with increased mindful and nonjudgmental observance. However, only executive functioning remained significantly improved after 3 months.[19] Another open study reported improved performance in neuropsychological tasks, such as working memory, spatial memory, and verbal fluency, together with increased activation in the medial prefrontal cortex.[20] MBCT also led to improved emotional processing in BD, as assessed by electroencephalogram parameters.[21]

Regular home practice is postulated as a key element to MBCT effectiveness. A survey of 98 mindfulness interventions, which included nonclinical as well as clinical samples presenting with a wide range of physical and mental health conditions, identified 24 studies that tested the hypothesis of a positive association between mindfulness practice and clinical outcome.[22] To our knowledge, a single study examined this issue in BD. It concluded that more regular mindfulness meditation practice during the program was associated with an improvement in depression symptoms at 12-month follow-up.[23] Only 50% of participants continued to meditate at least once a week at that time.

Facing the dearth of data about post-intervention mindfulness practice and MBCT effectiveness in the long term, this survey focused on the perception of patients with BD, several years after their participation in MBCT. We sought to address the following questions: (a) document the frequency and type of mindfulness practice, (b) evaluate the perceived benefit from the program, (c) explore whether practice and perceived benefit were associated with each other and with time since participation, and (d) identify long-term changes perceived as direct consequences of the intervention.

Methods

Study design

This study was conducted in two specialized outpatient units for BD, part of the Geneva University Hospitals (Switzerland) and the Sainte-Anne Hospital in Paris (France). Both structures provide expertise in diagnostic evaluation, as well as treatment recommendations and provision. MBCT is included as a standard treatment option for patients with BD, especially in the late stages of the disorder. In keeping with naturalistic clinical conditions, patient inclusion in the MBCT program does not depend on strict criteria, except for the absence of current abuse or dependence to alcohol or other substances. Most patients have experienced several prior mood episodes and are in remission or only moderately symptomatic at admission in the MBCT program. They generally enter the program upon recommendation of their healthcare providers.

All patients who had participated in MBCT, as part of their standard treatment program, from 2006 to 2011 in Geneva and from 2008 to 2012 in Paris were eligible for this survey if they met diagnostic criteria for bipolar I or II disorder according to DSM-IV (as assessed by experienced psychiatrists) and participated in at least four MBCT sessions. They were contacted from January to February 2012 (Geneva) and January to February 2013 (Paris), either in person or by mail. They received brief information about the study and were invited to fill a questionnaire and return it, together with their written informed consent. A reminder was mailed to participants who did not respond to the first invitation. Response rate was 66.4% (71 of 107 patients). The study protocol was approved by the ethics committee of both hospitals and all participants provided written informed consent.

Mindfulness-based cognitive therapy

MBCT is based on mindfulness-based stress reduction (MBSR), which integrates a secular approach of Buddhist mindfulness, education about stress, and training in coping strategies and assertiveness.[24,25] MBCT combines the

principles of mindfulness with those of cognitive therapy.[10,26] It is a group-based program that consists of weekly meetings (about 2–2.5 h duration) delivered over an 8-week period, with guided mindfulness exercises and compact disc for self-practice. Body scan, sitting meditation, as well as mindful walking or movement, are considered formal meditation practices and their duration is long compared to other practices. Informal practices aim at facilitating the generalization of mindfulness skills into everyday life, by bringing mindful attention to internal and external experiences during daily routine activities. Finally, brief centering exercises called the ''three-minute breathing space'' are used either at neutral times during the day or as ''coping strategies'' when facing difficulties (emotional challenges and stress). Group sessions were conducted by well-trained and experienced instructors. Both during and after MBCT participation, patients' medical treatment (e.g., medication and medical visits) was provided as usual.

Questionnaire

The questionnaire, used in both centers, was elaborated in Geneva by a group of experienced clinicians involved in MBCT instruction and research. It retrospectively assessed patient-perceived change (10 questions coded from 1 = major negative change to 5 = major positive change) and global benefit from the program (four questions on a visual analog scale from 1 = not at all to 10 = enormously). Mindfulness practice was also addressed as follows: frequency of different types of practice (four questions coded from 1 = never or very rarely to 6 = daily), average duration of practice (from 1 = less than 10 min to 5 = more than 45 min), most frequent practice setting (individual or group practice), and readings related to mindfulness (yes or no). The questionnaire is available upon request (original French version and provisional English version).

Data analysis

Descriptive statistics included frequencies and percentages for categorical variables, and median and range for ordinal variables. A missing value was interpreted as no change or no practice for the corresponding variables. Independent samples were compared with the Fisher exact test for categorical variables and the Mann–Whitney *U* test for ordinal variables. The Mantel– Haenszel test for trend and the Jonckheere–Terpstra test for trend were used to test associations with time elapsed since participation in the program. Statistics were computed using SPSS version 20 (IBM Corporation, Armonk, NY). All tests were two tailed, with significance level at 0.05.

Results

Characteristics of survey respondents are provided in Table 1. The majority of participants were females (74.6%), 50 years and older (65.6%), and without professional activity (57.4%). Diagnoses included bipolar I (71.8%) and bipolar II disorders (28.2%). All, but one, were prescribed psychotropic medication (mood stabilizers 87.1%, antidepressants 58.6%, and antipsychotics 48.6%).

The survey took place at least 2 years after termination of the MBCT program for most patients (70.4%). Daily mindfulness practice at that time was infrequent: 4.2% for body scan or sitting meditation, 7.0% for mindful walking or movements, 11.3% for 3-min breathing space, and 14.1% for mindful daily activities. Mindfulness practice at least once a week is documented in Table 1. Formal mindfulness practice was endorsed by 54.9% of respondents. A nonsignificant decrease was observed with increasing time since MBCT participation (<2 years, 71.4%; 2–4 years, 53.3%; >4 years, 40.0%; Mantel–Haenszel test for trend, $p = 0.060$). Informal practice at least once a week was endorsed by 57.7% of respondents, with no effect of time since participation ($p = 0.72$). No significant difference was observed between patients with bipolar I and bipolar II disorders for either formal or informal practice (Fisher exact tests, $p = 0.12$ and $p = 0.59$, respectively). Practice was mostly individual, with only 25.4% of participants still involved in group practice. Duration of practice was 10–30 min for the majority of participants who practiced mindfulness (52.5%).

Perceived benefit from the MBCT program (rated on 1–10 scales) was moderate for the prevention of depressive relapse (median 5, range 1–10, $n = 52$) and hypomanic/manic relapse (median 6, range 1–10, $n = 44$). Nevertheless, long-lasting effects were acknowledged (median 7, range 1–10, $n = 67$): the most frequently cited effects (open question) were ''being in the moment'' ($n = 10$), ''increased self- and body-awareness'' ($n = 7$), and ''relaxation and well-being'' ($n = 5$). The program was perceived as a

Table 1. Characteristics of Former Mindfulness-Based Cognitive Therapy Participants ($N = 71$)

	Frequency	*%*
Female	53	74.6
Male	18	25.4
Age group ($N = 64$)		
30–49	22	34.4
50–59	21	32.8
60–79	21	32.8
Engaged in professional activities ($N = 61$)	26	42.6
Diagnosis		
Bipolar 1	51	71.8
Bipolar 2	20	28.2
Time interval since MBCT participation		
<2 Years	21	29.6
2–4 Years	30	42.3
>4 Years	20	28.2
Current practice (at least once a week)		
Body scan or sitting meditation	22	31.0
Mindful walking or movements	33	46.5
Three minutes breathing space	33	46.5
Mindful daily activities	41	57.7
Setting		
Individual practice	56	78.9
Group practice	18	25.4
Mindfulness readings	31	43.7
Mean duration of practice for respondents who currently practice ($N = 61$)		
<10 Min	22	36.1
10–30 Min	32	52.5
>30 Min	7	11.5

MBCT, mindfulness-based cognitive therapy.

Table 2. Perceived Benefit from the Mindfulness-Based Cognitive Therapy Program According to Mindfulness Practice

	Perceived benefit							
	Prevention of depressive relapse (N = 52)		*Prevention of hypomanic/manic relapse (N = 44)*		*Long-lasting effects (N = 67)*		*Persistent change in way of life or philosophy (N = 64)*	
Type of current mindfulness practice	*Median (range)*	p[a]	*Median (range)*	p[a]	*Median (range)*	p[a]	*Median (range)*	p[a]
Formal practice[b]								
At least once a week	5.5 (1–10)	0.10	6 (1–10)	0.80	7 (2–10)	0.052	7 (2–10)	0.16
Less than once a week	3.5 (1–10)		6 (1–10)		5 (1–10)		5 (1–10)	
Three minutes breathing space								
At least once a week	6 (1–10)	0.035	6 (1–10)	0.53	7 (2–10)	0.76	7 (3–10)	0.24
Less than once a week	3 (1–10)		6 (1–10)		6 (1–10)		5.5 (1–10)	
Informal practice[c]								
At least once a week	6 (1–10)	0.17	6 (1–10)	0.29	7 (2–10)	0.12	7 (3–10)	0.038
Less than once a week	5 (1–10)		5.5 (1–10)		6 (1–10)		5 (1–10)	

[a]Mann–Whitney *U*-test.
[b]Either body scan, sitting meditation, or mindful walking or movements.
[c]Mindful daily activities.

determinant of persistent change in participants' way of life or philosophy of life (median 6, range 1–10, $n = 64$). Perceived benefits tended to decrease with the time elapsed since MBCT participation (prevention of depressive relapse, $p = 0.081$; prevention of hypomanic/manic relapse, $p = 0.063$; long-lasting effects, $p = 0.010$; and modified way of life, $p = 0.043$; Jonckheere–Terpstra trend tests). No significant difference was observed between bipolar I and bipolar II diagnostic groups. Most former participants would recommend MBCT to relatives and friends (93.0%).

The relationship between perceived benefits in the long term and sustained practice was examined by comparing participants who practiced at least once a week and the ones who did not (Table 2). A tendency was observed for formal practice being associated with increased long-lasting effects (Mann–Whitney *U* test, $p = 0.052$). Respondents who practiced mindful breathing regularly reported better prevention of depressive relapse ($p = 0.035$), whereas the ones who were compliant with regular informal practice perceived higher levels of change in their daily life ($p = 0.038$).

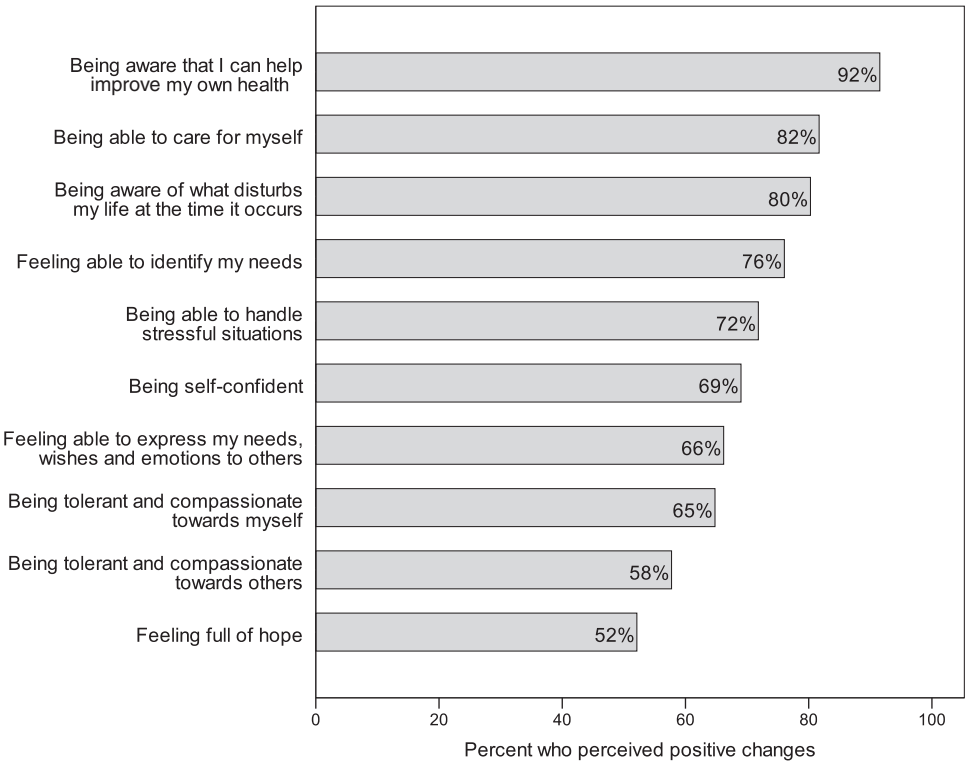


FIG. 1. Percent of participants who perceived some or major positive changes as direct consequences of MBCT participation ($N = 71$). MBCT, mindfulness-based cognitive therapy.

Perceived benefits in the long term did not significantly differ according to whether patients were still involved in group practice or not.

Positive long-term changes perceived as direct consequences of MBCT participation are further documented in Figure 1. Frequencies of positive changes were highest for ''being aware that I can help improving my own health,'' ''being able to care for myself,'' and ''being aware of what disturbs my life at the moment it occurs'' (≥80% of all respondents).

Discussion

To the best of our knowledge, this is the first survey in patients with BD that examined mindfulness practice and perceived benefits from MBCT in the long term, more than 2 years after the program for most respondents. In contrast, efficacy studies of mindfulness-based therapy for anxiety and depression symptoms had a median follow-up period of 12 weeks,[27] whereas relapse prevention studies most often considered 14–18-month observation periods.[28]

Although regular practice of mindfulness meditation is postulated to play a central role in sustained therapeutic effects, few studies have examined the amount and type of practice after termination of the MBCT program. However, a small study in BD showed that 50% of participants continued to meditate at least once a week after 12 months.[23] More than 50% of respondents to the present survey were compliant with such meditation frequency (formal and informal) more than 2 years after MBCT. Results, although encouraging, are also in agreement with an earlier study in unipolar patients that documented a significant decrease over time for formal meditation practice, but not informal practice.[29] This raises the issue of whether the original MBCT protocol[10] might need some adaptation to promote long-term adherence of patients with BD. Among a series of adjustments, Deckersbach et al.[30] proposed to introduce a stepwise approach to meditation and a gradual increase of the duration of practices, to overcome possible attention difficulties of patients with BD.

According to the staging model, treatment recommendations during the late stages of BD are to focus on approaches aimed at preventing relapse, reducing functional decline and improving patients' quality of life. Participants in this survey estimated that MBCT was moderately effective for relapse prevention. Indeed, a 12-month trial in BD did not support a protective effect of MBCT with respect to time to depressive or hypomanic/manic relapse, or number of recurrences.[17] However, patients in this study valued long-lasting benefits from MBCT, such as increased focus in the moment and greater self-awareness, as well as sustained changes in their daily life. Deckersbach et al. similarly observed improvement for a variety of outcome measures that included attention, emotion regulation abilities, psychological well-being, and psychosocial functioning.[13]

Perceived positive changes in this study were congruent with an enhanced sense of self-efficacy, as reported in a relapse prevention study in depression.[31] Self-efficacy has been proposed as a potential mediator of the relationship between greater use of mindfulness skills and improved emotion regulation difficulties.[32] Underlying mechanisms might include perceptual redistancing leading to increased acceptance, reduced anxiety response, and greater self-awareness and self-motivation.[33] A review of 14 qualitative MBCT and MBSR studies in different diagnostic groups led to describe the patients' process of transforming their relationship to the illness experience with four components, which were labeled sense of control, acceptance, command over the body, and ability to take action.[34] Various ''top-down'' and ''bottom-up'' emotion regulation strategies have been examined in relationship with mindfulness practice.[35]

The effectiveness of mindfulness is expected to increase with additional practice and integration of skills. In BD, the amount of mindfulness practice during the 8-week program was associated with improved depression symptoms at 12 months, suggesting that a deeper engagement in the practice might better protect against psychiatric symptoms. In contrast, sustained practice throughout the 12-month follow-up period was not associated with symptom reduction.[23] According to a review of articles evaluating the relationship between mindfulness practice and clinical outcome, only about half provided at least partial support to the expected association.[22] The question of which aspect of mindfulness practice is important (i.e., duration, frequency, quality, or a combination of these aspects) has led to emphasize the need to monitor the quality of mindfulness practice using specific instruments.[36] Another issue is to distinguish between different types of practices (e.g., longer formal meditation practices vs. more flexible informal practices during daily life activities) and their effect on different possible outcomes (e.g., state mindfulness scores, psychiatric symptoms, relapse rate, or quality of life measures). Results are controversial in this respect. More intensive formal practice during MBCT was associated with a reduced risk of relapse in depression.[37] Conversely, in generalized anxiety disorder, beneficial effects on worry, clinician-rated anxiety, and quality of life were associated with the amount of post-treatment informal practice, but not formal practice.[38] This survey provides preliminary support to the role of flexible informal practice with respect to long-lasting changes in the daily life of patients with BD.

Interestingly, sustained practice of short breathing exercises was associated with the perception of better efficacy with respect to the prevention of depressive relapse, but not hypomanic/manic relapse. On the one hand, one may hypothesize that patients' tolerance toward prodromes of depression might be lower than toward signs of escalating mood, postponing the introduction of relapse prevention strategies in the latter situation. On the other hand, one may postulate that specific practices might be needed to prevent depressive and hypomanic/manic relapse, respectively. In particular, mindful walking or movements may allow more grounding and focus in times of acceleration, increased energy, and distractibility.[30]

Several shortcomings of this study need to be pointed out. First, recruitment in specialized outpatient units for BD and limited sample size preclude generalization to more diverse populations, despite a good response rate. Second, we cannot exclude some social desirability bias or acquiescent response bias in reporting perceived benefit and changes. Third, the cross-sectional study design did not allow taking into account some relevant factors, such as pharmacological or psychological treatment during and after MBCT, actual depressive and hypomanic/manic relapse since program

termination, or changes in the amount and quality of practice over time. We also did not adjust for possible confounders, such as the severity of depressive or manic symptoms, when questionnaires were completed. As a consequence, no causal inference can be made with respect to the observed relationship between mindfulness practice and perceived benefit from MBCT.

Conclusions

Despite limitations, this survey speaks in favor of MBCT as an acceptable and beneficial approach in BD. Participants particularly valued increased awareness that they can influence their own health. Both informal and formal practices, when sustained in the long term, might promote long-lasting changes. Future prospective studies should further examine the amount and quality of home practice over time, explore the barriers to practice, and evaluate the impact of means to enhance adherence on different possible target outcomes.

Acknowledgment

We thank Sandra Ter Pelle for her expert technical assistance in article preparation.

Author Disclosure Statement

G.B. is a member of an advisory board for Pfizer, but there is no conflict of interest with this study. For the remaining authors, no conflict of interests is declared.

References

1. McGorry PD, Hickie IB, Yung AR, et al. Clinical staging of psychiatric disorders: A heuristic framework for choosing earlier, safer and more effective interventions. Aust N Z J Psychiatry 2006;40:616–622.
2. Scott J, Leboyer M, Hickie I, et al. Clinical staging in psychiatry: A cross-cutting model of diagnosis with heuristic and practical value. Br J Psychiatry 2013;202:243–245.
3. Berk M, Hallam KT, McGorry PD. The potential utility of a staging model as a course specifier: A bipolar disorder perspective. J Affect Disord 2007;100:279–281.
4. Kapczinski F, Dias VV, Kauer-Sant'Anna M, et al. Clinical implications of a staging model for bipolar disorders. Expert Rev Neurother 2009;9:957–966.
5. Frank E, Nimgaonkar VL, Phillips ML, et al. All the world's a (clinical) stage: Rethinking bipolar disorder from a longitudinal perspective. Mol Psychiatry 2015;20:23–31.
6. Kapczinski F, Magalhaes PV, Balanza-Martinez V, et al. Staging systems in bipolar disorder: An International Society for Bipolar Disorders Task Force Report. Acta Psychiatr Scand 2014;130:354–363.
7. Berk M, Brnabic A, Dodd S, et al. Does stage of illness impact treatment response in bipolar disorder? Empirical treatment data and their implication for the staging model and early intervention. Bipolar Disord 2011;13:87–98.
8. Miziou S, Tsitsipa E, Moysidou S, et al. Psychosocial treatment and interventions for bipolar disorder: A systematic review. Ann Gen Psychiatry 2015;14:19.
9. Salcedo S, Gold AK, Sheikh S, et al. Empirically supported psychosocial interventions for bipolar disorder: Current state of the research. J Affect Disord 2016;201:203–214.
10. Segal ZV, Williams JMG, Teasdale JD. Mindfulness-Based Cognitive Therapy for Depression: A New Approach to Preventing Relapse. New York: Guilford Press, 2002.
11. Segal ZV, Dinh-Williams LA. Mindfulness-based cognitive therapy for relapse prophylaxis in mood disorders. World Psychiatry 2016;15:289–291.
12. Forte A, Baldessarini RJ, Tondo L, et al. Long-term morbidity in bipolar-I, bipolar-II, and unipolar major depressive disorders. J Affect Disord 2015;178:71–78.
13. Deckersbach T, Hölzel BK, Eisner LR, et al. Mindfulness-based cognitive therapy for nonremitted patients with bipolar disorder. CNS Neurosci Ther 2012;18:133–141.
14. Mirabel-Sarron C, Dorocant ES, Sala L, et al. Mindfulness based cognitive therapy (MBCT) dans la prévention des rechutes thymiques chez le patient bipolaire I: Une étude pilote. Ann Médico-Psychol Revue Psychiatr 2009;167:686–692.
15. Weber B, Jermann F, Gex-Fabry M, et al. Mindfulness-based cognitive therapy for bipolar disorder: A feasibility trial. Eur Psychiatry 2010;25:334–337.
16. Williams JMG, Alatiq Y, Crane C, et al. Mindfulness-based cognitive therapy (MBCT) in bipolar disorder: Preliminary evaluation of immediate effects on between-episode functioning. J Affect Disord 2008;107:275–279.
17. Perich T, Manicavasagar V, Mitchell PB, et al. A randomized controlled trial of mindfulness-based cognitive therapy for bipolar disorder. Acta Psychiatr Scand 2013;127:333–343.
18. Murray G, Leitan ND, Berk M, et al. Online mindfulness-based intervention for late-stage bipolar disorder: Pilot evidence for feasibility and effectiveness. J Affect Disord 2015;178:46–51.
19. Stange JP, Eisner LR, Holzel BK, et al. Mindfulness-based cognitive therapy for bipolar disorder: Effects on cognitive functioning. J Psychiatr Pract 2011;17:410–419.
20. Ives-Deliperi VL, Howells F, Stein DJ, et al. The effects of mindfulness-based cognitive therapy in patients with bipolar disorder: A controlled functional MRI investigation. J Affect Disord 2013;150:1152–1157.
21. Howells FM, Laurie Rauch HG, Ives-Deliperi VL, et al. Mindfulness based cognitive therapy may improve emotional processing in bipolar disorder: Pilot ERP and HRV study. Metab Brain Dis 2014;29:367–375.
22. Vettese LC, Toneatto T, Stea JN, et al. Do mindfulness meditation participants do their homework? And does it make a difference? A review of the empirical evidence. J Cogn Psychother 2009;23:198–225.
23. Perich T, Manicavasagar V, Mitchell PB, et al. The association between meditation practice and treatment outcome in Mindfulness-based Cognitive Therapy for bipolar disorder. Behav Res Ther 2013;51:338–343.
24. Kabat-Zinn J. Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness. New York: Delacorte Press, 1990.
25. Kabat-Zinn J. Au coeur de la tourmente, la pleine conscience: MBSR, la réduction du stress basée sur la mindfulness: Programme en 8 semaines. Bruxelles: De Boeck, 2009.
26. Segal ZV, Williams JMG, Teasdale JD. Mindfulness-Based Cognitive Therapy for Depression. 2nd ed. New York: Guilford Press, 2013.
27. Hofmann SG, Sawyer AT, Witt AA, et al. The effect of mindfulness-based therapy on anxiety and depression: A meta-analytic review. J Consult Clin Psychol 2010;78:169–183.

28. Piet J, Hougaard E. The effect of mindfulness-based cognitive therapy for prevention of relapse in recurrent major depressive disorder: A systematic review and meta-analysis. Clin Psychol Rev 2011;31:1032–1040.
29. Bondolfi G, Jermann F, Van der Linden M, et al. Depression relapse prophylaxis with Mindfulness-Based Cognitive Therapy: Replication and extension in the Swiss health care system. J Affect Disord 2010;122:224–231.
30. Deckersbach T, Hölzel B, Eisner L, et al. Mindfulness-Based Cognitive Therapy for Bipolar Disorder. New York: Springer, 2014.
31. Alexander V, Tatum BC, Auth C, et al. A study of mindfulness practices and cognitive therapy: Effects on depression and self-efficacy. Int J Psychol Counsel 2012;4: 115–122.
32. Luberto CM, Cotton S, McLeish AC, et al. Mindfulness skills and emotion regulation: The mediating role of coping self-efficacy. Mindfulness 2014;5:373–380.
33. Shonin E, Van Gordon W, Griffiths MD. Mindfulness-based interventions: Towards mindful clinical integration. Front Psychol 2013;4:194.
34. Malpass A, Carel H, Ridd M, et al. Transforming the perceptual situation: A meta-ethnography of qualitative work reporting patients' experiences of mindfulness-based approaches. Mindfulness 2012;3:60–75.
35. Chiesa A, Serretti A, Jakobsen JC. Mindfulness: Top-down or bottom-up emotion regulation strategy? Clin Psychol Rev 2013;33:82–96.
36. Del Re AC, Fluckiger C, Goldberg SB, et al. Monitoring mindfulness practice quality: An important consideration in mindfulness practice. Psychother Res 2013;23:54–66.
37. Crane C, Crane RS, Eames C, et al. The effects of amount of home meditation practice in Mindfulness Based Cognitive Therapy on hazard of relapse to depression in the Staying Well after Depression Trial. Behav Res Ther 2014;63: 17–24.
38. Morgan LP, Graham JR, Hayes-Skelton SA, et al. Relationships between amount of post-intervention of mindfulness practice and follow-up outcome variables in an acceptance-based behavior therapy for Generalized Anxiety Disorder: The importance of informal practice. J Contextual Behav Sci 2014;3:173–176.

Address correspondence to:
Jean-Michel Aubry, MD, PhD
Mood Disorders Unit
Division of Psychiatric Specialities
Department of Mental Health and Psychiatry
Geneva University Hospitals
20 Bis Rue de Lausanne
1201 Geneva
Switzerland

E-mail: jean-michel.aubry@hcuge.ch

Article 4

Nicastro, R., Jermann, F.**,** Blin, S. B., Waeber, C., & Perroud, N. (2021). Mindfulness Training for Adults with Attention-Deficit/Hyperactivity Disorder: Implementation of Mindful Awareness Practices in a French-Speaking Attention-Deficit/Hyperactivity Disorder Unit. *Journal of Alternative and Complementary Medicine, 27*(2), 179-183.

The main aim of this study was to implement the Mindful Awareness Practices (MAP) program at Geneva University Hospitals in a French-speaking environment unit specialized in the care of adults with ADHD. The secondary objective was to evaluate the effect of MAP on ADHD symptomatology, depressive and anxiety symptomatology, and mindfulness skills. A total of 38 people were included, 30 people attended at least 50% of the sessions and 25 people completed the assessments at baseline, after the MAP program, and 2 months later.

The results show that the MAP program was suitable and feasible in a French-speaking unit specialized in the treatment of adult ADHD. A significant pre-post reduction in the core symptoms of ADHD was demonstrated (large effect size for inattention and medium effect size for hyperactivity/impulsivity). This was maintained during the 2-month follow-up. Concerning depressive and anxiety symptoms, a reduction was also observed pre-post, which was also maintained during the follow-up. Regarding mindfulness skills, changes were observed except for the dimensions of 'acting with awareness' and 'non-judging of inner experience'. It is possible that an effect on this kind of skill only occurs after a longer period of mindfulness practice. This needs to be investigated in the future.

Take home message: The successful implementation of the MAP program in a French-speaking environment offers a new type of care for adults suffering from ADHD at Geneva University Hospitals with promising initial results.

THE JOURNAL OF ALTERNATIVE AND COMPLEMENTARY MEDICINE
Volume 27, Number 2, 2021, pp. 179–183

DOI: 10.1089/acm.2020.0216

JACM

Mindfulness Training for Adults with Attention-Deficit/Hyperactivity Disorder: Implementation of Mindful Awareness Practices in a French-Speaking Attention-Deficit/ Hyperactivity Disorder Unit

Rosetta Nicastro, MA,[1,2] Françoise Jermann, PhD,[1] Sophie Bluteau Blin, CNS,[1] Caroline Waeber, CNS,[1] and Nader Perroud, MD[1–4]

Abstract

Introduction: Mindfulness-based programs are a promising option for patients with attention-deficit/hyperactivity disorder (ADHD), who face attention, hyperactivity, and emotion dysregulation issues in their daily life.

Objective: To examine the implementation and impact of specific mindfulness training for adults with ADHD in a French-speaking unit.

Methods: Thirty-eight adults with ADHD were included in an 8-week Mindful Awareness Practices (MAPs) program. Patients were assessed for ADHD symptoms, anxiety, depression, and mindfulness skills, before (T1) and after (T2) the eight sessions, and then 2 months later (T3).

Results: The patients adhered to the program as the majority of them completed it. A significant decrease in ADHD, depression, and anxiety symptoms was found between T1 and T2. Regarding mindfulness skills, a significant increase was observed between T1 and T2 in Observing, Describing and Nonreactivity to inner experience cores, but not Acting with awareness and Nonjudging of inner experience scores. There was no significant change between T2 and T3.

Conclusion: The MAPs program was successfully implemented and showed promising effects on ADHD symptomatology and related symptoms.

Keywords: ADHD, attention, adult, mindfulness training, depression

Introduction

Attention-Deficit/Hyperactivity Disorder (ADHD) is a neurodevelopmental disorder characterized by inattention, hyperactivity, and impulsivity, which affects around 5% of the adult general population.[1,2] Three presentations of ADHD are described in the American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorders (DSM-5):[3] predominantly inattentive, predominantly hyperactive-impulsive, and combined. ADHD is a lifelong condition associated with marked impairments in familial, social, and professional functioning. Stimulant treatments have been shown to be effective in treating ADHD symptoms, but some patients respond poorly or not at all to treatment,[4,5] some refuse to take medication, and others ask for alternative or complementary approaches. For these

[1]Department of Psychiatry, Service of Psychiatric Specialties, Geneva University Hospitals, Geneva, Switzerland.
[2]Department of Psychiatry, University of Geneva, Geneva, Switzerland.
[3]Department of Psychiatry, Faculty of Medicine, University of Geneva, Geneva, Switzerland.
[4]Department of Psychiatry, Dalhousie University, Halifax, Nova Scotia, Canada.

reasons, mindfulness meditation represents a promising option for ADHD patients.

Mindfulness can be defined as paying attention, on purpose, in the present moment, and nonjudgmentally.[6] It involves sustained attention to, and acceptance of, the present moment[7] and requires a set of skills, including being nonreactive, observing with awareness, acting with awareness, describing with awareness, and adopting a nonjudgmental approach toward one's experience.[8] Initially developed to reduce stress (e.g., related to pain) and prevent relapses into depression, mindfulness-based interventions have since been adapted for several psychologic problems, including coping with pain and fibromyalgia, eating disorders and substance use,[9] and ADHD.[10,11]

Mindfulness might seem incompatible with the profile of ADHD patients, who must deal with loss of vigilance, distractibility, lack of sustained attention, and mind wandering. However, ADHD and mindfulness can join forces, as the principal objectives of mindfulness practice are to learn to be more aware of attention movements and identify the points when attention is lost.

A recent meta-analysis of the impact of mindfulness-based interventions reports that they are beneficial for ADHD symptoms.[11] However, adaptations of classic meditation training methods are recommended to make this practice more suitable and comfortable for ADHD patients. Zylowska[12] developed an eight-step mindfulness meditation program called Mindful Awareness Practices (MAPs). The intervention provides psychoeducation on the clinical symptoms, neurobiology, and etiology of ADHD. Didactic visual supports are used to illustrate and explain the concepts discussed. Each session begins with a short meditation and a discussion of home practice, followed by the introduction and practice of new exercises, the presentation of next week's home practice, and a closing meditation. The mindfulness practice duration is gradually lengthened from 5 to 15 min, rather than the 45 min recommended in more classic programs. Informal practices in everyday life are encouraged and walking meditation can be substituted for sitting meditation to handle impatience and urges to move. A loving kindness practice is also included to address the low self-esteem and frequent judgmental thoughts associated with ADHD.

So far, few studies have been conducted on this specific mindfulness training. In an uncontrolled study, Zylowska et al.[13] examined the feasibility of the 8-week MAPs program in a sample of 24 adults and 8 adolescents with ADHD. ADHD symptoms, anxiety, and depression improved after treatment. In a second pilot study,[14] adults with ADHD were randomly assigned to a MAPs program or a waiting list control group. ADHD symptoms and emotional dysregulation improved for the treatment group compared with the control group. Bueno et al.[15] compared 21 ADHD patients (14 on medication) and 8 healthy subjects who participated in an 8-week MAPs program to 22 ADHD patients and 9 healthy subjects who did not. An increase in quality of life and mood and an improvement in attention were observed for MAPs participants (both patients with ADHD and healthy subjects), but no significant difference between controls and patients was found. Recently, a randomized controlled trial, including 81 medication-free adult ADHD patients[16] compared an 8-week MAPs program to structured psychoeducation. Both treatment groups showed significant improvements in ADHD symptomatology at 8 weeks and the 6-month follow-up, but no difference in symptom reduction was found between the treatment groups. Women seemed to benefit more from the interventions, whereas men showed more pronounced changes during the MAPs treatment.

The principal aim of this study is to implement Zylowska's MAPs program in a French-speaking adult ADHD unit to offer patients a larger treatment panel. A secondary goal is to evaluate the benefits of this practice for mindfulness skills and ADHD and related symptoms.

Methods

Participants

Thirty-eight patients who met the DSM-5 criteria for ADHD[3] were included after assessment by a trained psychiatrist using the semistructured Diagnostic Interview for Adult ADHD, which applies the DSM-5 criteria.[17] Nineteen men and 19 women were included; 63% had a combined presentation and 37% a predominantly inattentive presentation. They were recruited in a specialized center for the diagnosis and care of adult ADHD patients at the Geneva University Hospitals, Switzerland. The MAP program was proposed to them after the diagnostic confirmation in the specialized center, at the beginning of their therapeutic follow-up.

The mean age of the sample was 40.5 years (SD = 11.5), 47% were single ($N = 18$), 42% ($N = 16$) married or in a couple and 11% separated or divorced ($N = 4$). Most participants had completed secondary education ($M = 15.9$ years of education; SD = 2.8) and 66% were employed at the time of the study. A dropout rate of 18.4% ($N = 7$) was observed in the initial sample of 38 patients. The reasons for the dropouts were as follows: one person was hospitalized for somatic reasons, two people complained about anxiety during the sessions, and four people mentioned that the group did not meet their expectations. Among the participants included in the study, 21% participated in <50% of the group sessions, meaning that 30 participants attended at least 50% of the sessions.

Finally, 25 patients (12 men and 13 women; 64% with a combined presentation and 36% with a predominantly inattentive presentation) completed the questionnaires at T1 and T2; 44% of these participants were taking psychostimulant medication (8 patients were treated with methylphenidate, 2 with lisdexamfetamine, and 1 with atomoxetine) during the study. The mean age of this final sample was 41 years (SD = 12.2), 48% were single, 48% married or in a couple, and 4% separated or divorced. Most of them had secondary education (mean = 16.6; SD = 2.8) and 76% were employed at the time of the study.

The study was approved by the ethics committee of the Geneva University Hospitals and informed written consent was obtained from all participants.

Measures

All participants completed the following self-report questionnaires at the beginning and end of the MAPs program, then after 2 months:

- The Adult ADHD Self-Report Scale-V1.1 (ASRS)[18] measures the frequency of hyperactive-impulsive (nine items) and inattentive (nine items) symptoms.
- The Beck Depression Inventory II (BDI-II)[19] was used to assess the presence and severity of depression symptoms. It includes 21 items rated on a 4-point scale (0–3). The total score ranges from 0 to 63, with higher scores indicating greater severity.
- The State-Trait Anxiety Inventory (STAI)[20] measures the presence and severity of anxiety symptoms and proneness to be anxious. There are two subscales: the State Anxiety Scale (20 items), which evaluates the current state of anxiety, and the Trait Anxiety Scale (20 items), which evaluates stable aspects of anxiety proneness. Raw scores of 0–39 are considered to indicate nonclinical anxiety, scores of 40–51 indicate moderate clinical anxiety, and scores >51 indicate high clinical anxiety.
- The Five Facet Mindfulness Questionnaire short form (FFMQ-SF)[21] is a 24-item version of the original version by Baer et al.[8] The following mindfulness facets are measured: Observing, Describing, Acting with awareness, Nonjudging of inner experience, and Nonreactivity to inner experience. The items are rated on a 5-point Likert scale, ranging from 1 (never or very rarely true) to 5 (very often or always true). Scores range from 5 to 25 except for Observing (range 5–20), with higher scores indicating better mindfulness skills.

Intervention

Four 8-week MAPs programs, including 8–10 participants each were conducted for a 2-year period. Each group session lasted 2 h and was led by two psychiatric nurses with personal mindfulness practice and expertise in ADHD symptomatology and mindfulness training. A first pretreatment introductory meeting was led by an expert ADHD psychiatrist. Information about ADHD symptoms and the rationale for mindfulness practice was provided. The following eight steps were trained: attention and the five senses; mindful breathing; mindfulness of sound, breath and body; mindfulness of body sensations and movement; mindfulness of thoughts; mindfulness of feelings; mindful listening and speaking; and mindful decisions and actions. Two months after the end of the program, participants met again for a 2-h follow-up session. Homework was given in the form of formal mindfulness practice or informal mindfulness practice in everyday life and participants were strongly encouraged to complete it. Patients received handouts and audio recordings. During the program, patients followed their usual pharmacologic treatment.

Data analysis

Repeated measures *t* tests were computed to assess possible differences between T1 (pregroup) and T2 (postgroup) and possible changes from T2 to the 2-month follow-up (T3). All analyses were performed using SPSS. The significance level was set at 0.05.

Results

Means and SDs at T1 (pregroup), T2 (postgroup), and T3 (2-month follow-up) for each variable are presented in Table 1. Repeated measures *t* tests showed a significant decrease in hyperactive-impulsive and inattentive symptoms (ASRS) between T1 and T2, as well as in depressive (BDI-II) and anxiety symptoms (STAI) (Table 1).

Regarding mindfulness skills, repeated measures *t* tests showed an increase in Observing, Describing, and Nonreactivity to inner experience scores (Table 1). There was,

Table 1. Mean (SD) for Scores on the ASRS, BDI-II, STAI, and FFMQ at T1, T2, and T3

	N	T1	T2	t	p *T1 vs. T2*	d	*Follow-up*	N	T3	t	p *T2 vs. T3*	D
Adult ADHD self-report scale	24							19				
Inattention		25.5 (6.2)	22.3 (6.4)	4.36	<0.001	0.90			22.3 (5.5)	1.15	0.26	0.3
Hyperactivity/ impulsivity		21.9 (5.0)	19.5 (5.7)	1.22	<0.01	0.60			18.9 (5.4)	1.22	0.24	0.3
Beck depression inventory-II	24							20				
		18.4 (12.0)	10.6 (8.2)	3.67	<0.01	0.80			9.5 (9.2)	0.89	0.39	0.2
State-trait anxiety inventory	23							18				
State		52.3 (10.3)	46.5 (10.8)	2.54	<0.05	0.50			43.3 (12.5)	1.34	0.20	0.5
Trait		54.5 (10.5)	48.4 (10.9)	3.11	<0.01	0.70			46.9 (11.9)	0.24	0.82	0.7
Five facet mindfulness questionnaire	23							18				
Observe		13.0 (3.2)	14.4 (3.0)	2.04	0.05	0.40			15.11 (3.5)	–0.95	0.36	0.2
Describe		14.1 (4.0)	15.3 (4.0)	2.60	<0.05	0.50			15.9 (4.8)	–1.20	0.25	0.3
Act with awareness		14.7 (4.6)	14.7 (3.5)	0.05	0.96	0.01			14.6 (3.6)	–0.57	0.58	0.1
Accept without judgment		15.5 (4.1)	16.2 (4.0)	0.71	0.48	0.20			16.8 (3.8)	–0.70	0.50	0.2
Nonreactivity to inner experience		10.4 (3.0)	13.1 (3.4)	3.76	<0.01	0.80			14.4 (3.9)	–0.85	0.41	0.2

ADHD, attention-deficit/hyperactivity disorder.

however, no change in Acting with awareness and Nonjudging of inner experience scores between T1 and T2.

For all variables, analyses showed that there was no significant change between the end of the sessions (T2) and the 2-month follow-up (T3).

Discussion

The aim of this study was to present the implementation of an 8-week MAPs program in a French-speaking unit for adults with ADHD, and to describe its results. To the authors' knowledge, this is the first implementation and evaluation of this treatment in a French-speaking population. Moreover, it is also of specific value as it was led by an independent team without the involvement of the developer of the MAPs. Lack of independence is mentioned as a possible bias (allegiance effect) in psychotherapy research.[22] The authors reported 82% of completed treatments, which matches the 78% adherence rate described by Zylowska et al.[13] This participation rate suggests that the mindfulness practice program adapted for ADHD populations is a feasible and well-tolerated intervention.

Although the intervention was relatively short, it was associated with a significant decrease in the severity of core ADHD symptoms, with a large effect size for inattention (0.90) and a medium effect size for hyperactivity-impulsivity (0.60) scores on the ASRS. These results show that mindfulness practice engages and improves sustained attention to the present moment, mind wandering and distraction monitoring, and attention flexibility.[23] The reduction in hyperactivity-impulsivity symptoms is also consistent with studies that examined the impact of mindfulness practice on executive functions, and specifically cognitive and motor inhibition. In fact, several studies found improvements in inhibition of automatic responses after mindfulness meditation.[24] Being more aware of one's own thoughts, emotions, behaviors, and urges contribute to mental control and self-regulation, which are necessary to achieve goals and avoid impulsive behaviors.

Regarding mindfulness skills, the results show improved scores on the Observe, Describe, and Nonreactivity to inner experience subscales of the FFMQ-SF (Table 1), whereas no statistically significant change was observed for Acting with awareness and Nonjudging of inner experience. Observing and describing are core skills in mindfulness practice as they require attention to one's experiences in the present moment. They involve noticing thoughts, feelings, and sensations without considering their quality or content. Nonreactivity to inner experience is the ability to take a nonattached stance toward what is observed. In ADHD, behavioral and cognitive impulsivity and especially an urge to act when an emotion is felt are often described. Mindfulness practice is apparently an efficient way to observe and restrain emotional urges to action and impulsive behaviors, as it facilitates self-monitoring. However, the abilities to act with awareness and adopt a nonjudgmental position may require more practice before a change is observed. Changes in these skills were reported in a 12-month follow-up trial assessing the benefice of a structured psychoeducational CBT treatment for ADHD, including mindfulness practice. Further studies more specifically on MAPs must be conducted to clarify this point.

Results showed a decrease of depressive symptoms (BDI-II), with a large effect size (0.80), and of anxiety symptoms, with medium effect sizes (STAI state 0.50; STAI trait 0.70). These changes in depression and anxiety are similar to those reported by Zylowska et al.[13] with the MAPs program and with mindfulness-based interventions more generally.[10] Mindfulness practice encourages the observation of emotions and negative thoughts, which could help to reduce anxiety and depressive symptoms. However, other factors such as group support or psychoeducation elements could have contributed to the positive effect of the MAP intervention.

For all participants, there was no significant change between the end of the group sessions (T2) and the 2-month follow-up (T3), suggesting that the improvement could be maintained over time. The focus on practicing exercises in everyday life might contribute to the integration and maintenance of mindfulness skills over time.

Limitations

The major limitation of this study is the absence of a control group or a randomization procedure. The second limitation is the small sample size. However, the authors' principal goal was to assess the feasibility and implementation of the program in a French-speaking population. Participation was voluntary. Participants were included when they expressed an interest in the MAPs program. In further studies it would be interesting to include a control condition and to enroll a larger sample of participants, which would make it possible to identify indicators of response or nonresponse and define a specific profile of patients who benefit most from this kind of mindfulness intervention. It would also be interesting to assess the level of at home practice to assess the specific effect of the frequency of mindfulness practice on mindfulness skills improvement. Another limitation concerns the fact that one cannot rule out the possibility that a change in mental condition or stress level explained the improvement in ADHD variables. Further studies should control for the presence of mood disorders in patients to ensure that any change is explained by attention training.

In the authors' experience, group members often reported that the group was an important resource for information sharing and mutual support. They also appreciated the nonjudgmental compassionate climate. The authors have recently added a satisfaction questionnaire and a measure of home practice to answer these questions.

Conclusion

Preliminary outcomes support the feasibility and interest of the program for patients, whether or not they are receiving pharmacologic treatment. The MAPs program was successfully implemented in a French-speaking population. The results of the pre–post assessments must be considered exploratory; nonetheless, they are promising. The stability of the results at the 2-month follow-up is very promising for adult ADHD patients who have often difficulties integrating and maintaining newly learned skills. A longer follow-up should be proposed to assess the impact of this kind of mindfulness program, including repeated practice, on a chronic condition such as ADHD.

Author Disclosure Statement

No competing financial interests exist.

Funding Information

No funding was received.

References

1. Fayyad J, De Graaf R, Kessler R, et al. Cross-national prevalence and correlates of adult attention-deficit hyperactivity disorder. Br J Psychiatry 2007;190:402–409.
2. Kessler RC, Adler L, Barkley R, et al. The prevalence and correlates of adult ADHD in the United States: Results from the National Comorbidity Survey Replication. Am J Psychiatry 2006;163:716–723.
3. American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. Arlington, VA: American Psychiatric Association, 2013.
4. National Institute for Health and Care Excellence. Attention Deficit Hyperactivity Disorder: Diagnosis and Management. NICE Guideline, 2018 [homepage on the Internet]. Online document at: www.nice.org.uk/guidance/NG87, accessed September 13, 2019.
5. Wigal SB. Efficacy and safety limitations of attention-deficit hyperactivity disorder pharmacotherapy in children and adults. CNS Drugs 2009;23:21–31.
6. Kabat-Zinn J, Hanh TN. Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness. New York: Random House Publishing Group, 2009.
7. Bishop SR, Lau M, Shapiro S, et al. Mindfulness: A proposed operational definition. Clin Psychol Sci Pract 2004; 11:230–241.
8. Baer RA, Smith GT, Lykins E, et al. Construct validity of the five facet mindfulness questionnaire in meditating and nonmeditating samples. Assessment 2008;15:329–342.
9. Khoury B, Lecomte T, Fortin G, et al. Mindfulness-based therapy: A comprehensive meta-analysis. Clin Psychol Rev 2013;33:763–771.
10. Poissant H, Mendrek A, Talbot N, et al. Behavioral and cognitive impacts of mindfulness-based interventions on adults with attention-deficit hyperactivity disorder: A systematic review. Behav Neurol 2019;2019:5682050.
11. Xue J, Zhang Y, Huang Y. A meta-analytic investigation of the impact of mindfulness-based interventions on ADHD symptoms. Medicine 2019;98.
12. Zylowska L. The Mindfulness Prescription for Adult ADHD: An 8-Step Program for Strengthening Attention, Managing Emotions, and Achieving Your Goals. Boston, MA: Shambhala, 2012.
13. Zylowska L, Ackerman DL, Yang MH, et al. Mindfulness meditation training in adults and adolescents with ADHD: A feasibility study. J Atten Disord 2008;11:737–746.
14. Mitchell JT, McIntyre EM, English JS, et al. A pilot trial of mindfulness meditation training for ADHD in adulthood: Impact on core symptoms, executive functioning, and emotion dysregulation. J Atten Disord 2013;21:1105–1120.
15. Bueno VF, Kozasa EH, da Silva MA, et al. Mindfulness meditation improves mood, quality of life, and attention in adults with attention deficit hyperactivity disorder. Biomed Res Int 2015;2015:962857.
16. Hoxhaj E, Sadohara C, Borel P, et al. Mindfulness vs psychoeducation in adult ADHD: A randomized controlled trial. Eur Arch Psychiatry Clin Neurosci 2018;268:321–335.
17. Kooij JJS. Adult ADHD: Diagnostic Assessment and Treatment. New York: Springer, 2012.
18. Adler L, Kessler R, Spencer T. Adult Self Report Scale, ASRS-V1.1 Screener. New York: World Health Organization, 2003.
19. Beck AT, Steer RA, Ball R, Ranieri W. Comparison of beck depression inventories-IA and -II in psychiatric outpatients. J Pers Assess 1996;67:588–597.
20. Spielberger CD, Gorsuch RL, Lushene R, et al. Manual for the State-Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychologists Press, 1983.
21. Bohlmeijer E, Ten Klooster PM, Fledderus M, et al. Psychometric properties of the five facet mindfulness questionnaire in depressed adults and development of a short form. Assessment 2011;18:308–320.
22. Chambless DL, Hollon SD. Defining empirically supported therapies. J Consult Clin Psychol 1998;66:7–18.
23. Malinowski P. Neural mechanisms of attentional control in mindfulness meditation. Front Neurosci 2013;7:8.
24. Gallant SN. Mindfulness meditation practice and executive functioning: Breaking down the benefit. Conscious Cogn 2016;40:116–130.

Address correspondence to:
Rosetta Nicastro, MA
Department of Psychiatry
Service of Psychiatric Specialties
Geneva University Hospitals
Rue de Lausanne 20bis
Geneva 1201
Switzerland

E-mail: rosetta.nicastro@hcuge.ch

III. Conclusion

A. Mindfulness-based Interventions (MBIs) in psychiatry: scientific evidence

Mindfulness entered the field of Western medicine some forty years ago, and more specifically the field of psychiatry some twenty years ago. After these twenty years, there is now an empirical basis for the efficacy of mindfulness-based interventions in the field of psychiatry (Goldberg et al., 2018). A decisive factor was the development of MBCT, the first mindfulness-based intervention aimed at a psychiatric population. The development of MBCT was made possible by expert clinician-researchers in the field of depression, who were able to identify points of convergence between their knowledge (e.g. cognitive vulnerability) and the possible contributions of mindfulness to the prevention of depressive relapse. This enabled them to develop an intervention specifically tailored to the needs of participants remitted from depressive episodes but at high risk of relapse. Their scientific background allowed them to test their hypotheses with a methodology based on randomized controlled trials, which is essential for evidence-based medicine. Over the years, numerous studies have shown that the relapse rate was lower among participants having participated in an MBCT group compared to the relapse rate of control participants (moderate effect size - Goldberg et al., 2018). When the participation in an MBCT group has been compared to an active treatment (e.g. antidepressant treatment), the data indicate similar efficacy (non-inferiority), which offers an interesting alternative for people at high risk of relapse who wish to develop skills for prevention. In addition to the prevention of depressive relapse for people suffering from recurrent unipolar depressive disorder, other mindfulness-based interventions aimed at psychiatric populations have emerged. In this work, we have focused our attention on the development of mindfulness-based interventions for two other psychiatric disorders, bipolar disorder, and ADHD. The results indicate a positive effect of MBIs for both disorders but at this stage, the results are only preliminary, as they still need to be confirmed by RCT studies based on sound methodology. This work is in progress.

Currently, the scientific community in the field of mindfulness is particularly interested in the mechanisms of action that lead to the observed benefits. To gain a better understanding of these mechanisms, theoretical models have been proposed, the benefits reported by MBIs' participants have been analyzed (qualitative methodology) and several studies have specifically tested certain mechanisms. Several authors postulated that one of these mechanisms could be an increase in attentional abilities as the practice of mindfulness calls for different types of attention (see definition in point I.A.1.). This hypothesis was already present in 1995, few years before the publication of MBCT

when the authors of this intervention (John Teasdale, Zindel Segal and Mark Williams) published a review entitled "How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness) training help?" (Teasdale et al., 1995). However, to date, the data in the literature whatever the psychiatric population is not sufficient to conclude that a mindfulness-based intervention has an impact on cognitive functioning. Another hypothesis was to link the frequency and duration of mindfulness meditation practice at home (homework between sessions) to the results observed. Two systematic reviews of the literature note methodological difficulties such as variability between studies and difficulty in measuring for instance informal practices and indicate at most small positive associations between home-practice and clinical outcomes (Lloyd et al., 2018, Parsons et al., 2017). To date, other mechanisms of action must be evaluated. Several candidates have emerged from feedback from participants (e.g. a sense of agency; acceptance), theoretical models (e.g. motivation to engage, capacity to monitor the experience, changing the orientation to experience, ability to step aside, capacity to self-regulate) (see section I.B.4.) and studies which have evaluated mediators (e.g. mindfulness, repetitive thinking) (see sections I.B.3. and I.B.4.). Future studies will undoubtedly shed new light on this question of mechanisms of action, which is currently still open.

As we have seen, the effects of the MBIs are either positive or promising and still require further validation. However, as with any development of a scientifically validated intervention (e.g. medication), it is also important to consider the possible side-effects that a mindfulness-based intervention could cause. Currently, more than 80% of clinical trials in the field of mindfulness do not mention the occurrence or non-occurrence of adverse effects (Wong et al., 2018). Thus, several authors have invited the scientific community to address contraindications for participation in a mindfulness-based intervention and possible side effects (Van Dam et al., 2018). This lack of information about the occurrence of adverse effects is not specific to the field of mindfulness. Indeed, as pointed out by Jonsson et al. (2014), this lack is also a fact in the field of psychological interventions. The definition of adverse events in the field of mindfulness must take several aspects into account (Binda et al., 2022). A distinction must be made between serious adverse events (e.g. hospitalization, serious harm) and minor and transient adverse events. In addition to this distinction, the identification of an adverse event must consider the fact that an approach based on mindfulness is, by its very nature, an approach that proposes that participants become increasingly aware of their thoughts, emotions, and sensations, which in turn may lead them to encounter unpleasant experiences. When faced with unpleasant experiences, an automatic reaction corresponds to a tendency to flee, suppress, or avoid them. In mindfulness meditation, for example, people are invited to direct their attention toward what is present, whether this is positive, negative, or neutral. Let's imagine that the person

feels sad and turns their attention to it. The very process of mindfulness is an invitation to be present to the emotions, bodily sensations, thoughts, etc. moment by moment. Mindfulness is a way of getting off automatic pilot by being present to what is there, without judgment. By being present, people can discover how they function when faced with difficulties, gain a better understanding of the relationship between mind and body, and experience impermanence. Finally, if an adverse event is identified, it is also a question of determining whether the adverse event is related to the mindfulness-based intervention or independent of it.

A systematic review including 36 RCT studies on MBSR or MBCT that includes a statement concerning adverse events has recently been carried out (Wong et al., 2018). The authors distinguished between adverse events that could be linked to the intervention and those that were independent. Among the studies included, 25 concerned MBSR for a total of 1231 participants. No study reported a serious adverse event and six participants out of a total of 1231 (0.49%) mentioned an adverse event related to the intervention. These were feelings of anger, anxiety, soreness, and strained neck. Among the 11 MBCT studies (for a total of 768 participants), two studies reported serious adverse events (hospitalization, death). In both studies, these events were unrelated to the intervention and occurred in both the intervention and control groups. In summary, the low incidence of adverse events means that MBSR and MBCT can be considered safe interventions.

B. Some thoughts on quality standards for research into MBIs

Since the development of MBCT, a wide variety of mindfulness-based interventions have been developed. Crane et al. (2017) have defined what are the essential elements and what are the variable elements for a program to be considered “mindfulness-based” (they use the metaphor of 'wrap and weft' for the essential elements and variable elements). The *wrap elements* are that the program is based on recognized theories and practices in the field of contemplative traditions and sciences (medicine, psychology, education), rests on a model that accounts for human distress and pathways for relieving it, contributes to developing a new relationship with experience, better self-regulation capacities, positive qualities such as compassion, wisdom and encourages experiential engagement of participants in mindfulness meditation practices accompanied by an inquiry-based learning process. Another key element of mindfulness-based programs is that those are led by a teacher who is trained to enable effective delivery of the program, with the capacity to embody the qualities and attitudes of mindfulness and contribute to the learning process. The *weft elements* are related to the specific curriculum, populations, and contexts for whom the program is featured. The teacher has the

underlying theoretical knowledge and professional training related to the populations that the mindfulness-based course is delivered.

As mentioned above, an essential element is the MBI instructors' qualifications. In the case of MBCT, for example, a training pathway defining the steps required to be recognized as an MBCT instructor has been put in place https://www.mbct.com/wp-content/uploads/2020/12/mbct-training-pathway_version-11_jan__2018.pdf. This training pathway ensures that the people who deliver MBCT are delivering the MBCT protocol and not creating something that deviates from it. The stages are made up of practical-theoretical sessions and supervision by recognized and experienced instructors. This is essential to ensure the integrity of the protocol. Unfortunately, this type of training is not necessarily available for MBIs other than MBCT (and MBSR) and this raises the question of the training of people who teach MBIs when the latter is not an adaptation of MBCT, for example.

In addition to the completion of the training pathway, which is a must for all MBCT instructors, efforts have been made to identify criteria for assessing instructor competence (Crane et al., 2013). The authors have identified six areas of competence: 1. Coverage, pacing, and organization of session curriculum ; 2. Relational skills ; 3. Embodiment of mindfulness ; 4. Guiding mindfulness practices ; 5. Conveying course themes through interactive inquiry and didactic teaching; 6. Holding the group learning environment. Instructors' skills are rated from Incompetent to Advanced for each domain. Such an instrument has the merit of identifying the quality standards expected of mindfulness-based intervention instructors, but its use in the scientific literature remains partial. Indeed, one of the limitations is probably having enough people trained in the use of the MBI:TAC to ensure reliability across assessments. The authors of the instrument have developed a training pathway to learn to use the MBI:TAC https://mbitac.bangor.ac.uk/training.php.en.

The proliferation of mindfulness-based interventions in psychiatry and the explosion of studies in this field have prompted several authors to identify precautions and priorities for the future. For example, Dimidjian et Segal (2015) analyzed the type of MBCT or MBSR studies conducted between 1985 and 2013 according to the National Institute of Health stage model (Onken et al., 2013). This framework defines 5 stages in the development, evaluation, and implementation of therapeutic interventions (see Table 4).

Table 4. National Institute of Health stage model

Stage 0	Basic research to understand the mechanisms and processes specific to a given disorder
Stage I	Intervention development based on data from basic science
Stage II	Efficacy of the intervention in ideal and controlled conditions - comparison of intervention participants to wait-list controls or active controls
Stage III	Real-world testing
Saage IV	Effectiveness
Stage V	Dissemination and implementation

Dimidjin and Segal's findings show that 25% of studies were devoted to stage 0, 45% to stage I, 20% and 9% to stage II respectively compared to waiting list controls and active controls, <1% to stage III, 1% to stage IV and <1% to stage V. Since 2013, MBCT research for the prevention of depressive relapse, the number of studies towards higher stages has progressed although still very modestly. At this stage, the efficacy of MBCT has been well demonstrated, and priority should be given to stages III, IV, and V studies. This work is already underway, of course, with for example the dissemination and implementation of MBCT online in the community (Segal et al., 2020). In this work, we looked at the development of mindfulness-based interventions for people with bipolar disorder or ADHD. Considering the National Institute of Health stage model, the studies carried out to date are essentially stage 0, I, or II studies as was the case some 5-10 years ago in the field of MBCT. One essential point will be to pay particular attention to the methodology of the studies. Authors of future studies should define an initial research question and then consider whether : An RCT is possible? Which control group is appropriate? What sample size is needed? What should be the follow-up duration? And of course, the qualifications of the instructors, the adherence of the participants, and any dropouts or adverse events should be systematically mentioned in the publications.

C. My research trajectory

I work 100% as a psychologist-psychotherapist in the Department of Psychiatry. By way of example, I'd like to mention two different types of study that I'm currently carrying out, which illustrate how I continue my research activities in this field of mindfulness.

I've been teaching MBCT groups for many years. So, for several years, at the last MBCT session (part of the MBCT protocol), I collected the opinions of participants in an MBCT group. Participants are asked to indicate on a scale of 1 to 10 "How important was the MBCT program to you?" and to write down why they gave this rating. This feedback provides an important body of data on which to base a

qualitative analysis. The first steps have already been carried out with a student as part of her Master of Medicine thesis.

In September 2021, together with Dre Camille Nemitz-Piguet (Faculty of Medicine – Department of Psychiatry) and Prof. Serge Rudaz (Faculty of Sciences - School of Pharmaceutical Sciences), we secured funding from the Swiss National Science Foundation for a randomized controlled study evaluating the impact of a mindfulness-based group (MBCT for Life – MBCT-L) with healthcare students (FNS 32003B_205111/1: "Mindfulness-Based Intervention to reduce stress and improve prosocial skills for health-care students: a translational RCT integrating clinical, neuroimaging and biomedical outcomes"). This project is unique in that it draws on our 3 areas of expertise: I'm responsible for the mindfulness intervention integrity and the clinical/psychological aspects, Prof. Rudaz for the biomedical analyses, and Dre Nemitz-Piguet for the neuroimaging aspects. We have already included 162 students and are in the process of completing the last MBCT-L groups.

To conclude this thesis, I would like to take the opportunity to thank Prof. Bondolfi for all the years we have worked together on mindfulness and especially for his unfailing support throughout my career. Thank you Guido!!!

IV. References

1. Alsubaie M, Abbott R, Dunn B, et al. Mechanisms of action in mindfulness-based cognitive therapy (MBCT) and mindfulness-based stress reduction (MBSR) in people with physical and/or psychological conditions: A systematic review. Clin Psychol Rev 2017;55:74-91.

2. American Psychiatric Association. Diagnostic and statistical manual of mental disorders: DSM-5™. 5th ed. Arlington, VA: American Psychiatric Publishing; 2013.

3. Baer RA, Smith GT, Allen KB. Assessment of Mindfulness by Self-Report:The Kentucky Inventory of Mindfulness Skills. Assessment 2004;11:191-206.

4. Baer RA, Smith GT, Hopkins J, Krietemeyer J, Toney L. Using Self-Report Assessment Methods to Explore Facets of Mindfulness. Assessment 2006;13:27-45.

5. Baminiwatta A, Solangaarachchi I. Trends and Developments in Mindfulness Research over 55 Years: A Bibliometric Analysis of Publications Indexed in Web of Science. Mindfulness 2021;12:2099-116.

6. Bergomi C, Tschacher W, Kupper Z. Konstruktion und erste Validierung eines Fragebogens zur umfassenden Erfassung von Achtsamkeit. Diagnostica 2014;60:111-25.

7. Binda DD, Greco CM, Morone NE. What Are Adverse Events in Mindfulness Meditation? Global Advances in Health and Medicine 2022;11:2164957X221096640.

8. Bishop SR, Lau M, Shapiro S, et al. Mindfulness: A proposed operational definition. Clin Psychol (New York) 2004;11:230-41.

9. Bohlmeijer E, Prenger R, Taal E, Cuijpers P. The effects of mindfulness-based stress reduction therapy on mental health of adults with a chronic medical disease: a meta-analysis. J Psychosom Res 2010;68:539-44.

10. Bondolfi G, Jermann F, der Linden MV, et al. Depression relapse prophylaxis with Mindfulness-Based Cognitive Therapy: replication and extension in the Swiss health care system. J Affect Disord 2010;122:224-31.

11. Brown KW, Ryan RM. The benefits of being present: Mindfulness and its role in psychological well-being. J Pers Soc Psychol 2003;84:822-48.

12. Buchheld N, Grossman P, Walach H. Measuring Mindfulness in Insight Meditation (Vipassana) and Meditation-Based Psychotherapy: The Development of the Freiburg Mindfulness Inventory (FMI). J Meditation Meditation Res 2001;1:11-34.

13. Cardaciotto L, Herbert JD, Forman EM, Moitra E, Farrow V. The Assessment of Present-Moment Awareness and Acceptance:The Philadelphia Mindfulness Scale. Assessment 2008;15:204-23.

14. Chadwick P, Hember M, Symes J, Peters E, Kuipers E, Dagnan D. Responding mindfully to unpleasant thoughts and images: Reliability and validity of the Southampton mindfulness questionnaire (SMQ). Br J Clin Psychol 2008;47:451-5.

15. Chan-Ob T, Boonyanaruthee V. Meditation in association with psychosis. J Med Assoc Thai 1999;82:925-30.

16. Chiesa A, Serretti A. Mindfulness based cognitive therapy for psychiatric disorders: a systematic review and meta-analysis. Psychiatry Res 2011;187:441-53.

17. Choi E, Farb N, Pogrebtsova E, Gruman J, Grossmann I. What do people mean when they talk about mindfulness? Clin Psychol Rev 2021;89:102085.

18. Cohen ZD, DeRubeis RJ, Hayes R, et al. The development and internal evaluation of a predictive model to identify for whom Mindfulness-Based Cognitive Therapy (MBCT) offers superior relapse prevention for recurrent depression versus maintenance antidepressant medication. Clin Psychol Sci 2023;11:59-76.

19. Collins SE, Chawla N, Hsu SH, Grow J, Otto JM, Marlatt GA. Language-based measures of mindfulness: initial validity and clinical utility. Psychol Addict Behav 2009;23:743-9.

20. Cortese S, Adamo N, Del Giovane C, et al. Comparative efficacy and tolerability of medications for attention-deficit hyperactivity disorder in children, adolescents, and adults: a systematic review and network meta-analysis. Lancet Psychiatry 2018;5:727-38.

21. Crane RS, Eames C, Kuyken W, et al. Development and Validation of the Mindfulness-Based Interventions – Teaching Assessment Criteria (MBI:TAC). Assessment 2013;20:681-8.

22. Crane RS, Brewer J, Feldman C, et al. What defines mindfulness-based programs? The warp and the weft. Psychol Med 2017;47:990-9.

23. Deckersbach T, Hölzel BK, Eisner LR, et al. Mindfulness-based cognitive therapy for nonremitted patients with bipolar disorder. CNS Neurosci Ther 2012;18:133-41.

24. Dimidjian S, Segal ZV. Prospects for a clinical science of mindfulness-based intervention. Am Psychol 2015;70:593-620.

25. Erisman SM, Roemer L. A Preliminary Investigation of the Process of Mindfulness. Mindfulness 2012;3:30-43.

26. Feldman G, Hayes A, Kumar S, Greeson J, Laurenceau J-P. Mindfulness and Emotion Regulation: The Development and Initial Validation of the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R). J Psychopathol Behav Assess 2007;29:177-90.

27. Fresco D, Moore M, van Dulmen M, et al. Initial Psychometric Properties of the Experiences Questionnaire: Validation of a Self-Report Measure of Decentering. Behav Ther 2007;38:234-46.

28. Garland E, Gaylord S, Park J. The role of mindfulness in positive reappraisal. Explore (NY) 2009;5:37-44.

29. Garland EL, Farb NA, R. Goldin P, Fredrickson BL. Mindfulness Broadens Awareness and Builds Eudaimonic Meaning: A Process Model of Mindful Positive Emotion Regulation. Psychol Inq 2015;26:293-314.

30. Godfrin KA, van Heeringen C. The effects of mindfulness-based cognitive therapy on recurrence of depressive episodes, mental health and quality of life: A randomized controlled study. Behav Res Ther 2010;48:738-46.

31. Goldberg SB, Tucker RP, Greene PA, et al. Mindfulness-based interventions for psychiatric disorders: A systematic review and meta-analysis. Clin Psychol Rev 2018;59:52-60.

32. Grossman P. On the porosity of subject and object in 'mindfulness' scientific study: challenges to 'scientific' construction, operationalization and measurement of mindfulness. Curr Opin Psychol 2019;28:102-7.

33. Gu J, Strauss C, Bond R, Cavanagh K. How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies. Clin Psychol Rev 2015;37:1-12.

34. Hammar Å, Ronold EH, Rekkedal G. Cognitive Impairment and Neurocognitive Profiles in Major Depression-A Clinical Perspective. Front Psychiatry 2022;13:764374.

35. Hanssen I, Huijbers MJ, Lochmann-van Bennekom MWH, et al. Study protocol of a multicenter randomized controlled trial of mindfulness-based cognitive therapy and treatment as usual in bipolar disorder. BMC Psychiatry 2019;19:130.

36. Hayes SC, Strosahl KD, Wilson KG. Acceptance and commitment therapy: Guilford press New York; 1999.

37. Hepark S, Kan CC, Speckens A. [Feasibility and effectiveness of mindfulness training in adults with ADHD: a pilot study]. Tijdschr Psychiatr 2014;56:471-6.

38. Hirsch O, Chavanon M, Riechmann E, Christiansen H. Emotional dysregulation is a primary symptom in adult Attention-Deficit/Hyperactivity Disorder (ADHD). J Affect Disord 2018;232:41-7.

39. Hirvikoski T, Lindström T, Carlsson J, Waaler E, Jokinen J, Bölte S. Psychoeducational groups for adults with ADHD and their significant others (PEGASUS): A pragmatic multicenter and randomized controlled trial. Eur Psychiatry 2017;44:141-52.

40. Hitchcock C, Rudokaite J, Haag C, et al. Autobiographical memory style and clinical outcomes following mindfulness-based cognitive therapy (MBCT): An individual patient data meta-analysis. Behav Res Ther 2022;151:104048.

41. Hölzel BK, Lazar SW, Gard T, Schuman-Olivier Z, Vago DR, Ott U. How Does Mindfulness Meditation Work? Proposing Mechanisms of Action From a Conceptual and Neural Perspective. Perspect Psychol Sci 2011;6:537-59.

42. Ives-Deliperi VL, Howells F, Stein DJ, Meintjes EM, Horn N. The effects of mindfulness-based cognitive therapy in patients with bipolar disorder: a controlled functional MRI investigation. J Affect Disord 2013;150:1152-7.

43. Janssen L, de Vries AM, Hepark S, Speckens AEM. The Feasibility, Effectiveness, and Process of Change of Mindfulness-Based Cognitive Therapy for Adults With ADHD: A Mixed-Method Pilot Study. J Atten Disord 2020;24:928-42.

44. Jermann F, Van der Linden M, Gex-Fabry M, et al. Cognitive functioning in patients remitted from recurrent depression: Comparison with acutely depressed patients and controls and follow-up of a Mindfulness-Based Cognitive Therapy Trial. Cognitive Therapy and Research 2013;37:1004-14.

45. Jonsson U, Alaie I, Parling T, Arnberg FK. Reporting of harms in randomized controlled trials of psychological interventions for mental and behavioral disorders: a review of current practice. Contemp Clin Trials 2014;38:1-8.

46. Kabat-Zinn J. An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. Gen Hosp Psychiatry 1982;4:33-47.

47. Kabat-Zinn J, Lipworth L, Burney R. The clinical use of mindfulness meditation for the self-regulation of chronic pain. J Behav Med 1985;8:163-90.

48. Kabat-Zinn J. Full Catastrophe Living: Using the Wisdom of Your Body and Mind to Face Stress, Pain, and Illness: Delacorte Press; 1990.

49. Kabat-Zinn J. Mindfulness-Based Interventions in Context: Past, Present, and Future. Clin Psychol (New York) 2003;10:144-56.

50. Kenny MA, Williams JM. Treatment-resistant depressed patients show a good response to Mindfulness-based Cognitive Therapy. Behav Res Ther 2007;45:617-25.

51. Keramatian K, Torres IJ, Yatham LN. Neurocognitive functioning in bipolar disorder: What we know and what we don't. Dialogues Clin Neurosci 2021;23:29-38.

52. Killingsworth MA, Gilbert DT. A wandering mind is an unhappy mind. Science 2010;330:932.

53. Kooij JJS, Bijlenga D, Salerno L, et al. Updated European Consensus Statement on diagnosis and treatment of adult ADHD. Eur Psychiatry 2019;56:14-34.

54. Kretschmer CR, Göz Tebrizcik B, Dommett EJ. Mindfulness Interventions for Attention Deficit Hyperactivity Disorder: A Systematic Review and Meta-Analysis. Psychiatry Int (Basel) 2022;3:363-99.

55. Kriesche D, Woll CFJ, Tschentscher N, Engel RR, Karch S. Neurocognitive deficits in depression: a systematic review of cognitive impairment in the acute and remitted state. Eur Arch Psychiatry Clin Neurosci 2022.

56. Kuyken W, Hayes R, Barrett B, et al. Effectiveness and cost-effectiveness of mindfulness-based cognitive therapy compared with maintenance antidepressant treatment in the prevention of depressive relapse or recurrence (PREVENT): a randomised controlled trial. Lancet 2015;386:63-73.

57. Kuyken W, Warren FC, Taylor RS, et al. Efficacy of Mindfulness-Based Cognitive Therapy in Prevention of Depressive Relapse: An Individual Patient Data Meta-analysis From Randomized Trials. JAMA Psychiatry 2016;73:565-74.

58. Lao SA, Kissane D, Meadows G. Cognitive effects of MBSR/MBCT: A systematic review of neuropsychological outcomes. Conscious Cogn 2016;45:109-23.

59. Lau MA, Segal ZV, Williams JMG. Teasdale's differential activation hypothesis: implications for mechanisms of depressive relapse and suicidal behaviour. Behav Res Ther 2004;42:1001-17.

60. Lau MA, Bishop SR, Segal ZV, et al. The Toronto Mindfulness Scale: development and validation. J Clin Psychol 2006;62:1445-67.

61. Lim GY, Tam WW, Lu Y, Ho CS, Zhang MW, Ho RC. Prevalence of Depression in the Community from 30 Countries between 1994 and 2014. Sci Rep 2018;8:2861.

62. Lindsay EK, Creswell JD. Mechanisms of mindfulness training: Monitor and Acceptance Theory (MAT). Clin Psychol Rev 2017;51:48-59.

63. Linehan M. Skills Training Manual for Treating Borderline Personality Disorder, First Ed: Guilford Publications; 1993.

64. Liu CI, Hua MH, Lu ML, Goh KK. Effectiveness of cognitive behavioural-based interventions for adults with attention-deficit/hyperactivity disorder extends beyond core symptoms: A meta-analysis of randomized controlled trials. Psychol Psychother 2023.

65. Lloyd A, White R, Eames C, Crane R. The Utility of Home-Practice in Mindfulness-Based Group Interventions: A Systematic Review. Mindfulness (N Y) 2018;9:673-92.

66. Ma SH, Teasdale JD. Mindfulness-based cognitive therapy for depression: replication and exploration of differential relapse prevention effects. J Consult Clin Psychol 2004;72:31-40.

67. MacKenzie MB, Abbott KA, Kocovski NL. Mindfulness-based cognitive therapy in patients with depression: current perspectives. Neuropsychiatr Dis Treat 2018;14:1599-605.

68. McCartney M, Nevitt S, Lloyd A, Hill R, White R, Duarte R. Mindfulness-based cognitive therapy for prevention and time to depressive relapse: Systematic review and network meta-analysis. Acta Psychiatr Scand 2021;143:6-21.

69. Merikangas KR, Jin R, He JP, et al. Prevalence and correlates of bipolar spectrum disorder in the world mental health survey initiative. Arch Gen Psychiatry 2011;68:241-51.

70. Miklowitz DJ, Alatiq Y, Goodwin GM, et al. A pilot study of mindfulness-based cognitive therapy for bipolar disorder. Int J Cogn Ther 2009;2:373-82.

71. Mirabel-Sarron C, Dorocant ES, Sala L, Bachelart M, Guelfi JD, Rouillon F. Mindfulness based cognitive therapy (MBCT) dans la prévention des rechutes thymiques chez le patient bipolaire I : une étude pilote. Ann Med Psychol (Paris) 2009;167:686-92.

72. National Institute for Health and Care Excellence (NICE). Depression in adults: treatment and management : NICE guideline. NICE, 2022. (29.09.2023, at https://www.nice.org.uk/guidance/ng222.)

73. Nicastro R, Jermann F, Bluteau Blin S, Waeber C, Perroud N. Mindfulness Training for Adults with Attention-Deficit/Hyperactivity Disorder: Implementation of Mindful Awareness Practices in a French-Speaking Attention-Deficit/Hyperactivity Disorder Unit. J Altern Complement Med 2021;27:179-83.

74. Nolen-Hoeksema S. Responses to depression and their effects on the duration of depressive episodes. J Abnorm Psychol 1991;100:569-82.

75. Oliva F, Malandrone F, di Girolamo G, et al. The efficacy of mindfulness-based interventions in attention-deficit/hyperactivity disorder beyond core symptoms: A systematic review, meta-analysis, and meta-regression. J Affect Disord 2021;292:475-86.

76. Onken LS, Carroll KM, Shoham V, Cuthbert BN, Riddle M. Reenvisioning Clinical Science: Unifying the Discipline to Improve the Public Health. Clinical Psychological Science 2013;2:22-34.

77. Parsons CE, Crane C, Parsons LJ, Fjorback LO, Kuyken W. Home practice in Mindfulness-Based Cognitive Therapy and Mindfulness-Based Stress Reduction: A systematic review and meta-analysis of participants' mindfulness practice and its association with outcomes. Behav Res Ther 2017;95:29-41.

78. Perich T, Manicavasagar V, Mitchell PB, Ball J, Hadzi-Pavlovic D. A randomized controlled trial of mindfulness-based cognitive therapy for bipolar disorder. Acta Psychiatr Scand 2013;127:333-43.

79. Poissant H, Mendrek A, Talbot N, Khoury B, Nolan J. Behavioral and Cognitive Impacts of Mindfulness-Based Interventions on Adults with Attention-Deficit Hyperactivity Disorder: A Systematic Review. Behav Neurol 2019;2019:5682050.

80. Segal ZV, Williams JMG, Teasdale JD. Mindfulness-Based Cognitive Therapy for Depression, First Edition: A New Approach to Preventing Relapse: Guilford Publications; 2002.

81. Segal ZV, Bieling P, Young T, et al. Antidepressant monotherapy vs sequential pharmacotherapy and mindfulness-based cognitive therapy, or placebo, for relapse prophylaxis in recurrent depression. Arch Gen Psychiatry 2010;67:1256-64.

82. Segal ZV, Dimidjian S, Beck A, et al. Outcomes of Online Mindfulness-Based Cognitive Therapy for Patients With Residual Depressive Symptoms: A Randomized Clinical Trial. JAMA Psychiatry 2020;77:563-73.

83. Shapiro SL, Carlson LE, Astin JA, Freedman B. Mechanisms of mindfulness. J Clin Psychol 2006;62:373-86.

84. Sherrill H, Sherrill J, Caceda R. Psychotic mania induced by diffuse meditation. Psychiatry Res 2017;258.

85. Solomon DA, Keller MB, Leon AC, et al. Multiple recurrences of major depressive disorder. Am J Psychiatry 2000;157:229-33.

86. Song P, Zha M, Yang Q, Zhang Y, Li X, Rudan I. The prevalence of adult attention-deficit hyperactivity disorder: A global systematic review and meta-analysis. J Glob Health 2021;11:04009.

87. Stange JP, Eisner LR, Hölzel BK, et al. Mindfulness-based cognitive therapy for bipolar disorder: effects on cognitive functioning. J Psychiatr Pract 2011;17:410-9.

88. Tang Y-Y, Hölzel BK, Posner MI. The neuroscience of mindfulness meditation. Nat Rev Neurosci 2015;16:213-25.

89. Teasdale JD. Cognitive Vulnerability to Persistent Depression. Cogn Emot 1988;2:247-74.

90. Teasdale JD, Segal Z, Williams JM. How does cognitive therapy prevent depressive relapse and why should attentional control (mindfulness) training help? Behav Res Ther 1995;33:25-39.

91. Teasdale JD, Segal ZV, Williams JM, Ridgeway VA, Soulsby JM, Lau MA. Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. J Consult Clin Psychol 2000;68:615-23.

92. Vago DR, Silbersweig DA. Self-awareness, self-regulation, and self-transcendence (S-ART): a framework for understanding the neurobiological mechanisms of mindfulness. Front Hum Neurosci 2012;6:296.

93. Van Dam NT, van Vugt MK, Vago DR, et al. Mind the Hype: A Critical Evaluation and Prescriptive Agenda for Research on Mindfulness and Meditation. Perspect Psychol Sci 2018;13:36-61.

94. Watkins ER, Roberts H. Reflecting on rumination: Consequences, causes, mechanisms and treatment of rumination. Behav Res Ther 2020;127:103573.

95. Weber B, Jermann F, Gex-Fabry M, Nallet A, Bondolfi G, Aubry JM. Mindfulness-based cognitive therapy for bipolar disorder: a feasibility trial. Eur Psychiatry 2010;25:334-7.

96. Weber B, Sala L, Gex-Fabry M, et al. Self-Reported Long-Term Benefits of Mindfulness-Based Cognitive Therapy in Patients with Bipolar Disorder. J Altern Complement Med 2017;23:534-40.

97. Weiss-Cowie S, Verhaeghen P, Duarte A. An updated account of overgeneral autobiographical memory in depression. Neurosci Biobehav Rev 2023;149:105157.

98. Williams JM. Capture and rumination, functional avoidance, and executive control (CaRFAX): Three processes that underlie overgeneral memory. Cogn Emot 2006;20:548-68.

99. Williams JM, Alatiq Y, Crane C, et al. Mindfulness-based Cognitive Therapy (MBCT) in bipolar disorder: preliminary evaluation of immediate effects on between-episode functioning. J Affect Disord 2008;107:275-9.

100. Williams K, Hartley S, Langer S, Manandhar-Richardson M, Sinha M, Taylor P. A systematic review and meta-ethnographic synthesis of Mindfulness-based Cognitive Therapy for people with major depression. Clin Psychol Psychother 2022;29:1494-514.

101. Wong SYS, Chan JYC, Zhang D, Lee EKP, Tsoi KKF. The Safety of Mindfulness-Based Interventions: a Systematic Review of Randomized Controlled Trials. Mindfulness 2018;9:1344-57.

102. Xuan R, Li X, Qiao Y, et al. Mindfulness-based cognitive therapy for bipolar disorder: A systematic review and meta-analysis. Psychiatry Res 2020;290:113116.

103. Xue J, Zhang Y, Huang Y. A meta-analytic investigation of the impact of mindfulness-based interventions on ADHD symptoms. Medicine (Baltimore) 2019;98:e15957.

104. Yatham LN, Kennedy SH, Parikh SV, et al. Canadian Network for Mood and Anxiety Treatments (CANMAT) and International Society for Bipolar Disorders (ISBD) 2018 guidelines for the management of patients with bipolar disorder. Bipolar Disord 2018;20:97-170.

105. Yorston GA. Mania precipitated by meditation: A case report and literature review. Ment Health Relig Cult 2001;4:209-13.

106. Zylowska L, Ackerman DL, Yang MH, et al. Mindfulness meditation training in adults and adolescents with ADHD: a feasibility study. J Atten Disord 2008;11:737-46.