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Pleine conscience, régulation émotionnelle et psychose : états des connaissances et applications cliniques

par

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Résumé

Cette thèse est divisée en trois parties principales, ayant toutes trait à la régulation des émotions ou à l'efficacité des interventions issues de la troisième vague des thérapies cognitives comportementales, en particulier chez les personnes ayant des symptômes psychotiques. La thèse est composée d'un chapitre de livre rédigé en francais, de quatre articles rédigés en anglais (introduction, deux méta-analyses et une étude pilote) et d'une discussion générale rédigée en anglais. L'introduction, déjà publiée sous le format d'un chapitre de livre (et d'un article) constitue un examen exhaustif de la littérature portant sur la régulation des émotions dans la schizophrénie et dans les autres troubles psychotiques. Les individus présentant une schizophrénie présentent des dérégulations, indépendantes l'une de l'autre, dans les trois domaines distincts suivants: l'expression des émotions, le traitement des emotions, et l'expérience émotionnelle. Cette première partie de la thèse recommande fortement l'intégration des stratégies de régulation des émotions, notamment celles de la troisième vague des thérapies cognitives comportementales telles que la pleine conscience, l'acceptation et la compassion, dans le traitement des personnes souffrant de psychose.

Dans la deuxième partie de la thèse, deux méta-analyses examinant l'efficacité des stratégies de la troisième vague des traitements cognitifs comportementaux dans la régulation des émotions sont présentées. La première méta-analyse vise à examiner l'efficacité de la thérapie basée sur la pleine conscience pour tous les troubles psychologiques ainsi que pour les conditions médicales. La deuxième méta-analyse porte plus spécifiquement sur l'efficacité des stratégies de la troisième vague pour la psychose. Les résultats des deux méta-analyses démontrent des tailles d'effet entre modérées et larges, avec un effet plus marqué sur les symptômes affectifs, notamment l'anxiété, la dépression et la détresse. En outre, les stratégies étudiées (la pleine

conscience, l'acceptation et la compassion) sont des fortes modératrices positives de l'efficacité des traitements. Ces résultats suggèrent que ces stratégies sont efficaces dans la régulation des émotions, du moins lorsqu'elles sont mesurées au sein de grands bassins de participants, y compris les personnes souffrant de psychose.

La troisième partie de la thèse implique le développement et la validation préliminaire d'une nouvelle intervention de groupe pour des individus en début de psychose à l'aide d'une combinaison de stratégies d'acceptation, de compassion et de la pleine conscience. Douze individus ont participé à cette étude pilote. Les résultats démontrent la faisabilité et l'acceptabilité du traitement. Des améliorations significatives dans la régulation des émotions et dans les symptômes affectifs sont observées, et sont potentiellement liées à l'intervention.

Globalement, la thèse offre un soutien empirique du rôle de la régulation émotionnelle dans le traitement des personnes atteintes de troubles psychotiques. Plus de recherches sont nécessaires pour valider l'efficacité du nouveau traitement.

Mots-clés: pleine conscience, méditation, acceptation, compassion, troisième vague, régulation des émotions, psychose, schizophrénie, méta-analyse, efficacité des traitements

Abstract

This thesis is divided into three main parts, all pertaining to emotional regulation or to the efficacy of third wave cognitive behavioral treatments particularly in individuals having experienced psychotic symptoms. The thesis consists of one book chapter published in French, four articles published in English (i.e., introduction, deux meta-analyses and a clinical pilot study), and a general discussion. The introduction already published as an article (and as book chapter) involves a comprehensive review of the literature on emotion regulation in schizophrenia and other psychotic disorders. Individuals with schizophrenia and other psychotic disorders tend to show emotional dysregulations at the experiential, expressive, and processing levels. This first part strongly recommends integrating emotion regulation strategies, namely third wave cognitive behavioral strategies such as mindfulness, acceptance and compassion in the treatment of individuals with psychosis.

In the second part of the thesis, two meta-analyses reviewing the effectiveness of these third wave cognitive behavioral strategies in regulating emotions are presented. The first investigates the effectiveness of mindfulness-based therapy across all psychological disorders and medical conditions. The second meta-analysis focuses more specifically on the effectiveness of mindfulness interventions for psychosis. The results from both meta-analyses show moderate to large effect sizes, with higher ones for affective symptoms, especially anxiety, depression and distress. Furthermore, the investigated strategies (i.e., mindfulness, acceptance and compassion) are strong positive moderators of the treatments' effectiveness. These results suggest that these strategies are effective in regulating emotions, at least when measured in large pools of participants, including individuals with psychosis.

The third part of the thesis involves the development and preliminary validation of a new group intervention for early psychosis using a combination of acceptance, compassion and mindfulness. Twelve individuals participated in this pilot study. Results indicated the feasibility and acceptability of the treatment, with improvements in emotion regulation and affective symptoms observed, and potentially linked to the intervention.

The thesis overall empirically supports the important role of emotional regulation in treating individuals with psychosis. More research is warranted pertaining to the effectiveness of the new developed treatment.

Keywords: mindfulness, meditation, acceptance, compassion, third wave, emotion regulation, early psychosis, schizophrenia, meta-analysis, treatment outcome

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"Practice is not about doing or doing it right

It is about being - and being the knowing,

including the knowing of not knowing"

(Jon Kabat-Zinn, 2007)

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Preface

This thesis is divided in three main parts, consisting of a total of four articles and a book chapter along with a general discussion:

The introduction involves a comprehensive review of the literature on emotion regulation in schizophrenia and other psychotic disorders. It argues for the integration of emotion regulation strategies in the treatments of psychosis and schizophrenia. This part consists of an article entitled "Emotion Regulation and Schizophrenia" that was published in 2012 in the *International Journal of Cognitive Therapy* (volume 5, issue 1, pages 67-76). This article was also translated in French and rewritten as a book chapter entitled "Régulation des emotions et schizophrénie" that was published in 2012 in "Traité de regulation émotionnelle" by the *Groupe de Boeck*, Brussels, Belgium (pages 387-400) . We only included the original article written in English in the main text of the thesis for language compatibility.

The second part consisting of two articles, each is portraying a meta-analysis reviewing the effectiveness of these third wave cognitive behavioral strategies in regulating emotions. The first meta-analysis investigated the efficacy of mindfulness-based therapy across all psychological disorders and medical conditions. The article entitled "Mindfulness-Based Therapy: A Comprehensive Meta-Analysis" was published in 2013 in *Clinical Psychology Review* (volume 33, issue 6, pages 763-771). The second one focused specifically on the effectiveness of third-wave strategies for psychosis. The article entitled "Mindfulness Interventions for Psychosis: A Meta-analysis" was accepted for publication in *Schizophrenia Research* in July, 2013, an electronic copy was published online in August, 2013).

The last part consists of a single article portraying the development and validation of a new group intervention for early psychosis using a combination of acceptance, compassion and mindfulness. The article describing this pilot study entitled "Third wave strategies for emotion regulation in early psychosis: A pilot study" was accepted for publication in *Early Intervention in Psychiatry* in August, 2013.

The objectives of this thesis are three-folds: (1) to present a clear rationale, via a review of the literature, of the role of emotion regulation in the etiology and development of psychosis and schizophrenia; (2) to investigate the effectiveness of third wave cognitive behavioral therapy's strategies for emotion regulation; (3) to determine the feasibility and acceptability of a new third wave cognitive behavioral group therapy, combining effective strategies, for individuals with early psychosis. Therefore the thesis includes three parts each aiming at fulfilling one objective. The first objective is addressed in the first part of the thesis (i.e., the introduction) via the first article and book chapter; the second objective is fulfilled via the two meta-analyses comprised in the second part; and the third objective is achieved in the last article of the third part. These three parts are presented sequentially along with a general discussion at the end.

Part –I: Introduction

Emotion Regulation and Schizophrenia

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Gross (2007) defined emotion regulation as the process by which an individual influences which emotion will be experienced, when it will be experienced and how it will be experienced and expressed. Thus, emotion regulation processes involve both positive and negative emotions and include the coherence between different components of emotions, such as emotional experience, physiological responding, and facial expression. According to this definition, emotion regulation is distinct from emotion control, which is less flexible and adaptive, and involves restraint in the expression of emotions, rather than affecting the complete emotional process, including the experience and interpretation of emotions. Thompson (1991, 1994) considered that emotion regulation involved changes in "emotion dynamics" rather than changes in quality. In other words, emotion regulation does not change the emotion but alters its properties, such as latency, rise time, magnitude, duration, and speed of recovery. It also reduces or enhances the range of an emotional response in a particular situation, depending upon the individual's goals in that situation (Gross, 2007; Koole, 2009).

Many studies have suggested that emotion regulation plays an important role in both physical and mental health, and that failure to regulate emotions contributes to many forms of psychopathology (Koole, 2009). Recently, emotion regulation has received increased attention and many books and articles have been written about the link between emotional regulation and psychological disorders, including depression, anxiety, bipolar disorder, substance abuse, psychosis, schizophrenia, and personality disorders (e.g., Bradley, 2000; Flack & Laird, 1998; Rottenberg & Johnson, 2007). This part will concentrate on the role of emotion regulation in schizophrenia and strategies used in regulating emotions.

1. Emotional regulation in schizophrenia

Schizophrenia has most often been considered a "non-affective" thought disorder, in contrast to affective disorders such as bipolar disorder (Phillips, 2008, chap 2). However, some authors, namely Watson et al. (2006) suggest that emotive and cognitive processes interact in the development and maintenance of psychotic symptoms. A review of 69 studies found that individuals with schizophrenia reported higher anhedonia and demonstrated more negative emotions in studies using real-life events (Trémeau, 2006). Furthermore, results suggest a dysregulation in the domains of: expression, processing, and experience of emotions, and that these dysregulations are independent of each other.

1.1. Emotional expression in schizophrenia

Multiple studies have consistently shown that individuals with schizophrenia are less emotionally expressive than individuals without schizophrenia in a variety of contexts and in response to evocative stimuli such as film clips, still pictures, cartoons, music, foods, and social interactions such as role play (Kring & Moran, 2008). Differences in emotional expressivity were observed through facial expressions and vocal responses, for positive and negative emotions, in both men and women, on and off medication. Clinical and non-clinical populations were compared, including individuals with major depression (Kring & Moran, 2008). The etiology behind the diminished emotional expressivity in schizophrenia is not yet completely understood (Kohler & Martin, 2006). For example, Phillips & Seidman (2008) showed that some of these deficits exist prior to development of the illness. Some researchers suggest that the deficits are linked to connectivity problems in areas of the brain important for social and emotional expression, such as the anterior cingulate area (Trémeau, 2006). Other researchers suggest that a link exists between limited emotional expression and heightened emotional

experience (e.g., Flack, Laird, & Cavallaro, 1999). For example, Mino et al. (1998) observed that individuals from families with highly expressed emotions demonstrate a higher level of negative symptoms, namely a flat effect. In a recent book, Beck, Rector, Stolar, & Grant (2009) suggested that limited emotional expression among individuals with schizophrenia may result from biased and negative expectations about social involvement. The authors argued that individuals with schizophrenia expect less pleasure and little success in social activities and perceive themselves as inadequate. These beliefs lead them to distance themselves from others and may result in social isolation. These arguments suggest that emotional expression is strongly related to other components of the illness (biased beliefs, inadequate self-perception, and negative symptoms) and that treatments for schizophrenia should address the expression of emotions.

1.2. Emotional processing in schizophrenia

Some definitions of emotional processing include the perception, recognition, expression and experience of emotions (e.g., Phillips & Seidman, 2008). In this section, we restrict the definition of emotional processing to the perception/recognition of an emotion and to the cognitive interpretation of the emotion within a social context (i.e., using the perceived emotion to understand the mental state of someone else). Similar to emotional expression, individuals with schizophrenia may be impaired in emotional processing prior to development of the illness (Phillips & Seidman, 2008), and this impairment may be present in multiple channels (i.e., verbal, facial, and acoustic) (Trémeau, 2006). Impairment in facial emotion recognition is a prominent deficit in individuals with schizophrenia (Couture et al., 2006; Hooker & Park, 2002; Wallace, 1984). Morris, Weickert, & Loughland (2009) found that individuals with schizophrenia avoid gazing at important facial regions (especially the eyes) and have greater difficulty to recognize fear. A study by Green, Waldron, & Coltheart (2007) found that

individuals with schizophrenia failed to use contextual information in judging facial emotions. Individuals with schizophrenia were also observed to be impaired in their ability to understand another person's emotional state and intentions, or Theory of Mind (ToM). The effect size was large when compared to a control population (Bora, Yucel, & Pantelis, 2009; Sprong, Schothorst, Vos, Hox, & van Engeland, 2007).

Treatments integrating facial emotional recognition and ToM include: Social Cognitive and Interaction Training (SCIT; Penn, Roberts, Combs, & Sterne, 2007), and Social Cognitive Skills Training (SCST; Horan et al., 2009). Both programs train participants in various aspects of emotional recognition and ToM. Other treatments that explicitly focus on facial emotional recognition are computerized emotion training programs such as the Micro-Expression Training Tool (METT; Ekman, 2003) and Training in Affect Regulation program (TAR; Wölwer et al., 2005). Both training tools aim to enhance the user's ability to recognize facial emotion cues and features, however, these treatments are new and more evaluation of their effectiveness is needed. Studies suggest also a relationship between impaired emotional processing and functional outcomes (i.e., social behavior, community functioning, social skills, and social problem solving) in individuals with schizophrenia (Addington & Haarmans, 2006; Couture, Penn, & Roberts, 2006; Kee, Green, Mintz, & Brekke, 2003). These results emphasize the need for treatments addressing emotional processing deficits in schizophrenia.

1.3. Emotional experiences in Schizophrenia

A strong relationship has been observed between childhood trauma and psychotic symptoms. For example, Janssen et al. (2004), reported that child abuse before the age of 16 was a significant risk factor for developing psychotic symptoms later in life. Furthermore, Read, van Os, Morrison, & Ross (2005) argued that child abuse is a causal factor for psychosis and

schizophrenia. More specifically, childhood traumatic experiences can be represented in hallucinations exacerbating feelings of anxiety and depression (Beck et al., 2009, p. 339). Similarly, Myin-Germeys & van Os (2007) suggested the existence of an affective pathway to psychosis, with roots in childhood trauma, which could increase vulnerability to stressors and affect the ability to adapt to stressful situations. Mueser et al. (2004) found high rates of trauma and Post-Traumatic Stress Disorder (PTSD) among individuals with schizophrenia.

In addition to childhood trauma, Mueser, Lu, Rosenberg, & Wolfe (2009) argued that the experience of psychosis is traumatizing and may lead to the development of PTSD symptoms. Social stigma as a traumatic factor may play an important role. For example, Lolich & Leiderman (2008) found that individuals with a diagnosis of schizophrenia were the group most affected by stigmatization among clinical populations. Negative social stigma can impact life opportunities, quality of life and self-esteem, leading to social anxiety, social isolation and severe distress among individuals experiencing their first psychotic episode or among individuals with a diagnosis of schizophrenia (Birchwood et al., 2007; Crisp, Gelder, Rix, Meltzer, & Rowlands, 2000; Reed, 2008).

Stress is another environmental factor affecting schizophrenia. Research shows that individuals with schizophrenia do not experience more stressful life events than the normal population but they report greater subjective distress (Norman & Malla, 1993; Walker & Diforio, 1997). This high sensitivity to stress is considered one of the main reasons for symptomatic relapse despite the use of antipsychotic medication (Corcoran et al., 2003). Myin-Germeys & van Os (2007) suggested that failure to regulate emotions during a stressful situation could increase emotional reactivity and vulnerability to stress. Livingstone, Harper, & Gillanders (2009) examined emotional experience and regulation in individuals who had experienced psychosis,

individuals with mood and anxiety disorders and non-clinical individuals. They found that both clinical groups had similar emotional experiences and both relied on less effective emotion regulation strategies such as worry and rumination.

Individuals with schizophrenia have better outcomes related to the experience of positive emotions such as: warmth, contentment, love, kindness, and compassion. In a pilot study, Mayhew & Gilbert (2008) taught six individuals hearing malevolent voices to develop feelings of warmth, contentment and compassion. The participants' auditory hallucinations became less malevolent, less persecuting and more reassuring. Johnson et al. (2009) targeted negative symptoms by teaching study participants to develop feelings of love and kindness and to direct these feelings towards themselves and others. Negative symptoms improved. In a forensic setting, Laithwaite et al. (2009) showed that developing positive emotions such as warmth and compassion facilitates recovery among individuals suffering from psychosis. Other studies also suggest that feelings of hope, optimism, and empowerment are related to better outcomes in schizophrenia (Ho, Chiu, Lo, & Yiu, 2010; Lecomte et al., 1999; Warner, 2009).

2. Emotion regulation strategies in schizophrenia

Koole's literature review (2009) suggested that people can manage every aspect of emotion processing including how emotion directs attention, the cognitive appraisals that shape emotional experience and the physiological consequences of emotions, including body sensations. Henry, Rendell, Green, McDonald, & O'Donnell (2008) suggested two different ways to regulate emotions: suppression and re-appraisal. Suppression involves modifying or redirecting the focus of conscious attention to modify an emotion (e.g., distraction, avoidance of people, places, or objects that trigger the emotion); it also occurs after the emotional response has been triggered and requires managing the emotional expression and physiological response.

In contrast, re-appraisal is a cognitive process that is applied earlier. Re-appraisal alters a situation's meaning, influencing the expression and experience of the emotion (Gross, 2007). According to Henry et al. (2008) re-appraisal involves higher order cognitive functions and is associated with increased positive affects and improved interpersonal functioning. A recent study conducted by van der Meer, Van't Wout, & Aleman (2009) showed that individuals with schizophrenia used suppression strategies more frequently than reappraisal strategies. The same was shown among recovered depressed patients and these strategies were demonstrated ineffective in down-regulating negative emotions (Ehring, Tuschen-Caffier, Schnlle, Fischer, & Gross, 2010). Among suppression strategies is expression suppression (e.g. facial or vocal expressions), Badcock, Paulik, & Maybery (2011) showed that greater use of expressive suppression among individuals with schizophrenia was associated with an increase in severity of auditory hallucinations and greater disruption in daily life. The authors suggested targeting expressive suppression in cognitive and behavioral treatments for schizophrenia.

The individual's belief system plays also an important role in the outcomes of emotion regulation strategies (Tamir, John, Srivastava, & Gross, 2007). Watson et al. (2006) suggested that enhancing perceptions of controllability and working with beliefs regarding the emotional states following an episode of psychosis can be useful intervention targets. According to Freeman & Garety (2003), both negative emotions (e.g., unhappiness, fear, guilt, anger, disgust, and horror) and positive emotions (e.g., happiness, excitement, and over-confidence) influence the content, form and maintenance of delusions and hallucinations. They argued that the content of delusions is likely to be a direct reflection of the emotional state of the individual (e.g., anxiety/depression and persecutory delusions, over-confidence and grandiosity) and that emotion directly triggers auditory hallucinations in individuals with a hallucinatory predisposition. The

authors suggested that by conceptualizing delusions as emotional beliefs and by treating the emotion, the clinician could reduce positive symptoms. These strategies resemble those used in traditional cognitive-behaviour therapy for psychosis (CBTp) and have been demonstrated to be effective (Beck et al., 2009; Wykes, Steel, Everitt, & Tarrier, 2008).

2.1. Emotion regulation in CBT for psychosis

Beck et al. (2009) emphasized the importance of exploring emotionally relevant matters for individuals presenting psychotic symptoms such as concern, worry, and distress early in therapy in order to validate their emotional experience and to enhance the therapeutic alliance. Similarly, Chadwick (2006) presented a person-based approach to psychosis and stressed the importance of addressing distress in psychosis rather than focusing on symptoms. Birchwood & Trower (2006) criticized some studies on CBTp for focusing on reductions in psychotic symptoms rather than presenting outcomes in distress reduction. The authors noted the critical role of emotional disorders, such as depression, social anxiety and post-traumatic stress disorder, in psychosis. Tai & Turkington (2009) considered the importance of factors other than the content and style of thought in the development and maintenance of psychotic symptoms and schizophrenia. Those factors include: arousal, emotion, attachment and interpersonal issues, loss and trauma, self-esteem, accepting, and self-to-self relating. Pankey & Hayes (2003) suggested that the relationship between emotions and psychotic symptoms is not direct but is mediated by the relationship an individual builds with his symptoms and the emotional regulation strategies the individual uses. Chadwick (2006) argued for the integration of emotion regulation strategies in CBTp. Among these strategies are: positive emotions, acceptance, detachment, meta-cognition, imagery, and mindfulness. Positive emotions include hope, optimism, warmth,

compassion, contentment, empowerment, love, and kindness were discussed in a previous section. We will turn our attention to the remaining strategies:

According to Hayes, Strosahl et al. (1999) acceptance requires embracing thoughts and emotions evoked in the moment, actively and with awareness, without unnecessary attempts to change their frequency or form. For example, someone with psychosis could be taught to accept experiencing fearful thoughts and emotions in times of stress, and to notice the signs and impulses. Acceptance plays a crucial role in the cognitive aspect of emotional regulation, i.e., the conscious and cognitive way of handling the intake of emotionally arousing information (Garnefski & Kraaij, 2007; Garnefski, Kraaij, & Spinhoven, 2001; Thompson, 1991).

The distancing or detachment strategy teaches individuals to "distance themselves" from stimuli, thus becoming a "detached observer" (Beauregard, Lévesque, & Bourgouin, 2001). Detachment is a central component of Segal's Mindfulness-Based Cognitive Therapy (MBCT; Segal, Williams, & Teasdale, 2002), which has shown to be somewhat effective in treating affective disorders (Baer, 2003; Hofmann, Sawyer, Witt, & Oh, 2010). Hayes, Strosahl et al. (1999) used a similar strategy called "cognitive defusion" to teach individuals to separate thoughts from actions. Cognitive defusion is based on the premise that if thoughts and feelings are not directly linked to actions, they are less threatening. Hoppes (2006) suggested that the ability to de-center from mental events provides opportunities to practice gaining distance from more intense and painful thoughts or emotions when they occur in real-life situations. The concept of detachment is closely related to the concept of meta-cognitive awareness, defined as "the process of experiencing negative thoughts and feelings within a decentered perspective" (Chadwick, 2006, p. 17). The integration of meta-cognition in CBTp was extensively addressed in a review by Tai & Turkington (2009).

Mindfulness has been defined as the act of "inward contemplation and the intermediate state between attention to a stimulus and complete absorption into it" (cited in Johnson et al., 2009). Mindfulness can be practiced through meditation, an ancient Buddhist practice, or through cognitive and behavioral techniques. Among the cognitive techniques is to *observe* an emotion without judgment and without changing its content or intensity; to *describe* the observed emotion and body sensations using words; and to *participate* in the activity of the moment in a state of flow and spontaneity without being self-conscious (observe-describe-participate) (Linehan, 1993a, 1993b). An extended review on the role of mindfulness in emotion regulation was conducted by Chambers, Gullone, & Allen (2009).

Morrison (2004) suggested the use of imagery in treating persecutory delusions. He argued that psychosis-related images are associated with memory of past events, including trauma, and may identify unhelpful beliefs about self, world, and others. Furthermore, Morrison suggested integrating imagery in CBTp to reduce the frequency of distressing images or to alter the content or interpretation of such images.

Many recent CBTp studies are investigating functional and social outcomes beside symptoms reduction and some of them are integrating and testing several of the emotion regulation strategies. For example, Lecomte et al.'s single-blind randomized controlled trial (2008) showed effects on self-esteem, active coping and social support in addition to the reduction of positive and negative symptoms among CBTp participants. Many studies are using mindfulness as an adjunct to CBTp (e.g., Chadwick, Hughes, Russell, Russell, & Dagnan, 2009; Chadwick, Taylor, & Abba, 2005; Lavey, 2005). The results are encouraging, reporting significant improvement in negative emotions, and improvement in general clinical functioning. These studies demonstrate the potential usefulness and feasibility of teaching mindfulness to

individuals with a history of psychosis. Trappler & Newville (2007) used a group modality of CBTp called Skill Training in Affect Regulation (STAIR) to treat 24 inpatients with schizophrenia and histories of significant trauma and Complex PTSD. The treatment included emotional regulation strategies such as controlled breathing, grounding, and mindfulness. Patients were asked to use the skills they learned to carry out an extended recall of their traumatic experiences. The treatment was compared to supportive psychotherapy. After 12 weeks, only patients undergoing STAIR demonstrated significant improvement in measures of tension, excitement, hostility, suspiciousness, and anger-control. Multiple studies (Bach, Hayes, & Gallop, 2012; Bach & Hayes, 2002; Garcia Montes & Perez Alvarez, 2001; Gaudiano & Herbert, 2006; Gaudiano, Nowlan, Brown, Epstein Lubow, & Miller, 2012; Shawyer et al., 2012; White et al., 2011) were also conducted using elements of acceptance and detachment in treating individuals with psychosis. The results demonstrated a significant decrease in re-hospitalization rates, improvement in affective symptoms, such as a decrease in the level of distress associated with hallucinations, and an increase in social functioning compared to controls.

The importance of emotional regulation skills in CBT was recently investigated (Berking et al., 2008). The researchers compared a traditional CBT with a CBT including specific training in emotion regulation skills (i.e., acceptance, distress tolerance, and non-judgmental awareness) using 204 inpatients with different psychiatric diagnoses. Participants using CBT with emotion regulation showed a greater reduction in depression and negative affects, and a greater increase in positive affects compared to participants in the traditional CBT group. These findings provide preliminary support for using emotion regulation strategies to enhance the effectiveness of CBT based treatments; however, further research is warranted.

3. Conclusion

According to the reviewed literature, we suggest developing integrated emotion regulation interventions using the discussed strategies in targeting expression, processing, and experience of emotions in schizophrenia. These integrated interventions might have considerable clinical benefit, however, their feasibility and effectiveness must still be evaluated.

Even though emotion regulation is getting increased attention in recent psychological interventions and is beginning to be integrated with new cognitive behavioral therapies, a paucity of research studies exist on emotion regulation compared to cognitive appraisal or cognitive restructuring. Very few studies discuss emotion regulation strategies and even fewer measure changes in emotion regulation following treatment for individuals with schizophrenia or other psychotic disorders. According to the arguments presented in this part, emotion regulation strategies may play an important role in the symptomatic and functional outcomes of schizophrenia and they deserve increased attention in future clinical research on schizophrenia.

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Part –II: Meta-analysis 1

Mindfulness-Based Therapy: A Comprehensive Meta-Analysis

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Abstract

Background: Mindfulness-Based Therapy (MBT) has become a popular form of intervention. However, the existing reviews report inconsistent findings. ***Objective:*** To clarify these inconsistencies in the literature, we conducted a comprehensive effect-size analysis to evaluate the efficacy of MBT. ***Data Sources*:** A systematic review of studies published in journals or in dissertations in PubMED or PsycINFO from the first available date until May 10, 2013. ***Review Methods***: A total of 209 studies (n = 12,145) were included. ***Results:*** Effect-size estimates suggested that MBT is moderately effective in pre-post comparisons (n = 72; Hedge's g = .55), in comparisons with waitlist controls (n = 67; Hedge's g = .53), and when compared with other active treatments (n = 68; Hedge's g = .33), including other psychological treatments (n = 35; Hedge's g = .22). MBT did not differ from traditional CBT or behavioral therapies (n = 9; Hedge's g = -.07) or pharmacological treatments (n = 3; Hedge's g = .13). ***Conclusion***: MBT is an effective treatment for a variety of psychological problems, and is especially effective for reducing anxiety, depression, and stress.

Keywords: mindfulness, meditation, meta-analysis, treatment outcome

1. Introduction

An increasing number of meta-analyses and systematic reviews have investigated the effectiveness of mindfulness-based therapy (MBT). These reviews (listed in Table 1) reported inconsistent findings about the size of the treatment effect of MBT for reducing stress, anxiety, and depression associated with physical illness or psychological disorders (Baer, 2003; Bohlmeijer, Prenger, Taal, & Cuijpers, 2010; A. Chiesa & Serretti, 2010, 2011; Cramer, Lauche, Paul, & Dobos, 2012; de Vibe, Bjørndal, Tipton, Hammerstrøm, & Kowalski, 2012; Eberth & Sedlmeier, 2012; Fjorback, Arendt, Ørnbøl, Fink, & Walach, 2011; Grossman, Niemann, Schmidt, & Walach, 2004; Hofmann, Sawyer, Witt, & Oh, 2010; Klainin-Yobas, Cho, & Creedy, 2012; Ledesma & Kumano, 2009; Musial, Büssing, Heusser, Choi, & Ostermann, 2011; Piet & Hougaard, 2011; Sedlmeier et al., 2012; Zainal, Booth, & Huppert, 2012).

These inconsistencies may be due to a number of factors, including the choice of the MBT protocols, the restriction to specific research designs, and the inclusion of a particular group of patients. Moreover, little is known about the stability of treatment gains (Baer, 2003; Hofmann et al., 2010), about the active ingredients that may account for the efficacy of MBT (A. Chiesa & Serretti, 2011; Fjorback et al., 2011), and about the relevant moderator variables. It is assumed that mindfulness is a central mechanism of MBT (e.g., Richard Bränström, Kvillemo, Brandberg, & Moskowitz, 2010; Greeson et al., 2011; Kuyken et al., 2010; Shahar, Britton, Sbarra, Figueredo, & Bootzin, 2010) that might enhance positive affect, decrease negative affect, and reduce maladaptive automatic emotional responses (Gross, 2007; Hofmann, Sawyer, Fang, & Asnaani, 2012; Koole, 2009; Thompson, 1991, 1994). Although this is consistent with the notion that mindfulness training is associated with changes in areas of the brain responsible for affect regulation, and stress impulse reaction (Davidson et al., 2003; Hölzel et al., 2011; Lazar et

al., 2005) the empirical evidence for explaining the mechanisms of MBT remains sparse. Similarly, little is known about the potential moderators, including treatment duration (de Vibe et al., 2012; Hofmann et al., 2010; Klainin-Yobas et al., 2012; Sedlmeier et al., 2012), homework practice (Carmody & Baer, 2009; Fjorback et al., 2011; Toneatto & Nguyen, 2007), course attendance (de Vibe et al., 2012), and the clinical and mindfulness training and practical experience of the therapists delivering MBT (Carmody & Baer, 2009; Crane, Barnhofer, Hargus, Amarasinghe, & Winder, 2010; Davidson, 2010; Fjorback et al., 2011; Piron, 2001; Pradhan et al., 2007; Segal, Teasdale, Williams, & Gemar, 2002).

In order to address the weaknesses of the current literature, we conducted a comprehensive effect-size analysis with the following objectives: (1) to quantify the size of the treatment effect with the maximum available data; (2) to investigate and quantify the role of mindfulness in MBT; and (3) to explore moderator variables.

2. Methods

2.1. Eligibility criteria

Any study examining the pre-post or controlled effects of MBT for a wide range of physical and medical conditions, psychological disorders, and in non-clinical populations was considered in our analysis. Studies were excluded if they (1) did not include a mindfulness meditation-based intervention; (2) did not aim to examine treatment effects; (3) consisted of comparisons among meditators or among meditation styles; (4) examined the non-direct effects of mindfulness (i.e., mindfulness treatment administered to therapists and not directly to their clients); (5) examined mindfulness as a component of another treatment; (6) reported no clinical outcomes; (7) reported insufficient information to compute an effect size (e.g., only correlational data); or (8) reported data that overlapped with the data from other included studies.

The meta-analysis excluded studies that examined mindfulness as part of another treatment, such as cognitive behavior protocol, because it was difficult to dissociate the effect of mindfulness from other components. This led to the exclusion of Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999) and Dialectical Behavior Therapy (DBT; Linehan, 1993a, 1993b). Also, the meta-analysis excluded protocols using other forms of meditation (e.g., guided or concentration, or a combination of many meditation styles), excluding as result Loving-Kindness Meditation (LKM; Salzberg, 1995). A review of this specific meditation strategy can be found elsewhere (Hofmann, Grossman, & Hinton, 2011). Finally, studies based on meditation instruction, induction, or retreats were also excluded from this meta-analysis.

2.2. Information sources

Studies were identified by searching PubMed and PsycINFO from the first available date until May 10, 2013. No limits were applied for language and foreign papers were translated into English.

2.3. Search

We used the search term *mindfulness* alone or combined with the terms *MBSR* or *MBCT*.

2.4. Study selection

Eligibility assessment was performed in a non-blinded standardized manner by the first author and was revised by the second author. Disagreements between reviewers were resolved through discussions, and in a few instances the authors of the original studies were contacted for clarifications.

2.5. Data collection process

We developed an electronic data extraction sheet, pilot-tested it on five randomly-selected studies, and refined it accordingly. Data collection was conducted for the first time in April of 2010, was re-conducted and refined in April of 2011, and updated in May of 2013. When duplicate reports were identified for the same data, only the latest ones were included.

2.6. Data items

Information was extracted from each included trial based on (1) the characteristics of the trial (including the year of publication, design, randomization, blinding, therapist qualifications, number of participants, type of outcome measures, and follow-up time in weeks); (2) the characteristics of the intervention (including treatment protocol, target population, length of treatment in hours, attendance in number of sessions, length of assigned home practice in hours, quality of home practice as reported by participants, and treatment setting); (3) the characteristics of the control group, in controlled studies (including the number of participants, type of control, type of treatment, and length of treatment); and (4) the characteristics of participants (including mean age, percentage of males, attrition rate, and diagnosis). We made conservative assumptions for missing or unclear data. For example, if the report neglected to describe the qualifications of the therapists, we assumed that the therapists did not have appropriate clinical/mindfulness training.

2.7. Risk of bias in individual studies

To minimize the influence of data selection, we included data pertaining to all available outcomes, but we divided them into clinical and mindfulness, because effect sizes might vary between these two groups. The clinical outcomes included both physical measures (e.g., pain and blood pressure) and psychological measures (e.g., anxiety and depression). Mindfulness

outcomes consisted only of measures of mindfulness. We included data from follow-ups, when such data were available.

We also included a study quality score, which was comprised of items based on Jadad's criteria (Jadad et al., 1996) and others pertaining to mindfulness. The included items are adherence of the treatment to an established protocol (MBSR, MBCT, MBRP, or MMRP); administration of measures at follow-up; use of validated mindfulness measures (i.e., MAAS, KIMS, FMI, FFMQ, SMQ, TMS, or CAMS-R); clinical training of therapists (i.e., clinical psychologists, trainees in clinical psychology, or social workers); and the mindfulness training of therapists (i.e., formal training in validated protocols, or mindfulness meditation training/experience). For controlled studies, the items included whether participants were randomized between MBT and control groups, whether participants in both groups spent an equal amount of time in treatment, and whether evaluators or experimenters were blind regarding the MBT/control conditions and/or participants were blind regarding the study's hypotheses. For all binary items (i.e., true or false), a value of 1 was assigned if the item was true and a value of 0 if it was false. For the study design, pre-post studies were assigned a value of 0; studies with a waitlist, no-treatment, or drop-outs control group were assigned a value of 1; studies with a TAU control group were assigned a value of 2; studies with a treatment control group (other than TAU) were assigned a value of 3. For blinding, non-blinded studies were assigned a value of 0; single-blind studies were assigned a value of 1; and double-blind studies were assigned a value of 2.

The inter-rater agreement was assessed by comparing the ratings of the first author (B.K.) to the ratings of each of the four co-authors (G.F., M.M., P.T. and V.B.). Each co-author received a set of articles to review, along with a written document including specific instructions

on rating the studies. A one-hour training and discussion about the rating procedure was also provided.

2.8. Summary measures

The meta-analyses were performed by computing standardized differences in means. We completed all analyses using Microsoft Excel or Comprehensive Meta-Analysis, Version 2.2.057 (CMA; Borenstein, Hedges, Higgins, & Rothstein, 2005).

2.9. Synthesis of results

Effect sizes were computed using means and standard deviations (*SD*) when available. In the remaining studies, the effect sizes were computed using other statistics such as *F*, *p*, *t*, and χ^2. In within-group designs, when the correlations between the pre- and post-treatment measures were not available, we used a conservative estimate ($r = .7$) according to the recommendation by Rosenthal (1993). For all studies, Hedge's *g*, its 95% confidence interval (95% CI), and the associated *z* and *p* values were computed. To calculate the mean effect size for a group of studies, individual effect sizes were pooled using a random effect model rather than a fixed effect model, given that the selected studies were not identical (i.e., did not have either an identical design or target the same population).

For all study groups, the mean Hedge's *g*, the 95% confidence interval (95% CI), and the 95% prediction interval (95% PI) were computed. The prediction interval describes the distribution of true effects around the mean, whereas the confidence interval reflects the precision of the mean effect size. We systematically assessed the heterogeneity among studies in each group using I^2 and the chi-squared statistic (*Q*). I^2 measures the proportion of heterogeneity to the total observed dispersion, and is not affected by low statistical power. Higgins, Thompson, Deeks, and Altman (2003) suggested that an I^2 of 25% might be considered low, 50% considered

moderate, and 75% considered high. We used these values when dividing studies into groups and when interpreting the results.

2.10. Risk of bias across studies

To assess publication bias, we computed the fail-safe *N* (Rosenthal, 1993) and constructed a funnel plot.

2.11. Additional analyses

According to the objectives of this meta-analysis, we conducted meta-regression and clinical significance analyses. The aim of meta-regression analysis is to assess the relationship between one or more variables (moderators) and the pooled effect size. Borenstein et al. (2009) suggested a ratio involving at least ten studies for each moderator. In this meta-analysis, we investigated eight moderators: the mean effect size of mindfulness outcomes (measuring the improvement in mindfulness among participants), treatment length, duration of home practice (as indicated in the mindfulness protocol), therapist clinical training, therapist mindfulness training, study quality score, the mean age of participants, and the year of publication. The study-to-moderator ratio was very high (26).

The aim of the clinical significance analysis is to assess the clinical implications of our findings. As physical symptoms were rarely assessed using similar measures, we only assessed the clinical significance of MBT for psychological measures, specifically measures regarding anxiety and depression. Therefore, we selected the Beck Depression Inventory (BDI-I; Beck & Streer, 1987), (BDI-II; Beck, Steer, & Brown, 1996), the Beck Anxiety Inventory (BAI; Beck & Streer, 1993), the 20-items Center for Epidemiological Studies Depression Scale (CES-D), and the State-Trait Anxiety Inventory (STAI; Spielberger, 1983), because these were the most commonly used measures. Weighted average means were calculated at pre-treatment, post-

treatment, and follow-up. The results were interpreted according to the corresponding instrument's manual. For BDI-I, raw scores of 0-9 were considered asymptomatic (or "minimal level of depression"), whereas scores of 10-16 indicated mild depression, 17-29 indicated moderate depression, and scores above 30 indicated severe depression. For BDI-II, raw scores of 0-13 indicated minimal depression, 14-19 indicated mild depression, 20-28 indicated moderate depression, and 29-63 indicated severe depression. For BAI, raw scores of 0-7 were considered asymptomatic ("minimal level of anxiety"), whereas scores of 8-15 indicated a mild level of anxiety, scores 16-25 indicated moderate anxiety, and scores above 26 indicated severe anxiety. For the CES-D, scores ranged from 0 to 60, with higher scores indicating increasing severity of depression. Scores of 16 or higher are considered indicative of depression. Finally, for the STAI, raw scores of 0-39 were considered non-clinically anxious, scores of 40-51 were considered moderately clinically anxious, and scores above 51 were considered highly clinically anxious.

3. Results

3.1. Study selection

PubMed searches produced 902 publications and PsycInfo searches yielded 1974 publications. We carefully assessed the identified publications and applied the exclusion criteria, resulting in 209 studies (177 from journal articles and 32 from dissertations). Of the 209 studies, 207 reported post-treatment assessments, and two of them reported only follow-up data. The study selection process is illustrated in detail in Figure 1.

3.2. Study Characteristics

The effect size (Hedge's *g*) and other characteristics for each study are shown in Table 2. Studies were divided according to the methodological design. Then, within each of these groups, studies were sorted in an ascending manner: first, according to the target population (i.e., type of

participants); second, according to the implemented intervention; third, according to the comparison group; fourth, according to the study's first author name; and finally, according to the year of publication. Seventy one studies were included in the 16 previously published meta-analyses (listed in Table 1), while 138 studies were not included in any of the previous meta-analyses. The total number of participants included in our meta-analysis was 12,145.

Pre-Post design studies accounted for 72 studies, whereas the number of waitlist-controlled studies was 67. Treatment controlled studies accounted for 68 studies. The most common disorders were mood and cancer (n = 25), followed by anxiety (n = 23), pain (n = 17), alcohol/substance use (n = 8), and fibromyalgia (n = 6). Overweight/obesity and social anxiety/social phobia had a similar frequency (n = 5), followed by HIV and post-traumatic stress disorder (n = 4), and Headache (n = 3). Attention deficit hyperactivity disorder, psychosis/schizophrenia, personality disorders, child sexual abuse, irritable bowel syndrome, brain injury, heart disease, tinnitus, multiple sclerosis, and rheumatoid arthritis were all with a similar frequency (n = 2). The rest of the disorders or conditions accounted for a single study each. Many studies targeted more than one disorder.

3.3. Risk of bias within studies

Table 2 presents the included studies and their quality scores. One hundred and nine studies were randomized, 93 used at least one validated mindfulness measure, 35 assured an equal time between treatment and control groups, and 28 used blind evaluators, including four that were double-blinded. For controlled studies, the total score varied from a minimum of 1 (lowest quality) to a maximum of 11 (highest quality) with a mean of 4.84 (SD = 2.19) and a median of 5. For pre-post studies, the total score varied from a minimum of 0 to a maximum of

5, with a mean of 2.93 (*SD* = 1.19) and a median of 3. Inter-rater agreement was high (kappa = .94).

3.4. Results of individual studies

Hedge's *g* values for both clinical and mindfulness outcome measures, and at both post treatment and last follow-up, are presented in Table 2.

3.5. Synthesis of results

3.5.1. Effect on clinical outcomes at the end of the treatment. The results of the main groups are represented in Figure 2. Thirty-five studies compared MBT with other psychological treatments. MBT was more effective than psychoeducational interventions ($n = 9$; Hedge's $g = .61$; 95% CI [.27, .96], $p < .001$), supportive therapies ($n = 7$; Hedge's $g = .37$; 95% CI [.17, .57], $p < .001$), relaxation procedures ($n = 8$; Hedge's $g = .19$; 95% CI [.03, .35], $p < .05$), and imagery/suppression techniques ($n = 2$; Hedge's $g = .26$; 95% CI [.10, .53], $p < .005$). However, the heterogeneity of effect sizes was high among studies comparing MBT with psychoeducation ($I^2 = 82.72\%$, $Q = 46.29$), moderate to high among studies comparing MBT to supportive therapies ($I^2 = 64.30\%$, $Q = 16.81$), moderate among those comparing MBT to relaxation procedures ($I^2 = 59.11\%$, $Q = 17.12$), but low among those comparing MBT to imagery/suppression techniques ($I^2 = 0.00\ \%$, $Q = 0.12$). MBT did not differ from traditional CBT or behavioral therapies ($n = 9$; Hedge's $g = -.07$; 95% CI [-.26, .16], $p = .60$, *ns*) or pharmacological treatments ($n = 3$; Hedge's $g = .13$; 95% CI [-.11, .37], $p = .27$, *ns*).

As Figure 2 shows, when investigating pre-post and waitlist controlled studies separately, effect sizes associated with MBT were larger when treating psychological disorders, and smaller when treating physical or medical conditions. Among psychological disorders, anxiety disorders showed the largest effect sizes, followed by depression. These effects were even larger when

only measures corresponding to the target disorder were included (e.g., only anxiety measures when the treatment targeted an anxiety disorder). The mean effect size on anxiety was large for ten pre-post studies, Hedge's g = .89 (95% CI [.71, 1.08], p < .001) with low heterogeneity (I^2 = 13.90%, Q = 10.45), and in four waitlist controlled studies, Hedge's g = .96 (95% CI [.67, 1.24], p < .001). The mean effect size on depression was moderately strong for five pre-post studies, Hedge's g = .69 (95% CI [.52, .86], p < .001) and moderate for eight waitlist controlled studies, Hedge's g = .53 (95% CI [.32, .73], p < .001). Studies targeting non-clinical populations showed a moderate to high mean effect size in 18 pre-post studies, Hedge's g = .65 (95% CI [.51, .80], p < .001) and in 16 waitlist controlled studies, Hedge's g = .62 (95% CI [.42, .82], p < .001). However, heterogeneity was high in both groups. No differences in the mean of clinical outcomes were found among groups based upon gender.

3.5.2. Effect on clinical outcomes at the last follow-up. Follow-up periods varied across studies from three weeks to three years with a weighted mean of 28.92 weeks. Results at follow-up were largely similar to those at the end of treatment. The follow-up effect sizes of pre-post studies (n = 24) showed an average effect size (Hedge's g) of .57 (95% CI [.44, .69], < .001), waitlist controlled studies (n = 17) showed a Hedge's g = .43 (95% CI [.31, .55], p < .001), and treatment controlled studies (n = 30) showed a Hedge's g = .24 (95% CI [.12, .35], p < .001), heterogeneity was high among the three groups.

Seventeen studies compared MBT with other psychological treatments at follow-up. MBT was more effective than supportive therapies (n = 3; Hedge's g = .34; 95% CI [.11, .56], p < .005). The heterogeneity of effect sizes was moderately high (I^2 = 48.78%, Q = 3.90). The effect size was small and not significant of studies comparing MBT with relaxation (n = 5),

psychoeducation (n = 3), and traditional CBT or behavioral therapy (n = 6; Hedge's g = .04; 95% CI [-.22, .29], p = .78, *ns*).

Treatments targeting psychological disorders showed larger effect sizes compared with physical/medical conditions in both pre-post and waitlist controlled studies. In addition, MBT was associated with the largest mean effect sizes for anxiety and depression and the smallest effect sizes for cancer and pain. Six pre-post studies targeting anxiety showed a mean effect size of Hedge's g = .91 (95% CI [.69, 1.14], p < .001) at follow-up when only including anxiety measures; two pre-post studies targeting depression showed a mean effect size of Hedge's g = .75 (95% CI [.38, 1.12], p < .001) when only including mood measures.

3.5.3. Effect on mindfulness at the end of the treatment. A total of 93 studies included measures of mindfulness. Mean effect sizes of MBT on mindfulness at the end of the treatment were lower for treatment controlled-studies (n = 23; Hedge's g = .42; 95% CI [.27, .57], p < .001) than for waitlist controlled-studies (n = 28; Hedge's g = .53; 95% CI [.42, .65], p < .001), and pre-post studies (n = 42; Hedge's g = .69; 95% CI [.59, .80], p < .001), heterogeneity was moderate in the three groups. Mean effect size of mindfulness outcomes was also higher in studies targeting psychological disorders compared to studies targeting physical or medical conditions. Five studies comparing MBT with relaxation showed the superiority of MBT on mindfulness (n = 5; Hedge's g = .37; 95% CI [.04, .69], p < .05), heterogeneity was moderate (I^2 = 49.35%, Q = 7.90). Studies comparing MBT with other treatments (e.g., support, CBT, and imagery) did not reach statistical significance.

3.5.4. Effect of mindfulness at the last follow-up. Only 31 studies reported measures of mindfulness at follow-up. Results indicated that mindfulness was maintained with similar effect sizes. Treatment-controlled studies showed the smallest effect size (n = 9), Hedge's g = .30 (95%

CI [.13, .47], $p < .005$), heterogeneity was low ($I^2 = 22.71\%$, $Q = 10.35$), followed by waitlist-controlled studies ($n = 8$), Hedge's $g = .56$ (95% CI [.34, .78], $p < .001$), heterogeneity was moderate ($I^2 = 47.71\%$, $Q = 13.39$), and pre-post studies ($n = 14$), Hedge's $g = .66$ (95% CI [.41, .92], $p < .001$), however, heterogeneity was high ($I^2 = 79.58\%$, $Q = 63.67$).

3.5.5. Prediction intervals. We computed the prediction intervals (95% PI) for different groups of studies; results are presented in Figure 2 along with the 95% CI. In all groups, the prediction interval was wider than the confidence interval, a predictable result.

3.6. Risk of bias across studies

The effect size of all pre-post studies corresponded to a z value of 37.35 ($p < .00001$) indicating that 26,078 studies with a null effect size would be needed to nullify our results (i.e., for the two-tailed p value to exceed .05). Using the Trim and Fill method, 19 studies would need to fall on the left of the mean effect size to make the plot symmetric (Figure 3). Assuming a random effects model, the new imputed mean effect size was Hedge's $g = .44$ (95% CI [.42, .46]). Similar results were obtained for waitlist controlled studies, with a z value of 21.06 ($p < .00001$) and a corresponding fail-safe N of 7,675. No studies were trimmed. For treatment-controlled studies, z value was 15.95 ($p < .00001$) and fail-safe $N = 4,434$. When 12 studies were trimmed, the new imputed mean effect size was Hedge's $g = .26$ (95% CI [.23, .30]). These analyses suggest that the effect-size estimates were unbiased and robust.

3.7. Additional analyses

3.7.1. Meta-regression results. The effect size of MBT on clinical outcomes was positively moderated by the effect size on mindfulness outcomes ($n = 91$; $\beta = .41$, $SE = .04$, $p < .00001$) (Figure 4), the duration of treatment ($n = 182$; $\beta = .01$, $SE = .0015$, $p < .00001$), the mindfulness training of the therapist(s) ($n = 154$; $\beta = .13$, $SE = .04$, $p < .0005$), negatively moderated by the

study quality score (n = 207; β = -.05, SE = .004, p < .00001), and the year of publication (n = 207; β = -.01, SE = .003, p < .0005). The effect of MBT on clinical outcomes was not moderated by the duration of home practice (p = .09, ns), the clinical training of therapists (p = .07, ns), or by the age of participants (p = .78, ns).

At follow-up, the effect size of MBT on clinical outcomes was positively moderated by the effect size on mindfulness outcomes (n = 28; β = .58, SE = .08, p < .00001), and negatively moderated by the study quality score (n = 65; β = -.029, SE = .006, p < .00005). The remaining moderators did not reach significance level.

3.7.2. Clinical significance. Pre-treatment, post-treatment, and follow-up outcomes using BAI showed that a mild level of anxiety (n = 9) at pre-treatment (M = 12.17) was further reduced at both post-treatment (M = 7.51) and follow-up (M = 8.14). A moderate level of anxiety (n = 12) at pre-treatment (M = 19.34) was decreased to a mild level at both post-treatment (M = 11.79) and follow-up (M = 11.38). A severe level of anxiety (n = 1) at pre-treatment (M = 31.32) was decreased to a mild level at post-treatment (M = 12.93), no data were available at follow-up. On both BDI-I and BDI-II, a mild level of depression (n = 24 for BDI-I and n = 16 for BDI-II) at pre-treatment (M = 14.08 for BDI-I and 16.19 for BDI-II) was decreased to a mild level of depression at post-treatment (M = 8.77 for BDI-I and 8.64 for BDI-II), and to a mild or minimal level at follow-up (M = 10.48 for BDI-I and 9.70 for BDI-II). A moderate level of depression (n = 6 for BDI-I and n = 5 for BDI-II) at pre-treatment (M = 22.13 for BDI-I and 23.27 for BDI-II) was reduced to a mild level at both post-treatment (M = 13.43 for BDI-I and 14.12 for BDI-II) and follow-up (M = 13.93 for BDI-I and 14.97 for BDI-II). A severe level of depression (n = 1 for BDI-I and n = 4 for BDI-II) at pre-treatment (M = 30.33 for BDI-I and 32.29 for BDI-II) was

reduced to a moderate to mild level at post-treatment (M = 12.33 for BDI-I and 21.13 for BDI-II) and to a mild level at follow-up (M = 18.56 for BDI-II).

On the CES-D, results showed that non-clinical depression in five studies at pre-treatment (M = 11.03) was further reduced at both post-treatment (M = 6.76) and follow-up (M = 8.44). Clinical depression (n = 9) at pre-treatment (M = 18.31) became non-clinical at both post-treatment (M = 13.48) and follow-up (M = 15.49). Finally, on the STAI, non-clinical anxiety in 13 studies at pre-treatment (M = 35.91) was further reduced at both post-treatment (M = 31.25) and follow-up (M = 29.35). A moderate clinical anxiety (n = 22) at pre-treatment (M = 42.94) was reduced to non-clinical level of anxiety at post-treatment (M = 39.73) and to a mild level at follow-up (M = 40.33). A high clinical anxiety (n = 8) at pre-treatment (M = 52.87) was reduced to moderate levels at both post-treatment (M = 47.20) and follow-up (M = 46.54).

4. Discussion

This meta-analysis examined 209 studies with a combined total of 12,145 participants of diverse ages, genders, and clinical profiles. The wide variety of studies, the variety of participants, and the use of meta-analytic validity measures allowed us to clarify some inconsistencies concerning the therapeutic value of MBT. The results showed that MBT is moderately effective in pre-post studies. When compared to some other active treatments (including psychoeducation, supportive therapy, relaxation, imagery, and art-therapy), the effect sizes were small to moderate, suggesting the superiority of MBT. However, MBT was not more effective than traditional CBT.

MBT was more effective in treating psychological disorders than it was in treating physical or medical conditions. More specifically, MBT showed large and clinically significant effects in treating anxiety and depression, and the gains were maintained at follow-up. These

findings were similar to those obtained in previous meta-analyses (e.g., Hofmann et al., 2010). In addition, the average attrition among participants in the selected studies (16.25%) was smaller than the attrition rate usually obtained in cognitive and behavioral studies (e.g., 22.5% of 1,646 patients offered CBT in an National Health Service clinic in the UK; Westbrook & Kirk, 2005). These results suggest a high commitment among participants to MBT.

One obvious question is whether MBT also changes measures of mindfulness. Surprisingly, mindfulness was measured in only 45% of all studies. The results showed that participants in MBT were more mindful at the end of the treatment, and that gains were maintained at the last follow-up. In addition, there was a strong positive correlation between the mindfulness levels of the participants and the clinical outcomes. These results provide preliminary support for the role of mindfulness in the effectiveness of MBT. Future studies will need to explore the mechanism of action for MBT. Similarly, little is known about treatment moderators, such as therapists' training. We observed that therapists' experience with mindfulness, but not their general clinical training, moderated clinical outcomes at the end of the treatment, which was consistent with earlier reports (Pradhan et al., 2007), suggesting that therapists' experience with mindfulness might have a direct or an indirect effect on the clinical outcomes of the participants (Grepmair et al., 2007). Unfortunately, however, very few studies have quantified the therapists' training experience. Future studies should explicitly report this information.

In contrast with previous meta-analyses of MBT (Hofmann et al., 2010; Klainin-Yobas et al., 2012; Piet & Hougaard, 2011), our results showed that the study quality score negatively moderated the efficacy of MBT, pointing to expectancy and other biases. Similar results were obtained in other meta-analyses (e.g., Wykes, Steel, Everitt, & Tarrier, 2008). However, the

duration of treatment and the assigned homework practice time did not consistently moderate the efficacy of MBT. These results are consistent with the contradictory outcomes found in the published literature. Better efficacy predictors could be attendance and the actual duration of home meditation practice, because they measure motivation and might indicate whether participants find the intervention useful (Carmody & Baer, 2008; Toneatto & Nguyen, 2007; de Vibe et al., 2012). Other possible moderators include meditation depth (Piron, 2001) and group cohesion (Imel, Baldwin, Bonus, & Maccoon, 2008).

In order to conduct a comprehensive review of the literature, we inevitably included studies with different levels of quality, which we quantified and included in the analyses. Our meta-analysis only included mindfulness meditation protocols, limiting the scope of the results to this particular practice. To address our own expectancy bias, we implemented liberal selection criteria and included a large variety of studies. Despite these limitations, our results showed that MBT is moderately to largely effective. Furthermore, the findings suggest that mindfulness is a central component of the treatment effectiveness, and that the mindfulness of participants and of therapists is a strong predictor of effective MBT. We recommend conducting more methodologically rigorous studies to establish the efficacy of MBT in comparison with, or in addition to, other standard treatments (especially to CBT) and in order to thoroughly examine and quantify moderators and mediators of effective MBT.

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*References marked with an asterisk indicate studies included in the meta-analysis.

Table 1.

Results from previous empirical reviews and meta-analyses

Review/Meta-analysis	Description	*Ns*	*Np*	*g, d, r, rr, or*	95%CI	*p*	FS *N*	ES FU	I^2
Baer (2003)	General review	15	998	.59 (*d*)	-	-	-	.59	-
	Axis-I disorders[a]	4		.96 (*d*)	-	-	-	-	-
	Chronic pain	4		.37 (*d*)	-	-	-	-	-
Grossman et al. (2004)	MBSR only								
	Mental health	18	894	.50 (*d*)	[.43, .57]	<.0001	-	-	-
	Physical health	9	566	.42 (*d*)	[.34, .50]	<.0001	-	-	-
Ledesma & Kumano (2009)	MBSR for cancer[b]								
	Mental health	7	416	.48 (*d*)	[.38, .59]	<.0001	10	-	-
	Physical health	8	516	.18 (*d*)	[.08, .28]	<.0001	136	-	-

Table 1. *(continued).*

Review/Meta-analysis	Description	*Ns*	*Np*	*g, d, r, rr, or*	95%CI	*p*	FS *N*	ES FU	I^2
Bohlmeijer et al. (2010)	MBSR for mental health[b]	8	667						
	Depression outcomes	6		.26 (*g*)	[.18, .34]	<.001	31	-	0.00
	Anxiety outcomes	4		.47 (*g*)	[.11, .83]	<.05	-	-	53.95
Hofmann et al. (2010)	MBT (MBSR + MBCT)	39	1,140						
	Anxiety outcomes			.63 (*g*)	[.53, .73]	<.01	4,150	.60	-
	Depression outcomes			.59 (*g*)	[.51, .66]	<.01	4,302	.60	-
	Anxiety disorders only	7		.97 (*g*)	[.72, 1.22]	<.01	-	-	-
	Mood disorders only	4		.95 (*g*)	[.71, 1.18]	<.01	-	-	-
Chiesa & Serretti (2009)	MBSR for healthy people	10	671						
	Stress outcomes			.74 (*d*)	[-.03, 1.51]				
	Spirituality			.82 (*d*)	[-.01, 1.65]				

Table 1 *(continued)*.

Review/Meta-analysis	Description	*Ns*	*Np*	*g, d, r, rr, or*	95%CI	*p*	FS *N*	ES FU	I^2
Chiesa & Serretti (2011)	MBCT for mental disorders	14	866						
	MBCT + TAU vs. TAU	4	384	.36 (*or*)	[.24, .86]	<.005	-	-	29.00
Fjorback et al. (2011)[c]	MBT (17 MBSR, 4 MBCT)	21	1,827						
Piet & Hougaard (2011)	MBCT vs. control	5	408	.66 (*rr*)	[.53, .82]	<.005	14	-	0.00
	MBCT vs. m-ADM	2	179	.80 (*rr*)	[.60, 1.08]	.15, ns	-	-	0.00
Musial et al. (2011)	MBSR for Cancer	19	1,118						
	Mood states	10	411	.42 (*d*)	[.26, .58]	<.0001	-	-	73.50
	Reduction in distress	15	587	.58 (*d*)	[.45, .72]	<.0001	-	-	67.20
	Quality of life	6	248	.29 (*d*)	[.17, 0.40]	≤.00005	-	-	23.40
Klainin-Yobas et al. (2012)	MBT for mental disorders	39	1,847						
	MBT vs. TAU	11	438	.53 (*d*)	[.39, 67]	<.001	6	-	44.47

Table 1 *(continued)*.

Review/Meta-analysis	Description	*Ns*	*Np*	*g, d, r, rr, or*	95%CI	*p*	FS *N*	ES FU	I^2
Sedlmeier et al. (2012)	MdBT in non-clinical	163		.26 (*r*) [d]					
	MdBT versus relaxation	10		.21 (*r*)					
	MdBT versus no-treatment	125		.27 (*r*)					
de Vibe et al. (2012)	MBSR	31	1,942						
	Mental health outcomes	26		.53 (*g*)	[.46, 61]	-	-	-	0.00
	Somatic outcomes	10		.31 (*g*)	[.10, .52]	-	-	-	11.00
Eberth & Sedlmeier (2012)	MM in non-clinical	39		.56 (*d*)	-	-	-	-	-
Zainal et al. (2012)	MBSR for breast cancer	9	470						
	Stress	8	307	.71 (*d*)	[.51, .91]	-	-	-	37.99
	Depression	7	392	.58 (*d*)	[.43, .72]	-	-	-	.00
	Anxiety	4	166	.73 (*d*)	[.45, 1.1]	-	-	-	40.23

Table 1 *(continued)*.

Review/Meta-analysis	Description	*Ns*	*Np*	*g, d, r, rr, or*	95%CI	*p*	FS *N*	ES FU	I^2
Cramer et al. (2012)	MBSR or MBCT for BC[b]	3	327						
	Depression	2	147	.37 (*d*)	[.08, .65]	< .05	-	-	.00
	Anxiety	2	147	.51 (*d*)	[.21, .80]	< .001	-	-	.00
	Spirituality	2	147	.27 (*d*)	[-.37, .91]	.41, *ns*	-	-	79.00

Note. Ns = Number of reviewed studies; Np = Overall number of participants; *g* = Hedge's *g*; *d* = Cohen's *d*; *r* = Standardized effect size; *rr* = risk ratio; or = odds ratio; FS = Fail-Safe; ES FU = Effect Size at Follow-Up; [a]Included anxiety, depression, and binge eating; MBSR = Mindfulness-Based Stress Reduction; [b]Included only randomized controlled studies; MBT = Mindfulness-Based Treatments; MBCT = Mindfulness-Based Cognitive Therapy; TAU = Treatment As Usual; [c]Effect sizes were not pooled; Mm-ADM = maintenance Antidepressant Medication; MdBT = Meditation-Based Treatment; [d]*r* = .26 is equivalent to a Cohen's *d* of .58 (assuming equal sample sizes for meditation and control groups); MM = Mindfulness Meditation; BC = Breast Cancer.

Table 2.

Description and Effect Size Analyses of the Efficacy of the selected Mindfulness-Based Studies

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
					Pre-Post Studies								
Zylowska et al., 2008 (m5,11)	ADHD-Dep-Anx(32)	-	38	MAPs(23)	-	-	0	20	9.3	ADHD Sx;BAI;BDI	.59	-	2
van de Weijer-Bergsma et al., 2012	ADHD (10)	13.4	50	MM (8)	-	-	0	12	-	CBCL;YSR;BRIEF; FFS;SHS (MAAS)	-.01 (.08)	16 .29(.34)	4
Zgierska et al., 2008	Alcohol depend(19)	38.4	47	MMRP (15)	-	-	-	16	24	PDA;HHD;TD SCL-90R;OCDS (MAAS)	.57 (.89)	-	4
Miller et al. 1995 (m1,2,11)	Anxiety(22)	38	-	MBSR(17)	-	-	-	-	-	MIA;BAI;BDI;FSS[a]; HAM-A;HAM_____	.50	156(.57)	2

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Manzaneque et al., 2011	Anxiety-Depression (16)	-	43.8	MM(16)	-	-	-	8	16	MH-5;	1.11	-	1
Joo et al., 2010	ASH(11)	52.6	45.5	MBSR(11)	-	-	-	20	-	BDI;STAI	.70	26	1
Deckersbach et al., 2012	Bipolar (12)	38.7	25	MBCT (12)	-	-	25	24	45	HAM-D;YMRS;PSWQ; RSQ;ERS;ASRS;CPAS PWBS; LIFE-RIFT;	.43 (.64)	13 .31(.44)	4
Azulay et al., 2012	Brain injury (22)	48.9	50	MBSR (22)	-	-	0	20	-	PQOL;PSES;SPSI-RSF (MAAS)	.34	-	4
Smith et al., 2006	BED(25)	47.8	20	MBSR(25)	-	-	-	-	-	STAI(MAAS)	.67(.85)	-	3
Sachse et al., 2011	BPD (22)	39	13.6	MBCT (22)	-	-	27.3	16	-	STAI;BDI-II;DES-II SDQ;BIS-11(FFMQ)	.20 (.18)	-	2

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Lengacher et al. 2011 (m10, 15,16)	Breast Canc. (19)	56.8	0	MBSR(19)	-	-	-	16	36	PSS;STAI;CES-D;MSAS LOT-R;QoL;Social Support	.32	-	3
Matousek and Dobkin, 2010 (m10,15)	Breast Canc. (59)	56.4	0	MBSR (57)	-	-	9	26	49	MSCL;Coping; CES-D; PSS;SoC;(MAAS)	.49 (.33)	-	3
Chambers et al., 2012	Cancer-Prostate (19)	67	100	MBCT (15)	-	-	21	20	28	HADS;IES-R;EPIC; MAX-PC;FACT-P (FFMQ)	.00 (.16)	13 .11(.53)	5
Ando et al., 2009	Cancer(28)	60	14.3	MBSR(28)	-	-	-	29.5	36	HADS;FACIT-Sp	.25	-	3
Birnie et al., 2010 (m10)	Cancer(42)	62.9	50	MBSR(42)	-	-	50	15	-	POMS;C-SOSI(MAAS)	.32(.42)	-	2

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Carlson and Garland, 2005 (m3,5,10)	Cancer(63)	54	22.2	MBSR(63)	-	-	-	15	36	POMS;SQ;SOSI	.63	-	3
Carlson et al., 2003 (m3,5,10)	Cancer(59)	54.5	17	MBSR(42)	-	-	32.2	15	-	SOSI;Phy. measures;QoL	.38	-	1
Garland et al., 2013	Cancer (268)	53.5	15.7	MBSR (268)	-	-	-	26	36	C-SOSI;POMS (MAAS;FFMQ)	.51 (.58)	-	3
Kieviet-Stijnen et al., 2008 (m5,10)	Cancer(47)	48.4	27.7	MBSR(46)	-	-	17	27.5	42	POMS;QoL; Phy. Sx(RSC);HDI	.33	52(.49)	3
Knauss, 2008	Cancer(20)	-	5	MBSR(20)	-	-	-	-	-	QoL(MAAS;KIMS)	.68 (1.00)	-	3

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Epstein-Lubow et al., 2011	Caregivers (9)	56.2	0	MBSR (9)	-	-	0	9.5	24	CESD;STAI;ZBI SF-36(KIMS)	.49 (-.13)	4 .39(-.28)	2
Minor et al., 2006	Caregivers (44)	38	13.6	MBSR(44)	-	-	-	16	36	POMS;SOSI	.76	-	2
Lengacher et al., 2012	Cancer patients (26) +	53.5	30.8	MBSR (24)	-	-	8.3	6	36	CESD;PSS;STAI;SF-36; MSAS;	.34	-	3
	Caregivers (26)	51.5	38.5	(23)	-	-	11.5	6	36	CESD; PSS; STAI; SF-36; MSAS;	.10	-	3
Kimbrough et al., 2010 (m11)	Child sexual abuse(27)	45	11	MBSR(23)	-	-	14.8	27	17.5	BDI-II;BSI;PCL (MAAS)	.64 (.57)	24 .43(.47)	4

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Baer et al., 2012	Chronic illness (87)	49	33	MBSR (87)	-	-	17	-	-	PSS (FFMQ)	.92 (.80)	-	2
Simpson & Mapel, 2011	Chronic illness (29)	51	21	MBSR (29)	-	-	10	27	42	SF-36;DASS;VAS;PCS; PGIC(KIMS)	.63 (.56)	26 .06(.09)	5
Eisendrath et al., 2008 (m11)	Depression (55)	-	25.5	MBCT(51)	-	-	7	16	0	BAI;BDI;RRQ (FMI)	.58 (.58)	-	4
Michalak et al., 2010	Depression (20)	47.1	21.7	MBCT(20)	-	-	13	-	-	Phy. Measures (body movement & speed)	.54	-	1
Wood, N. A., 2010	Depression in HIV/AIDS(27)	46.3	92.6	MBCT(5)	-	-	81.5	20	-	BAI;BDI;SF-36 (MAAS)	.68 1.13	8 .82(.74)	5

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Kenny and Williams, 2007 (m5,11)	Depression/ Bipolar(48)	43.3	26	MBCT(48)	-	-	2	17	56	BDI	.85	-	2
Mathew et al., 2010 (m11)	Depression/ Bipolar(39)	23.1	-	MBCT(14)	-	-	25.8	-	-	BDI-II	.65	52 .71	4
Lush et al., 2009 (m5)	Fibromyalgia (24)	44	0	MBSR(24)	-	-	20.9	20	36	BSI;BAI;BDI; Physiological recording	.28	-	3
Craigie et al., 2008 (m5)	GAD(23)	43.4	26	MBCT(20)	-	-	13.0	18	-	BAI;BDI-II;PSWQ; DASS(A,D&S);RRAQ;QoL	.64	13 1.00	4
Evans et al., 2008 (m5,11)	GAD(11)	49	45.45	MBCT(11)	-	-	-	16	28	POMS;PSWQ;BAI;BDI (MAAS)	.83 (.77)	-	3

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Kabat-Zinn et al., 1992 (m1,2,5)	GAD(20)	38	-	MBSR(10)	-	-	8.3	-	-	MIA;BAI;BDI;FSS[a]; HAM-A;HAM-D	.5 .55	13	2
Robinson, 2002	HIV(15)	41	94.1	MBSR(15)	-	-	-	27.5	42	POMS;FAHI; Phy. Measures	.22 .54	13	4
Lovas and Barsky, 2010 (m11)	Hypoch. (10)	35.6	50	MBCT(10)	-	-	-	16	28	HCQ;Avoidance;BAI; BDI-II;HAI;PHQ;WI; QOLWHO(FFMQ)	.82(.66)	13 .97(.76)	5
Carmody and Baer, 2008	Mixed[1](174)	47.1	37	MBSR (174)	-	-	15	26	45	MSCL;BSI;PWBS (FFMQ)	.65 (.69)	-	2
McKim, 2008	Mixed[1](32)	50.4	34	MBSR(32)	-	-	-	16	-	MSCL;BSI(MAAS)	.78(.55)	-	2

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Reibel et al., 2001 (m1,2,5,11)	Mixed[2] (121)	47.2	29	MBSR (103)	-	-	11	-	-	MSCL;SCL-90;SF-36	.56	52 .37	2
Ree and Craigie, 2007 (m5,11)	Mood/ Anx.(23)	39.5	23	MBCT (23)	-	-	11.6	20	36	SES;BDI;ISI DASS(A,D&S)(MAAS)	.59 (.48)	13 .62	4
Collard et al., 2008	Non-clinical(15)	-	16.7	MBCT (15)	-	-	20	16	-	PANAS (MAAS)	.40 (.48)	-	4
Lee et al., 2008	Non clinical(25)	10.5	40	MBCT (17)	-	-	32	18	18	CBCL;MASC;STAIC; RCDS	.37	-	1
Schroevers and Brandsma, 2010	Non-clinical(64)	42.2	28	MBCT (64)	-	-	25	26	42	PANAS; (KIMS;SCS)	.57 (.53)	-	4

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Chang et al., 2004 (m14)	Non-clinical(43)	46.5	42.9	MBSR (43)	-	-	35	26	36	PSOM;PSS (MSE)	1.50 (2.14)	-	2
Deyo, 2008	Non-clinical(7)	28.6	28.6	MBSR (7)	-	-	56.3	-	-	RRQ;BDI;SOSI (KIMS)	.26 (.64)	-	3
Evans et al., 2010	Non-clinical(14)	48	35.7	MBSR (14)	-	-	-	28	35	POMS (MAAS)	.77 (1.21)	-	4
Fang et al., 2010	Non-clinical(24)	50.8	33.3	MBSR (17)	-	-	21	20	20	BSI-18;SF-36	.53	-	1
Flugel Colle et al., 2010	Non-clinical(16)	46.7	12.5	MBSR (16)	-	-	6.3	27.5	-	LASA	.55	-	2

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Greeson et al., 2011	Non-clinical(180)	45	24.7	MBSR (180)	-	-	0	27	23	SF-12;DSES (CAMS-R)	.40 (1.09)	-	3
Imel et al., 2008	Non-clinical(606)	46.3	28	MBSR (606)	-	-	-	29	36	MSCL;SCL-90	.78	-	3
Michaels, 2009	Non-clinical(24)	45.6	33.3	MBSR (24)	-	-	-	24	-	DAS[a] (KIMS)	.80 (.89)	-	3
Newsome, 2010	Non-clinical(31)	29.3	12.9	MBSR (31)	-	-	-	12	24	PSS (MAAS;SCS)	.99 (.95)	4 1.14(1.18)	5
Frewen et al., 2008	Non-clinical(43)	-	30	MBSR + MBCT (24)	-	-	33	20	-	DASS(A,D&S); UBC-CI-LGR;Indiv-NGLG (KIMS;MAAS)	.89 (.92)	-	3

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Galantino et al., 2005	Non-clinical(84)	43	4	MBSR + MBCT (69)	-	-	-	16	28	POMS;IRI;cortisol	.21	-	0
Duncan & Bardacke, 2010	Non-clinical(27)	34.6	25	MBCP (27)	-	-	-	33	27	PANAS;DES;CES-D; PSS;Pregnancy anxiety (FFMQ)	.57 (.80)	-	3
Kearney et al., 2012	Obesity in veterans (48)	49	87.5	MBSR (48)	-	-	10.4	27	36	TFEQ;FFQ;PHQ; PCL-C(FFMQ)	.81 (.79)	17 .46(.81)	4
Dalen et al., 2010	Overweight (10)	44	30	MEAL (10)	-	-	0	16	21	TFEQ;BES;BAI;BDI; PSS;PANAS(KIMS)	.59 .60	6 .68(.79)	2
Kim et al., 2010	Panic(23)	41.2	57	MBCT(23)	-	-	-	12	-	HAM-A; PDSS	.68	52	2

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Zoysa et al., 2012	MH Pro. (18)	35	22.2	MBCT (18)	-	-	-	20	36	GHQ-12;SWLS;PSWQ; STAI;LES(MAAS)	.78 (1.16)	78 1.31(1.14)	5
Brady et al., 2012	MH Pro. in an APU(16)	-	19	MBSR (16)	-	-	21.7	4	12	MBI;SOSS;MHPSS; (TMS)	.46 (.63)	-	2
Beddoe et al., 2009	Pregnancy (16)	-	0	MBY(16)	-	-	10.5	9	0	PSS;STAI	.50	-	1
Newsome et al., 2012	Professionals in training (31)	29.3	12.9	MBSR (31)	-	-	0	12	24	PSS; (MAAS; SCS)	.99 (.95)	4 1.14(1.06)	5
Smith, 2010	PSTD(29)	46.7	0	MBSR(15)	-	-	-	21	30	PSTD Sx; (MAAS;SCS)	1.29 (1.08)	-	4

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Green & Bieling, 2012	Psychiatric Patients (23)	53.65	21.7	MBCT (23)	-	-	34	16	36	BDI-II;PLS-SDHS; (TMS)	.47 (.38)	-	4
Goldin and Gross, 2010 (m11)	SAD (16)	35.2	-	MBSR (16)	-	-	12.5	27.5	18.1	SES; BDI-II; LSAS; STAI	.98	-	2
Bogels et al., 2006 (m5)	SP(9)	32.4	33	MBCT(9)	-	-	11	8	-	FNE;SPB;SFA; SCL-90;Self-Other-Ideal	.74	8 .94	3
Marcus et al., 2003	SU(21)	33.4	85.7	MBSR(16)	-	-	23.8	20	42	PSS	.12	-	3
Maddox, 2012	SU (14)	44	-	MBRP (14)	-	-	0	12	10	UPPS+P; (FFMQ)	.07 (2.24)	-	3

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Gans et al., 2013	Tinnitus (10)	58	75	MBSR (8)	-	-	20	27	24	THI;HRQoL;PAS;VAS; HADS;SF-36;SCL-90-R (FFMQ)	.48 (.31)	-	4
Rimes & Wingrove, 2011	Trainee Clinical Psychologists(20)	-	0	MBCT (20)	-	-	0	-	-	PSS;HADS;RI;RRQ (FFMQ;SCS)	.55 (.52)	-	2
Baker et al., 2012	Urinary Incontinence (7)	54.9	0	MBSR (7)	-	-	0	14.3	-	OABq-SF;HRQOL;PGI-I	.75	52	4
					Waitlist/No-Treatment Controlled Studies								
Vøllestad et al., 2011	Anxiety (76)	42.5	32.9	MBSR (31)	Waitlist (34)	yes	10.5	26	28	BAI;BDI-II;BIS;STAI PSWQ;SCL-90-R;(FFMQ)	.70 (.83)	26 .78(.59)	6

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Spek et al., 2013	Autism (42)	42.3	65.9	MBCT (21)	Waitlist (21)	yes	2.4	22.5	45	SCL-90-R;RRQ;GMS; WAIS-III;	.76	-	6
Bédard et al., 2003 (m5)	Brain Injury (13)	42.1	23.08	MBSR (10)	drop-outs (3)	no	23.1	15	20	SF-36	1.56	-	2
Kang & Oh, 2012	Breast Canc. (50)	-	-	MBSR (25)	No-Tx (25)	no	-	24	-	PSS	.92	-	4
Witek-Janusek et al., 2008 (m10)	Breast Canc. (68)	53	0	MBSR (38)	No-Tx (28)	no	13.6	25	-	Phy. measures;QoL (MAAS)	.64	4 (.49)	5
Hoffman et al., 2012	Breast Canc. (229)	49	0	MBSR (114)	Waitlist (115)	yes	7	22.5	36	POMS;FACT-B; FACT-ES;WHO-5	.36	4 (.36)	6

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Lengacher et al., 2009 (m5,10,13,14,15,16)	Breast Canc. (82)	57.5	0	MBSR (40)	Waitlist (42)	yes	2.4	12	36	MSAS;CESD;LOT; PSS;QoL	.20	-	5
Perez-Blasco et al., 2013	BFM (26)	34.33	0	MBSR+ MBCT(13)	No-Tx (13)	yes	19.2	16	-	PES;DASS(A,D&S);SHS SWLS(FFMQ; SCS)	.80 (1.09)	-	4
Monti et al., 2006 (m3,4,8,10)	Cancer (111)	53.6	0	MBAT (56)	Waitlist (55)	yes	16	20	24	SCL-90	.51	-	4
Van der Lee and Garssen, 2010	Cancer (100)	52	16.3	MBCT (59)	Waitlist (24)	yes	5	28.5	40.5	CIS;SIP;Well-Being	.49	26 .75	6
Matchim et al., 2011 (m10,15)	Cancer (32)	59.3	0	MBSR (15)	No-Tx (17)	no	11.1	26	42	POMS;SOSI (FFMQ)	.51 (.43)	4 .33(.72)	6

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Bränström et al., 2010; 2012 (m10,13)	Cancer (71)	51.8	1.4	MBSR (32)	Waitlist (39)	yes	16.5	16	-	PPS;IES-R;PSOM (FFMQ)	.39 (.44)	26 .28	7
Campbell et al., 2012	Cancer (35)	53.21	0	MBSR (19)	Waitlist (16)	yes	22.2	18	36	RRQ (MAAS)	.40 (.61)	-	6
Foley et al. 2010 (m8,10)	Cancer (115)	55.2	22.6	MBSR (55)	Waitlist (60)	yes	10.4	21	37.3	DASS(A,D&S);HAM-A; HAM-D (FMI)	.51 (.63)	13 .72(.75)	7
Speca et al., 2000 (m1,2,3,4, 5,8,10,13)	Cancer (90)	51	18.9	MBSR (53)	Waitlist (37)	yes	17.4	10.5	-	SOSI;POMS	.35	-	3

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Mackenzie et al., 2006 (m12,14)	Caregivers (30)	46.8	3.3	MBSR (16)	Waitlist (14)	no	-	2	5	SRDI;MBI;JSS;OLQ	.64	-	2
Rimes & Wingrove , 2013	Chronic Fatigue (35)	43.5	17.1	MBCT (16)	Waitlist (19)	yes	11.1	18	-	CFS;WSAS;PF-10;BAES; HADS;CBRSQ(FFMQ)	.48 (.47)	26 .38(.56)	7
Alberts et al., 2012	Disordered Eating (26)	48.5	0	MBCT (12)	Waitlist (14)	yes	0	20	36	Weight; DEB-Q; BSQ; DTS; G-FCQ-T(KIMS-E)	.48 (.56)	-	4
Britton et al., 2010 (m7)	Depression (26)	47.7	23.1	MBCT (12)	Waitlist (8)	yes	19.2	26	-	BDI;Sleep Diaries	.16	-	5
Godfrin and van Heeringen, 2010 (m7,9,11)	Depression (106)	45.7	18.9	MBCT (34)	Waitlist (41)	yes	10.4	22	48	POMS;BDI-II;HADS; QLDS	.79 .39	56	5

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Williams et al., 2008 (m7,11)	Depression/ Bipolar (48)	44	26.7	MBCT (21)	Waitlist (27)	yes	18.1	22	36	BAI;BDI	.70	-	6
Teixeira, 2010	DPN(22)	74.6	25	MM(10)	No-Tx(10)	yes	10	-	-	Pain;QoL	.60	-	3
O'Connor et al., 2013	Depression in elderly (48)	77	32.5	MBCT (18)	Waitlist (18)	no	33.3	18	36	BDI-II;HTQ;ICG-R; CES;LNSeq;	.09	22	4
Thompson et al., 2010	Epilesy (40)	35.9	19	MBCTip (13)	Waitlist (27)	yes	24.5	8	-	BDI;mBDI;PHQ-9; DCSES;BRFSS;(SCS)	.11	-	4
Sephton et al., 2007 (m4,5,8,13)	Fbmlgia (91)	48	0	MBSR (51)	Waitlist (39)	yes	17.7	27.5	30	BDI	.57	8 .43	8
Weissbecker et al., 2002 (m13)	Fbmlgia (91)	48	0	MBSR (51)	Waitlist (40)	yes	25	20	-	Sense of coherence	.51	-	3

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Sumter et al., 2009	Forensic (33)	33	0	MM (17)	No-Tx (16)	yes	-	17.5	0	Ph. Sx, NE;NB	.44	-	4
Asmaee Majid et al., 2012	GAD (33)	32.19	100	MBSR (16)	No-Tx (15)	yes	-	16	28	BAI; BDI-II; PSWQ;		-	4
Houghton, 2008	GAD (100)	43.4	0	MBSRi (50)	Waitlist (50)	yes	27.6	5	8.8	STAI;FWS (KIMS)	1.09 (.91)	-	4
Day et al., 2013	Headache (36)	41.7	11.1	MBCT (19)	Waitlist (17)	yes	25	16	36	Headache diary;VAS;BPI; PCS;HMSE;CPAQ(MAAS)	.89 (.77)	-	6
Cathcart et al., 2013	Headache (58)	45.78	43	MBSR (29)	Waitlist (29)	yes	27.6	12	10.5	DASS;Headache diary; (FFMQ)	.02 (-.09)	-	7

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Geary & Rosenthal (2011)	Health care employees (108)	45.27	10	MBSR (59)	No-Tx (49)	no	-	34	-	PSS;SF-36;DSES; SCL-90R	.88	52 (.77)	4
Robert-McComb et al., 2004 (m13)	Heart Disease (18)	60	0	MBSR (9)	Waitlist (9)	yes	0	16	-	SF-36	.35	-	3
Tacón et al., 2003 (m4,5,12,13,14)	Heart Disease (18)	60.5	0	MBSR (9)	Waitlist (9)	yes	10	24	-	PF-SOC;CECS;STAI	1.02	-	3
Duncan et al., 2012	HIV+ (76)	48	84	MBSR (40)	Waitlist (36)	yes	14	30	45	ACTCS-CL;BDI;PSS ART side effects (FFMQ)	(-.04)	13 .29(.07)	6
Carmody et al., 2011	Hot flashes (110)	53	0	MBSR (57)	Waitlist (48)	yes	9.1	26	36	HADS;PSS;SQ;QOL	.52	13	6

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Morone et al., 2008 (m4,8,12,13,14)	Low Back Pain (37)	74.9	43.2	modified MBSR(19)	Waitlist (18)	yes	19	12	36	MPQ-SF;CPAQ; QoL(SF-36);Ph. Fn	.27	13	6
Roth and Robbins , 2004	Mixed[3] (86)	47.9	14	MBSR (68)	No-Tx (18)	no	34	16	30	SF-36;FH;SQ	.42	-	3
Sampalli et al., 2009	MS (76)	45.8	0	MBSR (50)	Waitlist (26)	no	16	31	-	SCL-90-R;BSI;MPQ; QolWHO	.32	10 .58	4
Skovbjerg et al., 2012	MCS (37)	51.6	5.4	MBCT (17)	No-Tx (20)	yes	29.7	20	36	SCL-92;Brief IPQ	.04	12 .06	6
Heeren et al., 2009 (m12,14)	Non-clinical(36)	55.5	16.7	MBCT (18)	No-Tx (18)	no	14.3	8	-	AMT;Cognitive measures	2.20	-	2

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Raes et al., 2009 (m11)	Non-clinical(39)	41.6	41	MBCT (18)	Waitlist (21)	yes	-	-	-	BDI-II;LEIDS-R (KIMS)	.43 (.62)	-	4
Berghmans et al., 2010	Non-clinical(26)	28.4	21	MBSR (10)	No-Tx (9)	yes	26.9	20	-	HADS;PSS; Social Dysfunction	.37	-	3
Kang et al., 2009	Non-clinical(32)	22.5	0	MBSR (16)	No-Tx (16)	yes	22	14	-	BDI;STAI;PWI-SF	1.26	-	4
Potek, 2012	Non-clinical Adolescents(31)	15	51.6	MBSR (16)	No-Tx (15)	yes	-	4	1	PSS;MASC;DERS (FFMQ)	.48 (.34)	-	7
Anderson et al., 2007 (m12,13,14)	Non-clinical(72)	39.2	-	MBSR (39)	Waitlist (33)	no	15.2	16	-	NAI;PANAS;ARS;ASI; BAI;BDI;PSWQ;RSQ;RUM	.42	-	4

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Dziok, 2011	Non-Clinical(52)	43.7	15.4	MBSR (39)	Waitlist (13)	yes	-	12	36	STAI;CESD;PHQ-9; MaQ	1.11	-	4
Nyklicek and Kuijpers, 2008 (m8,12,13,14)	Non-clinical(57)	43.6	33	MBSR (29)	Waitlist (28)	yes	24	26	37.3	GMS;PSS;QoLWHO;VE (KIMS;MAAS)	.63 (.59)	-	4
Klatt et al., 2009 (m6,12,13,14)	Non-clinical(45)	45	28.5	MBSRld (22)	Waitlist (20)	yes	8.3	6	7.7	PSS;PSQI (MAAS)	.20 (.39)	-	4
Robins et al., 2012	Non-clinical(56)	46.2	16	MBSR (28)	Waitlist (28)	yes	21.4	27	36	CFQ;DERS;AFQ;RRS; PSWQ;SAES;MSCDS (FFMQ;SCS)	.59 (.88)	8 .57(.92)	7

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Hoffmann Gurka, 2006	Non-clinical(109)	-	20	MM (77)	Waitlist (32)	no	-	18	-	PWS;SCL-90-R;MSCL; USQ	.16	2 .16	3
Hanstede et al. , 2008	OCD (17)	25.7	29.4	MM (8)	Waitlist (9)	no	-	8	28	OCI-R (MQ)	1.38 (1.61)	-	2
Daubenmier et al., 2011	Overweight (47)	40.9	0	MB-EAT+ MBSR(24)	Waitlist (23)	yes	29.2	29.5	27	BRS;WCSI;PSS; STAI;DEB-Q(KIMS)	.44 (.60)	-	5
Poelke, 2009	Overweight (38)	40.9	0	CALMM (18)	Waitlist (15)	yes	0	29.5	31.5	RSES;PStS;SSS; BASS;CRS	.23	-	2
Sagula and Rice, 2004 (m5)	Pain (39)	-	25.64	MBSR (27)	Waitlist (13)	no	20.4	12	18.7	BDI;STAI	.28	-	3

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Nyklíček et al., 2012	Personality Type D (147)	46.07	31	MBSR (73)	Waitlist (74)	yes	12.5	26	36	PANAS; (MAAS;KIMS)	.32	-	5
Vieten and Astin 2008 (m6,13)	Pregnancy[5] (31)	33.9	0	MMI (13)	Waitlist (18)	yes	-	16	18.7	CESD;PANAS;PSS;STAI (MAAS)	.87 (.51)	-	7
Chadwick and Hughes, 2009	Psych./SZ (18)	41.6	21.7	MM (9)	Waitlist (9)	yes	9.1	10	15.2	CORE;PSYRATS; BAVQ-r (SMQ, SMVQ)	.38 (.64)	-	5
Pradhan et al., 2007 (m4,5,8,13)	RA (63)	54.5	12.7	MBSR (31)	Waitlist (32)	yes	7.9	27.5	36	DAS-28;SCL-90-R;PWBS (MAAS)	.21 (.13)	17 .43(.16)	7
Semple, 2006	Reading difficulties (25)	10	40	MBCT-C (13)	Waitlist (12)	yes	14	12	-	CBCL;STAIC;GMRT	.28	13 .07	4

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
De Raedt et al., 2012	RDP (71)	45.2	26.7	MBCT (45)	No-Tx (26)	no	-	27	-	HAM-D;MINI;BDI-II (MAAS)	.64 (.44)	-	3
Crane et al., 2008 (m7,11)	RDP (42)	44.65	-	MBCT (19)	Waitlist (23)	yes	30	22	0	BDI	.67	-	5
Ramel et al., 2004 (m5,11)	RDP (23)	50.9 65		MBSR (11)	Waitlist (11)	no	-	20	35	SCID;BDI;STAI; DAS[b]	.48	-	4
Geschwind et al., 2012	RDS (130)	43.9	24.6	MBCT (64)	Waitlist (66)	yes	2.3	20	36	HAM-D;IDS;	.52	52	5
Arana, 2006	SAD (22)	-	31.8	MBSRi (10)	Waitlist (12)	yes	-	18	16	CBSS;Shy Q;BAI;BDI; LSAS;SWLS (MAAS)	.87 (.89)	-	5

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Murray, 2005 (m13)	Sex as coping (22)	19.4	100	MBSR (11)	No-Tx (11)	yes	18.5	-	-	CUSI;NMRS;PANAS	.78	-	4
Langer et al., 2012	Schizophrenia spectrum (23)	34.7	58.74	MBCT (7)	Waitlist (11)	yes	21.7	8	-	CGI-SCH (SMQ)	.55 (1.00)	-	7
Spragg, 2011	Trainees in mental-health(16)	25.5	6.25	MBSR (8)	Waitlist (8)	yes	-	27.5	36	SCoS;IRI;MBI (KIMS)	.11 (.16)	4 .13(.30)	6
Ramel et al., 2004 (m5,11)	RDP (23)	50.9	65	MBSR (11)	Waitlist (11)	no	-	20	35	SCID;BDI;STAI; DAS[b]	.48	-	4
Geschwind et al., 2012	RDS (130)	43.9	24.6	MBCT (64)	Waitlist (66)	yes	2.3	20	36	HAM-D;IDS;	.52	52	5

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Arana, 2006	SAD (22)	-	31.8	MBSRi (10)	Waitlist (12)	yes	-	18	16	CBSS;Shy Q;BAI;BDI; LSAS;SWLS (MAAS)	.87 (.89)	-	5
Murray, 2005 (m13)	Sex as coping (22)	19.4	100	MBSR (11)	No-Tx (11)	yes	18.5	-	-	CUSI;NMRS;PANAS	.78	-	4
					Treatment Controlled Studies								
Murphy, 1995 (m2,13)	Aggression (31)	32.7	100	modified MBSR(15)	Relaxation (16)	yes	16.1	12	26	STAXI-II	.06	-	7
Garland et al. 2010	Alcohol dep. (53)	40.3	79.2	MORE (18)	Support (19)	yes	30.2	10	17.5	GPS;PSS;Craving (FFMQ)	.45 (-.05)	-	8
Kim et al., 2009 (m5,7,11)	Anxiety (46)	39. 5	63	MBCT (24)	PsyEd (22)	no	0	12	0	BAI;BDI;HAM-A; HAM-D;SCL-90(A&D)	1.36	-	7

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Pbert et al., 2012	Asthma (83)	52.8	32.5	MBSR (42)	Education Program (41)	yes	10.8	26	24	PEF;PSS;AQOL	.48	52 (.54)	7
Koszycki et al., 2007 (m5,8,11,13)	Anxiety (GSAD) (53)	38.3	47	MBSR (26)	CBGT (27)	yes	23	27.5	28	MINI;LSAS;CGI-SoI; SIAS;SPS;IPSM;BDI-II; LSRDS;QoL	-.66	-	6
Arch et al., 2013	Anxiety (105)	46	83	MBSR (45)	CBT (60)	yes	32.4	18	30	PSWQ;MINI;BDI-II	.08	13 .08	11
Perich et al., 2012	Bipolar (95)	-	34.7	MBCT + TAU (48)	TAU (47)	yes	29.5	18	30	MADRS;YRMS;DASS; STAI;DAS[b];RSQ(MAAS)	.12 (.32)	52 -.21(.17)	8
Lengacher et al., 2012	Breast Cancer (82)	57.2	0	MBSR (40)	TAU (42)	yes	2.4	12	18	STAI;CES-D;LOT-R;PSS; SF-36;SoSS	.21	-	5

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Würtzen et al., 2013	Breast Cancer (336)	54.14	0	MBSR + TAU (168)	TAU (168)	yes	18.5	21	-	SCL-90R;GSI;CES-D	.25	52 (.24)	7
Garland et al., 2007 (m3,5,10)	Cancer (104)	52.5	8.7	MBSR (60)	Art Th. (44)	no	24	15	42	POMS;FACIT-Sp;SOSI	.28	-	6
Oken et al., 2010	Caregivers (31)	64.9	23.8	MBCT (10)	PsyEd (11)	yes	10	9	-	PSS;SF-36;CES-D; GPSE;PSQI;ESS; (MAAS;FFNJ)	.05 (-.18)	-	9
Whitebird et al., 2012	Caregivers (78)	56.8	11.5	MBSR (38)	CCES (40)	yes	10	25	-	PSS;CES-D;STAI; SF-12;MBCBS;MOSSSS	.32	26 (.32)	9
Pipe et al., 2009	Caregivers (32)	49.8	3.1	MBSR (15)	Course/ seminar (17)	yes	3	10	56	SCL-90	.59	-	6

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Wong et al., 2011	Chronic pain (99)	47.9	0	MBSR (51)	MPI (48)	yes	15	27	-	NRS;POMS;SF-12;STAI; CES-D;Sick leaves;	.00	26 (.00)	10
Mularski et al., 2009 (m8)	COLD (86)	67.4	98.8	MBBT (20)	Support (29)	yes	43	-	-	MSAS;PSS;SFS-36; Phy. measures (FFMQ)	-.10 (-.04)	-	10
Bieling et al., 2012	Depression (84)	44	42	MBCT (26)	ADM (28)	yes	22.2	22	-	HAM-D;EQ (TMS)	.43 (1.26)	26	8
Manicavasgar et al., 2010 (m11)	Depression (45)	45.8	35.4	MBCT (19)	CBT (26)	yes	23	16	42	BAI;BDI-II	-.24	28 -.28	9
Chiesa et al., 2012	Depression (16)	51.93	25	MBCT (9)	PsyEd (7)	yes	16.7	16	30	HAM-D;BAI PGWBI(MAAS)	1.01 (-.78)	-	9

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Kingston et al., 2007 (m5,7,11)	Depression (17)	41.8	10.5	MBCT (6) (11)	TAU	yes	21.4	17	-	BDI;RUM	.88	4	5
Barnhofer et al., 2009 (m5,7,11)	Depression (28)	41.9	32.1	MBCT + TAU (14)	TAU (14)	yes	9.7	17	48	BDI-II;BSS	.80	-	7
Ma and Teasdale, 2004 (m7,8,9,11)	Depression (75)	44.5	64	MBCT + TAU (37)	TAU (38)	yes	4	16	-	RR	.92	13	7
Weiss et al., 2005	Depression/ Anxiety (31)	42.8	38	MBSR (15)	Support (16)	no	0	8	36	GSI	.62	26	7
Pinniger et al., 2012	Depression (97)	44.39	9.1	MM (16)	Tango (21)	yes	10.3	9	-	DASS-21;SWLS;RSES (MAAS)	-.06 (-.14)	-	8

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Parra-Delgado & Latorre-Postigo, 2013	Fbmlgia (33)	52.7	0	MBCT + TAU (17)	TAU (16)	yes	11.8	20	-	MINI;BDI;VAS;FIQ;	.82	13 (1.27)	7
Grossman et al., 2007 (m5)	Fbmlgia (52)	52	0	MBSR (29)	Support (13)	no	10	27	42	HADS;PPS;IPR; SSI;QoL	.68	156	6
Schmidt et al., 2011	Fbmlgia (177)	52.5	0	MBSR (53)	Relax. (56)	yes	18	27	49	PPS;CES-D;PSQI; STAI;QoL (FMI)	.18 (.26)	8 .18(.30)	12
Hoge et al. 2013	GAD (93)	39.16	49.44	MBSR (48)	SME (45)	yes	15	20	18	HAM-A;CGI-S;CGI-I; BAI;TSST	.45	-	7
Nash-Mc Feron, 2006	Headache (40)	49.5	17.5	MBSR + TAU (19)	TAU (18)	yes	7.5	4	-	SCI;Headache Log; SF-36	.58	-	5

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
SeyedAlinaghi et al., 2012	HIV+ (173)	35.9	69	MBSR (87)	Support (86)	yes	29.4	16	-	SCL-90-R;MSCL	.33	52 (.13)	9
Gayner et al., 2012	HIV+ (117)	44	100	MBSR (78)	TAU (39)	yes	26.9	30	48	IES;HADS;PANAS; (TMS)	.26 (.98)	26 .37(.60)	6
McManus et al., 2012	Hypochon. (74)	42.64	24.3	MBCT + TAU (36)	TAU (38)	yes	4	16	48	SHAI;WI;BAI;BDI-II; (FFMQ)	.33	52 .47	8
Zernicke et al., 2012	IBS (90)	44.4	10	MBSR (43)	TAU (47)	yes	23	15	-	POMS;C-SOSI;IBS-QOL; IBS-SSS; FACIT-Sp	.33	26 .09	4
Gaylord et al., 2011	IBS (75)	42.73	0	MBSR (36)	Support (39)	yes	5.6	20	-	IBS-SSS;IBS-QOL;BSI VSI (FFMQ)	.41 (.51)	13 .53(.48)	11

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Gross et al., 2011	Insomnia (30)	49.2	26.7	MBSR (20)	Pharm. (10)	yes	10	26	36	ISI;SF-12;PSQI	.04 .11	13	7
Kristeller et al., 2013	BED (150)	46.6	12	MB-EAT (53)	PECB (50)	yes	24.5	16	-	TFEQ;PFS;ESES; BDI-II;RSES;BMI	.05 (.03)	17	8
Biegel et al., 2009	[4]Mixed (85)	15.3	26.5	MBSR + TAU (34)	TAU (40)	yes	18.3	16	25.7	GAF(DSM);SCL-90; PSS;STAI	.47 .73	13	7
Grossman et al., 2010 (m13)	MS (150)	47.3	21	MBSR + TAU (76)	TAU (74)	yes	5	27	37.3	MFIS;CES-D;STAI; HAQUAMS	.71 .41	26	7
Rosenzweig et al., 2010	Non-clinical (277)	-	-	MBSR (125)	course/ seminar (152)	no	-	15	20	POMS	.52	-	4

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Shapiro et al., 2007 (m6,12,14)	Non-clinical (54)	29.2	11.1	MBSR (22)	course/ seminar (32)	no	23.8	16	-	PANAS;PPS;RRQ; STAI (MAAS;SCS)	.82 (.85)	-	7
Trotter, 2010 (m12)	Non-clinical (55)	23	36.4	MBSR (26)	PsyEd (29)	no	-	30	-	HSCL;RPWS;SF-13 (SCS)	.11 (.33)	-	6
Agee, 2007	Non-clinical (43)	41.6	9.3	MBSR (19)	Relaxation (24)	yes	16.3	22.5	36	HS;BSI;PSS;STAI (MAAS)	-.31 (-.10)	13 -.39(.12)	9
Jain et al., 2007 (m6,12,13,14)	Non-clinical (51)	25	18.5	MBSR (27)	Relaxation (24)	yes	22.1	12	-	PSOM;BSI;QoL	.22	-	7
Smith et al., 2008 (m12)	Non-clinical (50)	44.9	20	MBSR (36)	Relaxation (14)	no	21.9	30	-	BES;PWBS;PSS; BDI-II (MAAS)	.59 (1.04)	-	8

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Kingston et al., 2007 (m12)	Non-clinical (42)	23	21	modified MBSR(21)	Imagery (21)	yes	6.7	26	7	PT;PANAS (KIMS)	.21 (.61)	-	8
Liehr and Diaz, 2010	Non-clinical (18)	9.5	71	MI (8)	PsyEd (8)	yes	-	3	-	STAI;SMFQ	.72	-	6
Langer et al., 2010	Non-clinical (38)	21.3	15.7	MTI (18)	course/ seminar (20)	yes	39.7	8	-	RHS	.29	16 .43	6
Blevins, 2009	Overweight (23)	20.7	0	MBT (12)	Exposure Therapy (11)	yes	14	16	-	RSES;QEWP-R;BASS; ASS;BMI;Weight;BDI;	-.19 -.31	13	8
Plews-Ogan et al., 2005 (m13)	Pain (30)	46.5	23.3	MBSR (6)	Massage Therapy (8)	yes	23.3	30	-	STAI;SF-12	1.16	4	6

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Cusens et al., 2010	Pain (53)	47.3	21.3	MM (24)	TAU (20)	no	9.1	20	35	DAPOS;CPAQ;PSEQ; PCS;SF-36(MAAS)	.50 (.61)	-	4
Bratton, 2008	Pregnancy (20)	29	0	MM (10)	Relaxation (10)	no	20	6	6	STAI;W-DEQ (KIMS)	-.10 (.05)	40 -.10(.04)	7
King et al., 2013	PSTD in Veterans (37)	59.27	-	MBCT (20)	TAU (17)	yes	0	16	24	CAPS;	.61	-	6
Niles et al., 2012	PSTD in Veterans (33)	52.0	100	MBSR (17)	PsyEd (16)	no	18.2	3.5	10.5	CAPS;PCL-M;	1.08	6 (.03)	8
Kearney et al., 2013	PSTD in veterans (47)	52	78.7	MBSR + TAU (25)	TAU (22)	yes	6.4	27	36	PCL-C;PHQ-9;SF-8; HRQOL;BADS(FFMQ)	.31 (.59)	17 .31(.58)	7

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Teasdale et al., 2000 (m1,7,8,9,11)	RDP (145)	43.3	24.1	MBCT + TAU (76)	TAU (69)	yes	9	26.5	16	Depression - Relapse rate	.53	60	7
van Aalderen et al., 2012	RDP (205)	47.5	29.3	MBCT + TAU (102)	TAU (103)	yes	8.1	26	36	HAM-D;BDI;PSWQ; RSS;QoLWHO(KIMS)	.40 (.54)	52	8
Williams et al., 2000 (m1,7)	RDP (41)	43.9	26.8	MBCT + TAU (21)	TAU (20)	yes	-	16	-	HAM-D	.35	17	5
Zautra et al., 2008	RA (144)	54.3	31.9	MM&ER (41)	Pharm. (35)	yes	1.4	16	-	Pain Diary;PANAS;Pain; Depressive Sx;Coping;Control	.04	-	10
Goldin et al., 2012	SAD (56)	32.9	50	MBSR (31)	Aerobic (25)	yes	25	27	-	LSAS;SDS;MSCDS (FFMQ)	.40 (.64)	-	8

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Brotto et al., 2013	Sexual distress in women (20)	35.9	0	MBT (12)	CBT (8)	yes	0	3	-	FSDS; FSFI	.06	-	7
Brewer et al., 2011	Smokers (88)	45.9	62.1	MBRP + MMRP (41)	ALA-FFS (47)	yes	12	12	14	TLFB	.45	-	8
Piet et al., 2010 (m7)	SP (26)	21.8	30.8	MBCT (14)	CBT (12)	yes	22.7	16	32.7	SIAS;IIP;SDS;BAI;SPS; BDI-II;FNE;LSAS;SCL-90-R	.00 .06	52	7
Bowen et al., 2006 (m12)	SU (87)	37.4	79.2	MBRP (29)	TAU (58)	no	49.7	60	0	DDQ;DDTQ;BSI	.57	26	4
Bowen et al. 2009	SU (168)	40.5	63.7	MBRP (93)	TAU (75)	yes	45	16	42	TLFB; PACS; SIP-AD (FFMQ)	.20 (.29)	16 .08(-.16)	7

Table 2 *(continued)*.

Study	Type Particip(*N*)	Mean Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rand Assn	% Att	Tx hrs	Prac hrs	Clinical Measures (Mindfulness Measures)	Post *g*(*gm*)	Foll wks *g*(*gm*)	Qual Scor
Lee et al., 2011	SU in inmates (24)	40.7	100	MBRP (10)	TAU (14)	yes	-	15	-	DUDIT-E;DASE;BDI-II;	1.60	-	6
Brewer et al., 2009	SU (25)	38.2	72	MMRP (9)	CBT (5)	yes	44	9	-	DES;Alcohol/Cocaïne consumption (FFMQ)	.29 (.33)	-	8
Jimenez, 2009	Sx of Depression (120)	19.8	39.2	MM (61)	Relaxation (59)	yes	2.5	-	-	PANAS;PWBS;RRQ; CESD (FMI)	.23 (.49)	20 .13(.35)	7
Philippot et al., 2012	Tinnitus (30)	60	50	MBCT (12)	Relaxation (12)	yes	16.7	13.5	-	QIPA;BDI;STAI	.27	13 .57	9
Delgado et al., 2010	Worry (36)	21	0	MM (15)	Relaxation (17)	yes	11.1	10	-	PANAS;PSWQ;STAI; SHC;TMMS-24;DSROW	.06	-	5

Note. m1 = meta-analysis/review from Baer (2003); m2 = meta-analysis/review from Grossman et al. (2004); m3 = meta-analysis/review from Ledesma & Kumano (2009); m4 = meta-analysis/review from Bohlmeijer et al. (2010); m5 = meta-analysis/review from Hofmann et al. (2010); m6 =

meta-analysis/review from Chiesa & Serretti (2009); m7 = meta-analysis/review from Chiesa & Serretti (2011); m8 = meta-analysis/review from Fjorback et al. (2011); m9 = meta-analysis/review from Piet & Hougaard (2011); m10 = meta-analysis/review from Musial et al. (2011); m11 = meta-analysis/review from Klainin-Yobas et al. (2012); m12 = meta-analysis/review from Sedlmeier et al. (2012); m13 = meta-analysis/review from de Vibe et al. (2012); m14 = meta-analysis/review from Eberth & Sedlmeier (2012); m15 = meta-analysis/review from Zainal et al. (2012); m16 = meta-analysis/review from Cramer et al. (2012); mi,j,k = study included in meta-analyses/review mi, mj and mk. Comp. = Comparaison; Tx = Treatment; Prac = Practice; Foll = Follow-up; wks = weeks; Qual = Quality; Particip = Participant; Assn = Assignement; Att = Attrition; hrs = hours; *g*m = Hedge's g of Mindfulness outcomes; Scor = Score; ADHD = Attention Deficit Hyperactivity; MAPS = Mindful Awareness Practices; Disorder; Sx = Symptoms; BAI = Beck Anxiety Inventory; BDI = Beck Depression Inventory; Dep-Anx = Depression-Anxiety; CBCL = Child Behavior Checklist; YSR = Youth Self Report; BRIEF = Behavior Rating Inventory of Executive Function; FFS = Flinders Fatigue Scale; SHS = Subjective Happiness Scale; MMRP = Mindfulness Meditation Relapse Prevention; PDA = Percent Days Abstinent; HHD = Heavy Drinking Days; TD = Total Drinking; depend = dependency; SCL-90R = Symptoms Checklist 90-Revised; OCDS = Obsessive Compulsive Drinking Scale; MAAS = Mindful Attention and Awareness Scale; ASH = Aneurysmal Subarachnoid Hemorrhage; MBSR = Mindfulness-Based Stress Reduction; STAI = Strait-Trait Anxiety Inventory; MIA = Mobility Inventory for Agoraphobia; FSS[a] = Fear Survey Schedule; HAM-A = Hamilton Anxiety Rating Scale; HAM-D = Hamilton Depression Rating Scale; MH-5 = 5-item Mental Health; YMRS = Young Mania Rating Scale; PSWQ = Penn State Worry Questionnaire; RSQ = Response Style Questionnaire; ERS = Emotion Reactivity Scale; ASRS = Adult ADHD Self-Report Scale; CPAS = Clinical Positive Affective Scale; PWBS = Psychological Well-Being Scales; LIFE-RIFT = Longitudinal Interval Follow-up Evaluation – Range of Impaired Functioning Tool; PQOL = Perceived Quality of Life Scale; PSES = Perceived Self Efficacy Scale; SPSI-RSF = Social Problem-Solving Inventory—Revised Short Form; BED = Binge-Eating Disorder; BPD = Borderline Personality Disorder; DES-II = Dissociative Experience Scale; SDQ = Somatoform Dissociation Questionnaire; BIS-11 = Barratt Impulsiveness Scale-11; Canc. = Cancer; PSS = Perceived Stress Scale; MSAS =

Memorial Symptom Assessment Scale; LOT-R = Life Orientation Test Revised; QoL = Quality of Life; MSCL = Medical Symptoms Check List; SoC = Sense of Coherence; HADS = Hospital Anxiety and Depression Scale; IES-R = Impact of Event Scale - Revised; EPIC = Expanded UCLA Prostate Cancer Index; MAX-PC = Memorial Anxiety Scale for Prostate Cancer; FACT-P = Functional Assessment of Cancer Therapy-Prostate; FFMQ = Five-Facet Mindfulness Questionnaire; FACIT-Sp = Functional Assessment of Chronic Illness Therapy-Spiritual Well-Being; POMS = Profile of Mood States; C-SOSI = Calgary Symptoms of Stress Inventory; SQ = Sleep Quality; SOSI = Symptoms of Stress Inventory; Phy. = Physiological; RSC = Rotterdam Symptom Checklist; HDI = Health and Disease Inventory; KIMS = Kentucky Inventory of Mindfulness Skills; CESD = Center for Epidemiological Studies Depression Scale; ZBI = Zarit Burden Interview; SF-36 = Medical Outcomes Studies–Short-Form General Health Survey; BSI = Brief Symptom Inventory; PCL = Post-Traumatic Stress Disorder Checklist; DASS = Depression Anxiety Stress Scales; VAS = Visual Analog Scale; PCS = Pain Catastrophising Scale; PGIC = Patient Global Impression of Change; MBCT = Mindfulness-Based Cognitive Therapy; RRQ = Ruminative Response Scale; FMI = Frieburg Mindfulness Inventory; SF = Health Status Inventory; GAD = Generalized Anxiety Disorder; DASS(A,D&S) = Depression Anxiety Stress Scales(Anxiety, Depression and Stress scales); RRAQ = Reactions to Relaxation and Arousal Questionnaire; FAHI = Functional Assessment of HIV Infection; Hypoch. = Hypochondrias; HCQ = Hypochondriacal Cognitions Questionnaire; HAI = Health Anxiety Inventory; PHQ-9 = Patient Health Questionnaire; WI = Whiteley Index; QOLWHO = Quality Of Life World Health Organization; [1]Mixed clinical population; [2]Mixed physical and psychological disorders; SES = Rosenberg Self-Esteem Scale; ISI= Insomnia Severity Index; Anx. = Anxiety; PANAS = Positive Affect Negative Affect Scale; CBCL = Child Behavior Checklist; MASC = Multidimensional Anxiety Scale for Children; STAIC = State-Trait Anxiety Inventory for Children; RCDS = Reynolds Child Depression Scale; SCS = Self-Compassion Scale; PSOM = Positive States of Mind; MSE = Mindfulness Self-Efficacy; LASA = Linear Analogue Self-Assessment Scale; DSES = Daily Spiritual Experiences Scale; CAMS-R = Cognitive And Affective Mindfulness Scale-Revised; DAS[a] = Dyadic Adjustment Scale; UBC-CI-LGR = University of British Columbia Cognition Inventory-Letting-go Revised; Indiv-NGLG = Individualized Negative Cognition & Letting-Go

Scale; IRI = Interpersonal Reactivity Index; MBCP = Mindfulness-Based Childbirth and Parenting; DES = Differential Emotions Scale; TFEQ = Three-Factor Eating Questionnaire; FFQ = Food Frequency Questionnaire; PCL-C = Post-Traumatic Stress Disorder Checklist-Civilian; MEAL = Mindful Eating And Living; BES = Binge-Eating Scale; PDSS = Panic Disorder Specific Scale; MH = Mental Health; Pro = Professionals; GHQ-12 = General Health Questionnaire; SWLS = Satisfaction With Life Scale; LES = Life Events and Stress; APU = Acute Psychiatric Unit; MBI = Maslach Burnout Inventory; SOSS = Sense of Self Scale; MHPSS = Mental Health Professionals Stress Scale; MBY = Mindfulness-Based Yoga; PSTD = Post-Traumatic Stress Disorder; PLS-SDHS = Perceived Life Stress: Shortened Daily Hassles Scale; TMS = Toronto Mindfulness Scale; SAD = Social Anxiety Disorder; LSAS = Liebowitz Social Anxiety Scale; SP = Social Phobia; FNE = Fear of Negative Evaluation scale; SPB = Social Phobic Belief scale; SFA = Self-Focused Attention; SU = Substance Use/Abuse; UPPS+P = Urgency, Premeditation, Perseverance, Sensation Seeking, and Positive Urgency Impulse Behavior Scale; THI = Tinnitus Handicap Inventory; HRQoL = Health Related Quality of Life; PAS = Percent of Awareness Scale; OABq-SF = Overactive Bladder Symptom and Quality of Life-Short Form; HRQL = Health-Related Quality of Life; PGI-I = Patient Global Impression of Improvement; BIS = Bergen Insomnia Scale; GMS = Global Mood Scale; WAIS-III = Wechsler Adult Intelligence Scale; FACT-B = Functional Assessment of Cancer Therapy–Breast; FACT-ES Functional Assessment of Cancer Therapy–Endocrine Symptoms; WHO-5 = World Health Organization five-item well-being questionnaire; LOT = Life Orientation Test; BFM = Breast Feeding Mothers; PES = Parental Evaluation Scale; MBAT = Mindfulness-Based Art Therapy; CIS = Self-Report Checklist Individual Strength; SIP = Sickness Impact Profile; PPS = Pain Perception Scale; SRDI = Smith Relaxation Dispositions Inventory; JSS = Job Satisfaction Scale; OLQ = Orientation of Life Questionnaire; CFS = Chalder Fatigue Scale; WSAS = Work and Social Adjustment Scale; PF-10 = Physical Functioning; BAES = Beliefs about Emotions Scale; CBRSQ = Cognitive and Behavior Responses to Symptoms Questionnaire; DEB-Q = Dutch Eating Behavior Questionnaire; BSQ = Body Shape Questionnaire; DTS = Dichotomous Thinking Scale; G-FCQ-T = General Food Craving Questionnaire Trait;

QLDS = Quality of Life in Depression Scale; DPN = Diabetic Peripheral Neuropathy; MM = Mindfulness Meditation; HTQ = Harvard Trauma Questionnaire; ICG-R = Inventory of Complicated Grief-Revised; CES = Centrality of Event Scale; LNSeq = Letter-number sequencing; MBCTip = MBCT (internet + phone); mBDI = modified form of the BDI; DCSES = Depression Coping Self-Efficacy Scale; BRFSS = Behavioral Risk Factor Surveillance System; Fbmlgia = Fibromyalgia; FIQ = Fibromyalgia Impact Questionnaire; Ph. = Physical; NE = Negative Emotions; NB = Negative Behaviors; MBSRi = Mindfulness-Based Stress Reduction via internet; FWS = Friedman Well-Being Scale; BPI = Brief Pain Inventory; HMSE = Headache Management Self-Efficacy Scale; CPAQ = Chronic Pain Acceptance Questionnaire; PF-SOC = Problem-Focused Styles Of Coping; CECS = Courtauld Emotional Control Scale; ACTCS = AIDS Clinical Trials Group symptom checklist; ART = Advances in antiretroviral therapy; MPQ-SF = McGill Pain Questionnaire Short Form; Fn = Functioning; [3]Mixed psychiatric disorders in adolescents; FH = Family Harmony; MS = Multiple Sclerosis; MPQ = McGill Pain Questionnaire; QolWHO = Quality of Life World Health Organization; MCS = Multiple Chemical Sensitivity; IPQ = Illness Perception Questionnaire; AMT = Autobiographical Memory Test; LEIDS-R = Leiden Index of Depression Sensitivity Revised; PWI-SF = Psychosocial Well-being Index-Short Form; DERS = Difficulties in Emotion Regulation Scale; NAI = Novaco Anger Inventory; ARS = Anger Rumination Scale; ASI = Anger Sensitivity Index; RUM = Rumination; MaQ = Maastricht; Questionnaire; VE = Vital Exhaustion; MBSR-ld = Mindfulness-Based Stress Reduction (low dose); PSQI = Pittsburgh Sleep Quality Index; CFQ = Cognitive Failures Questionnaire; ACS = Affective Control Scale; RRS = Ruminative Response Scale; SAES = Spielberger Anger Expression Scale; MSCDS = Marlowe–Crowne Social Desirability Scale; PWS = Perceived Wellness Survey; USQ = Undergraduate Stress Questionnaire; OCD = Obsessive-Compulsive Disorder; OCI-R = Obsessive-Compulsive Inventory Revised; MQ = Mindfulness Questionnaire; MB-EAT = Mindfulness-Based Eating Awareness Training; BRS = Body Responsiveness Scale; WCSI = Wheaton Chronic Stress Inventory; CALMM = Craving and Lifestyle Management through Mindfulness; RSES = Rosenberg Self-Esteem Scale; PStS = Perceived Stigma Scale; SSS = Stigmatizing Situations Scale; BASS = Body Areas Satisfaction Scale; CRS = Coping Responses Scale; [5]Pregnancy with history of mood concerns; MMI = Mindful Motherhood Intervention; Psych. = Psychosis;

SZ = Schizophrenia; CORE = Clinical Outcomes in Routine Evaluation; PSYRATS = Psychiatric Symptom Rating Scale; BAVQ-r = Beliefs about Voices Questionnaire revised; SMQ = Southampton Mindfulness Questionnaire; SMVQ = Southampton Mindfulness Voices Questionnaire; MBCT-C = Mindfulness-Based Cognitive Therapy for Children; GMRT = Gates-MacGinitie Reading Tests; RDP = Recovered Depressed Patients; SCID = Structured Clinical Interview for the DSM-IV; DAS[b] = Dysfunctional Attitudes Scale; RDS = Residual Depressive Symptoms; IDS = Inventory of Depressive Symptoms; RA = Rheumatoid Arthritis Patients; DAS-28 = Disease Activity Score of 28 Joints; CBSS = Cheek and Buss Shyness Scale; Shy Q = Shyness Questionnaire; CUSI = Coping Using Sex Inventory; NMRS = Negative Mood Regulation Scale; CGI-SCH = Clinical Global Impression-Schizophrenia Scale; SCoS = Self-Consciousness Scale; IRS = Interpersonal Reactivity Index; STAXI = State and Trait Anger; MORE = Mindfulness Oriented Recovery Enhancement; GPS = Global Psychiatric Symptoms; PsyEd = Psychoeducation; A&D = Anxiety and Depression subscales; CBGT = Cognitive-Behavioral Group Therapy; PEF = Peak Expiratory Flow; AQOL = Asthma Quality of Life Questionnaire; MINI = Mini International Neuropsychiatric Interview; CGI-SoI = Clinical Global Impression - Severity of Illness subscale; GSAD = Generalized Social Anxiety Disorder; SIAS = Social Interaction Scale; SPS = Social Phobia Scale; IPSM = Interpersonal Sensitivity Measure; LSRDS = Liebowitz Self-Rated Disability Scale; MADRS = Montgomery-Åsberg Depression Rating Scale (MADRS); SoSS = Social Support Scale; GSI = Global Severity Index; Th. = Therapy; GPSE = General Perceived Self-Efficacy; ESS = Epworth Sleepiness Scale; FFNJ = measure of being NonJudgmental adapted from Factor Five; CCES = Community Caregiver Education and Support; MBCBS = Montgomery Borgatta Caregiver Burden Scale ; MOSSSS = Medical Outcomes Study Social Support Survey; COLD = Chronic Obstructive Lung Disease; MBBT = Mindfulness-Based Breathing Therapy; TAU = Treatment As Usual; MPI = Multidisciplinary Pain Intervention; NRS = Numerical Rating Scale; ADM = Antidepressant Medication; EQ = Experiences Questionnaire; CBT = Cognitive-Behavioral Therapy; PGWBI = Psychological General Well-being Index; BSS = Beck Scale for Suicide Ideation; RR = Relapse Rate; IPR = Inventory of Pain Regulation; SSI = Somatic Symptom Inventory; SME = Stress Management Education; TSST = Trier Social Stress Test; SCI = Shapiro Control Inventory; Hypochon. = Hypochondriasis ; SHAI = Short Health Anxiety

Inventory; IBS = Irritable Bowel Syndrome; IBS-QOL= Irritable Bowel Syndrome-Quality of Life; IBS-SSS = Irritable Bowel Syndrome-Severity Scoring System; Pharm. = Pharmacotherapy; PECB = PsychoEducational/Cognitive–Behavioral intervention; PFS = Power of Food Scale; ESES = Eating Self-Efficacy Scale; GAF = Global Assessment of Functioning in the DSM; MFIS = Modified Fatigue Impact Scale; HAQUAMS = Hamburg Quality of Life Questionnaire in Multiple Sclerosis; HSCL = Hopkins Symptom Checklist-21; RPWS = Ryff's Psychological Well-Being Scale; HS = Hassle Scale; PT = Pain Tolerance; MI = Mindfulness Intervention; SMFQ = Short Mood and Feelings Questionnaire; MTI = Mindfulness Training Intervention; RHS = Revised Hallucination Scale; MBT = Mindfulness-Based Therapy; QEWP-R = Questionnaire of Eating and Weight Patterns - Revised; ASS = Appearance Satisfaction Scale; BMI = Body Mass Index; DAPOS = Depression, Anxiety and Positive Outlook Scale; PSEQ = Pain Self-Efficacy Questionnaire; W-DEQ = Wijma Delivery Expectancy/Experience Questionnaire; CAPS = Clinician Administered PTSD Scale; PCL-M = Post-Traumatic Stress Disorder Checklist- Military Version; BADS = Behavioral Activation for Depression Scale; RSS = Rumination on Sadness Scale; MM&ER = Mindfulness Meditation and Emotional Regulation (MBSR + MBCT); SDS = Sheehan Disability Scale; FSDS = Female Sexual Distress Scale; FSFI = Female Sexual Function Index; MBRP = Mindfulness-Based Relapse Prevention; ALA-FFS = American Lung Association’s freedom from smoking; TLFB = Timeline Follow back; IIP = Inventory of Interpersonal Problems; DDQ = Daily Drinking Questionnaire; DDTQ = Daily Drug-Taking Questionnaire; TLFB = Timeline Followback; PACS = Penn Alcohol Craving Scale; SIP-AD = Short Inventory of Problems; DUDIT-E = Drug Use Identification Disorders Test- Extended; DASE = Drug Avoidance Self-Efficacy Scale; QIPA = Tinnitus Psychological Impact Questionnaire; SHC = Subjective Health Complaints; TMMS = Trait Meta-Mood Scale; DSROW = Daily Self-Report Of Worry.

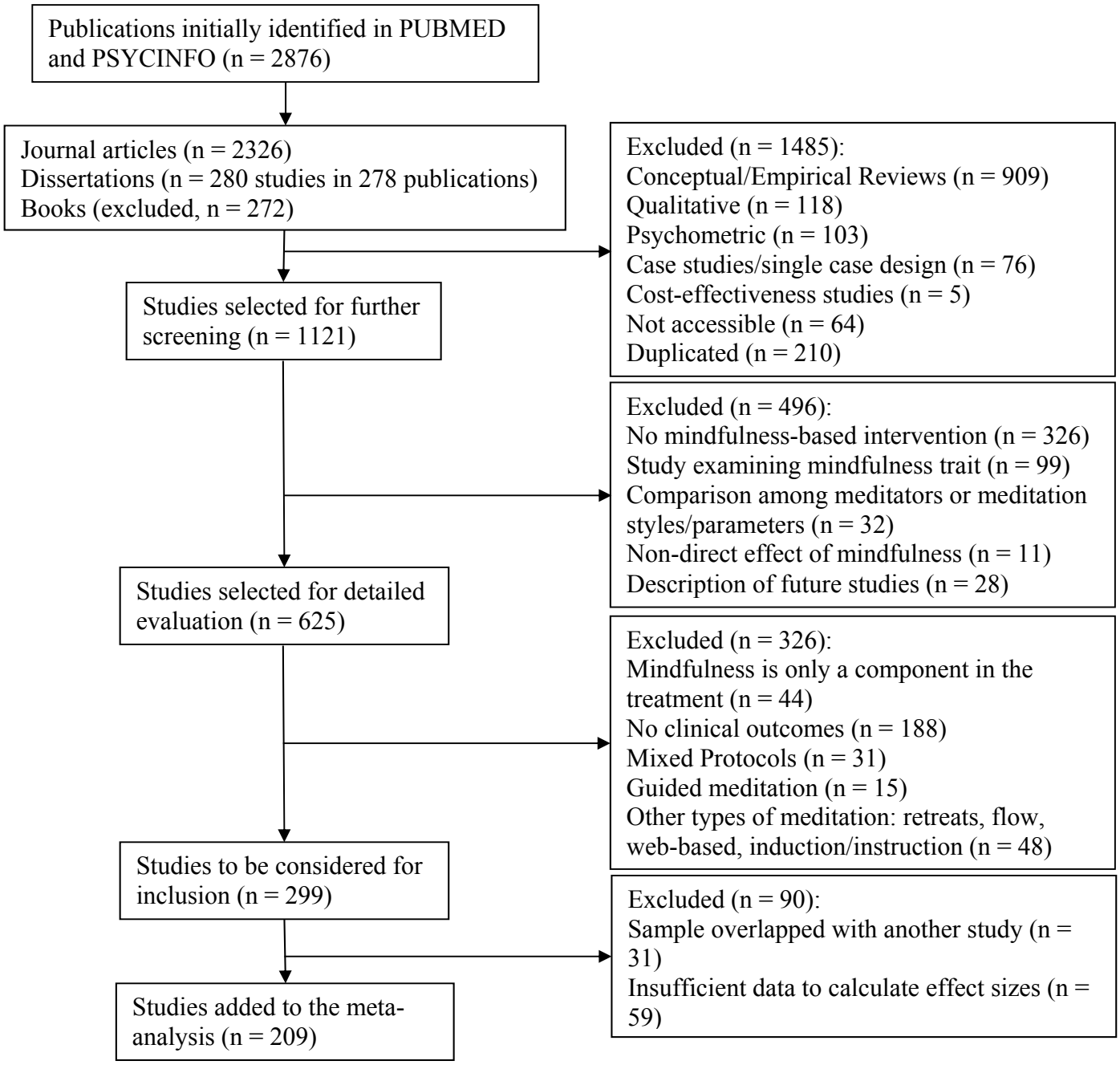

Figure 1. Flow diagram of the study selection process

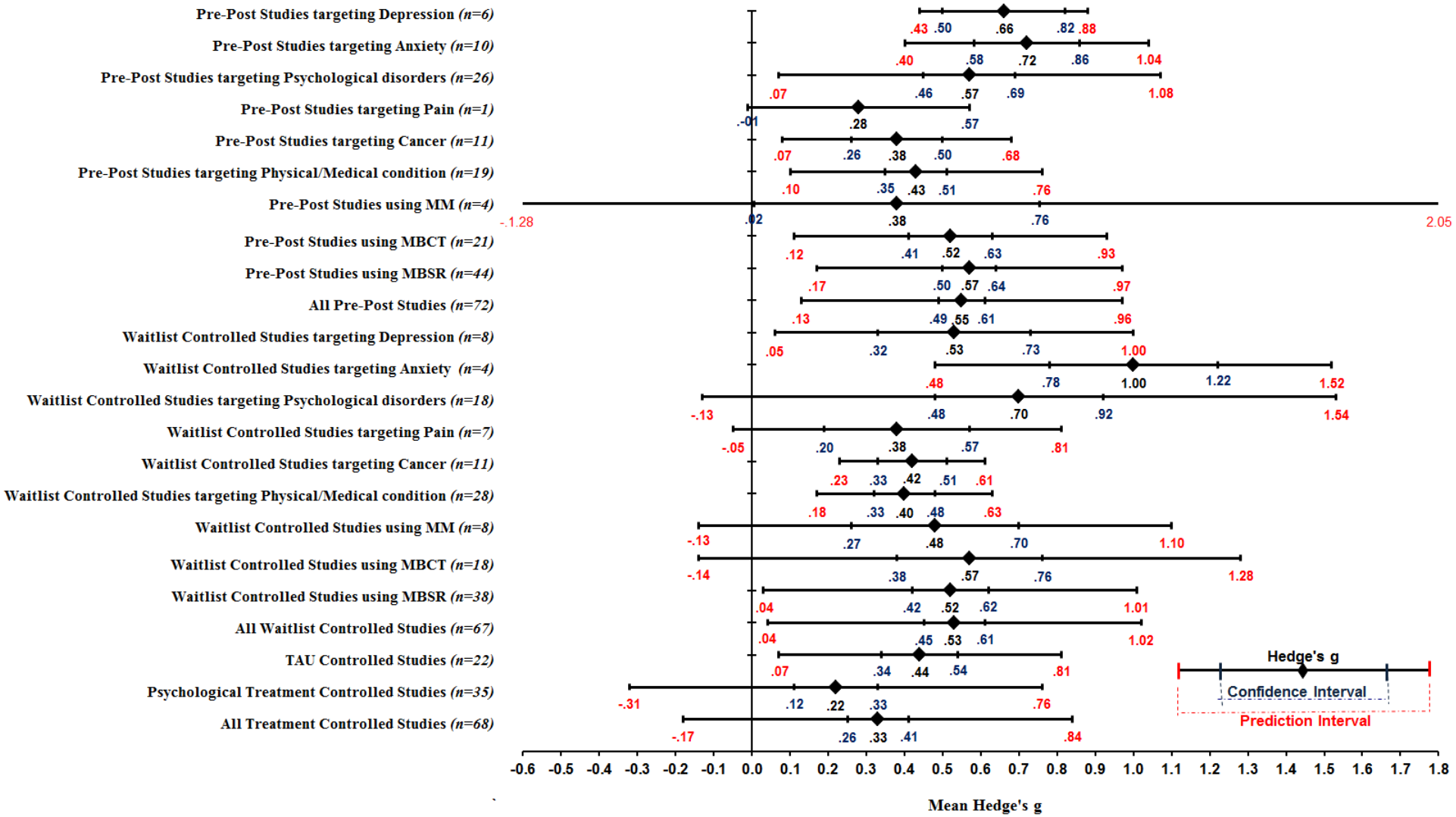

Figure 2. Mean Hedge's *g*, 95% confidence interval, and 95% prediction interval of main study groups. Note that the effect sizes were calculated at the end of the treatment and solely based on the clinical outcomes. Note also that MM = Mindfulness Meditation (meaning mindfulness protocols other than MBSR or MBCT).

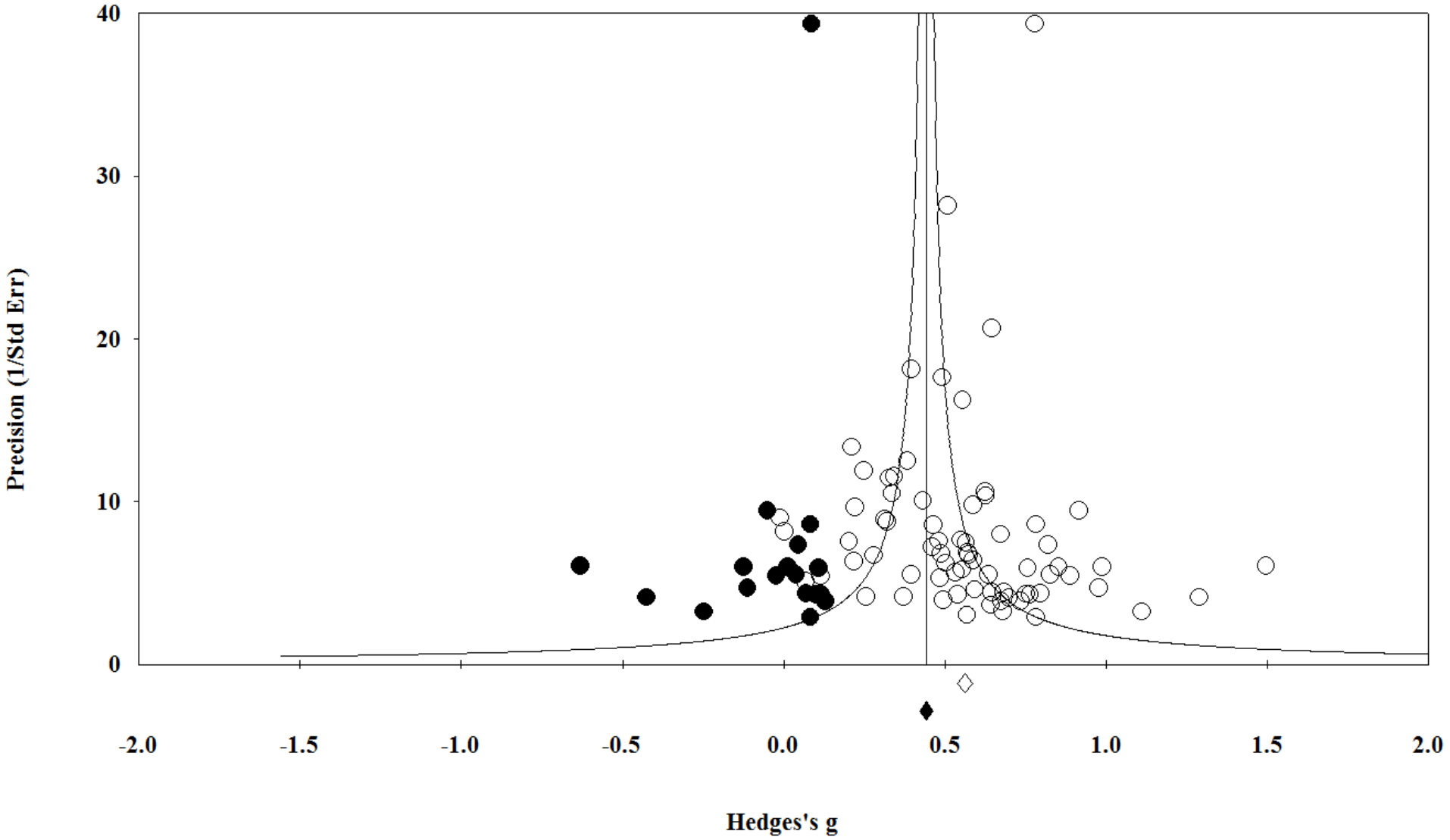

Figure 3. Funnel plot of precision by Hedge's g of pre-post studies including only clinical outcomes.

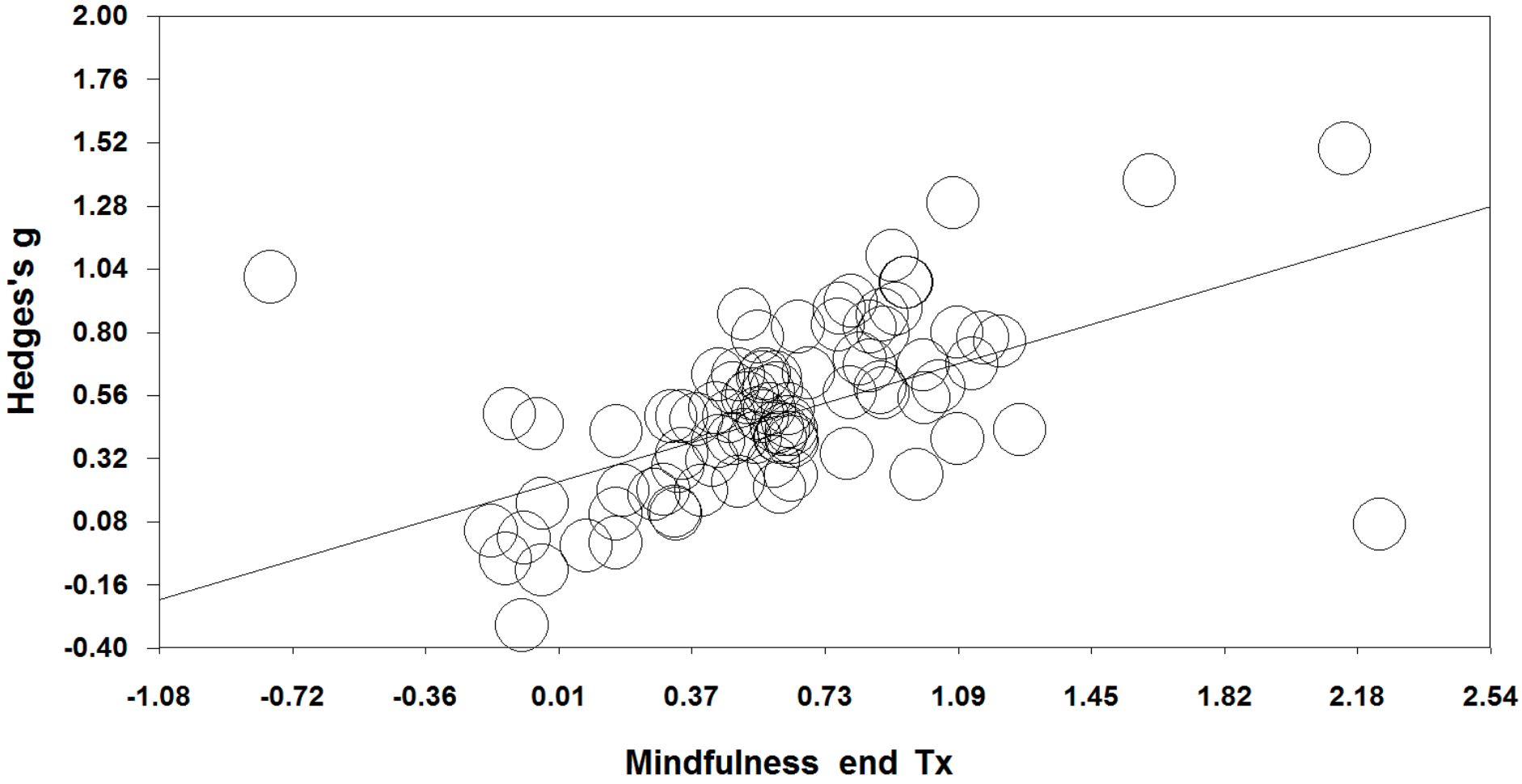

Figure 4. Relationship between mindfulness effect size and clinical effect size at the end of treatment for all studies. Each circle represents a specific study; its diameter is proportional to the study weight (i.e. to the ratio of the number of participants of the study to the total number of participants for the present meta-analysis). Note that Tx = Treatment.

Part –II: Meta-analysis 2

Mindfulness interventions for psychosis: A Meta-analysis

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Abstract

Background: An increasing number of mindfulness interventions are being used with individuals with psychosis or schizophrenia, but no known meta-analysis has investigated their effectiveness. ***Objective:*** To evaluate the efficacy of mindfulness interventions for psychosis or schizophrenia, we conducted an effect-size analysis of initial studies. ***Data Sources*:** A systematic review of studies published in journals or in dissertations in PubMED, PsycINFO or MedLine from the first available date until July 25, 2013. ***Review Methods***: A total of 13 studies (n = 468) were included. ***Results:*** Effect-size estimates suggested that mindfulness interventions are moderately effective in pre-post analyses (n = 12; Hedge's g = .52). When compared with a control group, we found a smaller effect size (n = 7; Hedge's g = .41). The obtained results were maintained at follow-up when data were available (n = 6; Hedge's g = .62 for pre-post analyses; results only approached significance for controlled analyses, n = 3; Hedge's g = .55, p = .08). Results suggested higher effects on negative symptoms compared with positive ones. When combined together, mindfulness, acceptance, and compassion strongly moderated the clinical effect size. However, heterogeneity was significant among the trials, probably due to the diversity of interventions included and outcomes assessed. ***Conclusion***: Mindfulness interventions are moderately effective in treating negative symptoms and can be useful adjunct to pharmacotherapy; however, more research is warranted to identify the most effective elements of mindfulness interventions.

Key words: mindfulness, acceptance, compassion, meta-analysis, psychosis, schizophrenia

1. Introduction

Mindfulness has its roots in eastern contemplative traditions and is often associated with the formal practice of insight meditation known as *Vipassana*. However, operational definitions of mindfulness include multiple dimensions, both cognitive and affective ones, including self-regulation of attention, decentering, awareness of sensations, thoughts, and emotions, openness and acceptance of all inner-experiences with calmness, non-reactivity and non-judgment, as well as other perceptual and cognitive aspects such as observing and describing (Baer, Smith, & Allen, 2004; Baer et al., 2008; Brown & Ryan, 2003; Cardaciotto, Herbert, Forman, Moitra, & Farrow, 2008; P. Chadwick et al., 2008; Feldman, Hayes, Kumar, Greeson, & Laurenceau, 2007; Lau et al., 2006; Walach, Buchheld, Buttenmuller, Kleinknecht, & Schmidt, 2006). Furthermore, Davidson (2010) suggested that mindfulness includes equanimity, kindness, and compassion. This diversity in defining, describing, and measuring the different aspects of mindfulness is also portrayed in mindfulness interventions. While some interventions concentrated on the awareness and attention aspects of mindfulness (e.g., meditation-based practices), others focused on acceptance and detachment (e.g., acceptance-based practices) or on kindness and compassion (e.g., compassion-focused therapy or loving-kindness meditation). This family of mindfulness interventions is often been referred as the "third wave" of cognitive behaviors interventions, in contrast to the first wave that concentrated on classical conditioning and operant learning and the second wave, which focused more on information processing and cognition (Hayes, 2004). Even though the third wave interventions can be perceived as different in terms of the techniques used, they all aim at regulating negative emotions by increasing the willingness of embracing present experiences in the moment, whether negative or positive, rather than automatically avoiding or suppressing them.

Developing mindfulness qualities (i.e., presence in the moment, acceptance, detachment, non-reactivity, non-judgment, and compassion) can be particularly helpful in alleviating the distress associated with psychosis rather than focusing solely on controlling psychotic symptoms such as voices, images, and paranoid intrusions (P. D. J. Chadwick, Birchwood, & Trower, 1996). Naturalistic studies of individuals coping with psychosis suggest the benefits of taking an accepting and mindful stance toward psychotic symptoms (Romme & Escher, 1989; Vilardaga, Hayes, Atkins, Bresee, & Kambiz, 2013). In fact, mindfulness based interventions focus primarily on how people relate with and respond to their psychotic experiences rather than identifying and directly challenging thoughts and beliefs about these experiences (Dannahy et al., 2011). According to Chadwick et al. (2005), a mindful response involves clear awareness and acceptance of psychotic sensations as transient experiences that are fundamentally "not me" (i.e. do not define the self), and not necessarily accurate reflections of reality. As a result, it involves observing unpleasant psychotic sensations as they pass, and allowing this movement in and out of awareness without getting caught in rumination or confrontation. Although psychotic sensations experienced mindfully likely remain unpleasant, or painful, the distress (or suffering) that comes from reacting against them is absent. A grounded theory analysis of 16 individuals with psychosis who had taken part in an outpatient mindfulness group suggested that mindfulness helps people relate differently to their psychotic experience, specifically by opening awareness to the experience, allowing the experience to be as it is (i.e., allowing thoughts and voices to come and go without reacting), and reclaiming power through accepting oneself and the experience (Abba, Chadwick, & Stevenson, 2008).

From an empirical point, randomized clinical trials have found that traditional Cognitive Behavior Therapy for psychosis (CBTp), which emphasizes identifying dysfunctional beliefs and

directly testing them out in behavioral experiments, is efficacious for treating residual positive and negative symptoms (Wykes, Steel, Everitt, & Tarrier, 2008). However, the evidence for treating emotional dysfunction in psychosis (such as anxiety, depression, and hopelessness) is less clear (Birchwood, 2003). Although Wykes et al. (2008) found a moderately strong effect size of CBTp on mood, when studies with 'poor' methodological quality were controlled for, the weighted effect size on mood in the adequate quality studies was not significant. In a review of mindfulness treatments for severe mental illness (including psychosis), Davis and Kurzban (2012) concluded that "*mindfulness-based interventions may be uniquely suited to impact distress related to symptoms and internalized stigma that are particularly salient for individuals living in the community with severe mental illness who are susceptible to experiences of social rejection and interpersonal stress*" (p. 227-228).

Mindfulness interventions for psychosis are fast growing and have been implemented for different patient groups. These interventions can be divided into three categories on the basis of the strategies they utilize. The first category comprises protocols that are mindfulness meditation based (i.e., using direct meditation practices), the second group is the acceptance based protocols, and the third can be called compassion based. By retraining attention, mindfulness meditation aims to regulate emotions by enhancing positive affect, decreasing negative affect, and reducing maladaptive automatic emotional responses (Gross, 2007; Hofmann, Sawyer, Fang, & Asnaani, 2012; Koole, 2009; Thompson, 1991, 1994). In addition, acceptance plays a crucial role in the cognitive aspect of emotional regulation, i.e., the conscious and cognitive way of handling the intake of emotionally arousing information (Garnefski & Kraaij, 2007; Garnefski, Kraaij, & Spinhoven, 2001; Thompson, 1991). For example, someone with psychosis could be taught to accept experiencing fearful thoughts and emotions in times of stress, and to notice the

signs and impulses. Furthermore, compassion activates the self-soothing system, increasing positive emotions such as hope, optimism, warmth, contentment, love, and kindness, and decreasing negative emotions such as shame, fear, and helplessness (Trémeau, 2006). As shown, all these interventions use somewhat different strategies for regulating emotions, and emotional regulation is suggested to be central in the treatment of psychotic disorders (e.g., Khoury & Lecomte, 2012).

Acceptance and Commitment Therapy, one acceptance/mindfulness-based approach, is currently recognized as an empirically supported treatment for psychosis by the American Psychological Association (American Psychological Association, n.d). However, beside the growing popularity of mindfulness interventions, no meta-analysis has investigated their effectiveness for psychosis. Moreover, the role of mindfulness, compassion, and acceptance components in the effectiveness of these interventions remains unknown. Two recent systematic reviews found that meditation and mindfulness interventions are useful adjuncts to usual care for psychotic disorders in reducing distress and hospitalization rates and in increasing feelings of self-efficacy (Davis & Kurzban, 2012; Helgason & Sarris, 2013). Another more general meta-analysis found that mindfulness meditation strongly moderated the effectiveness of mindfulness-based treatments for multiple psychiatric disorders and medical conditions (Khoury et al., 2013). Therefore, the aim of the current study was to conduct a meta-analysis of the initial studies that form the emerging evidence-base for mindfulness treatments specifically for psychosis.

In order to address the void of the current literature, we conducted an effect-size analysis with the following objectives: (1) to quantify the size of the effect of mindfulness interventions for psychotic disorders; and (2) to investigate and quantify the moderators of the effectiveness of mindfulness interventions for psychosis.

2. Method

2.1. Power analysis

Assuming an average sample size of 25 individuals per group (on the basis of previous meta-analyses, e.g., Khoury et al., 2013), a small to moderate effect size of 0.3 and a large heterogeneity among the studies (as mindfulness interventions differ in strategies used), for a power of 80%, 15 studies will need to be included in the meta-analysis. For a power of 90%, 18 or 19 studies will be needed (Borenstein, Hedges, Higgins, & Rothstein, 2009, p. 272).

2.2. Eligibility criteria

Given the early state of the literature, the limited number of available studies, and in order to have a sufficient power, any study examining the pre-post or controlled effects of a clinical intervention using any mindfulness protocol for any psychotic disorders was considered in our analysis. Studies were excluded if they: (1) did not aim to examine treatment effects; (2) reported no measures of symptoms or other psychosocial outcomes; (3) reported insufficient information to compute an effect size (e.g., only correlational data); or (4) reported data that overlapped with the data from other included studies.

The protocols included: Acceptance and Commitment Therapy (ACT; Hayes, Strosahl, & Wilson, 1999); Acceptance-Based Cognitive Behavior Therapy (ABCBT; Shawyer et al., 2012); Acceptance-Based Depression and Psychosis Therapy (ADAPT; Gaudiano, Nowlan, Brown, Epstein Lubow, & Miller, 2013); Mindfulness-Based Cognitive Therapy (MBCT; e.g., Segal, Williams, & Teasdale, 2002); Mindfulness-Based Psychoeducation Program (MBPP; Chien & Lee, 2013); Person-Based Cognitive Therapy (PBCT; P. Chadwick, 2006; P. Chadwick, Sambrooke, Rasch, & Davies, 2000); Loving-Kindness Meditation (LKM; Salzberg, 1995); and Compassionate Mind Training (CMT; Gilbert, 2001). Most of these protocols were tailored for

the people with psychotic disorders by: (1) decreasing the duration of sessions (most lasted less than 90 minutes); (2) including only one or two meditation practices, each lasting less than 15 minutes in order to decrease the risk of experiencing intense psychotic symptoms while meditating; (3) focusing on concrete strategies, such as acceptance of thoughts and emotions, and building compassion towards self and others rather than abstract/theoretical material (e.g., mindfulness philosophy). Also, the protocols varied as to the extent that they include formal mindfulness meditation practice.

2.3. Information sources

Studies were identified by searching PubMed, PsycINFO, and MedLine from the first available date until July 25, 2013. Additional searches included scanning reference lists of articles and inquiring about in press articles. No limits were applied for language and foreign papers were translated into English.

2.4. Search

We used the search term *mindfulness* alone or combined with the terms meditation or acceptance or detachment or compassion and combined with one of the terms *psychosis* or psychotic or schizophrenia.

2.5. Study selection

Eligibility assessment was performed in a non-blinded, standardized manner by the first author and was revised by the second author. Disagreements between reviewers were resolved through discussions, and in a few instances the authors of the original studies were contacted for clarifications.

2.6. Data collection process

We developed an electronic data extraction sheet, pilot-tested it on three randomly-selected studies, and refined it accordingly. Data collection was conducted for the first time in September of 2012, was re-conducted and refined in March of 2013, and was updated again in July of 2013. When duplicate reports were identified for the same data, only the latest ones were included.

2.7. Data items

Information was extracted from each included trial based on: (1) the characteristics of the trial (including the year of publication, design, randomization, blinding, therapist qualifications, number of participants, type of outcome measures, and follow-up time in weeks); (2) the characteristics of the intervention (including treatment protocol, target population, length of treatment in hours, attendance in number of sessions, length of assigned home practice in hours, quality of home practice as reported by participants, and treatment setting); (3) the characteristics of the comparison group, in controlled studies (including the number of participants, type of control, type of treatment, and length of treatment); and (4) the characteristics of participants (including mean age, percentage of males, attrition rate, and diagnosis).

2.8. Risk of bias in individual studies

To minimize the influence of data selection, we included data pertaining to all available outcomes. We identified different types of outcomes, namely positive symptoms, negative symptoms, affective symptoms, thought disorder, functioning, re-hospitalization, quality of life, and mindfulness/acceptance/compassion. We included data from follow-ups, when such data were available.

We also included a study quality score, which was comprised of items based on Jadad's criteria (Jadad et al., 1996) and others pertaining to mindfulness. The included items are

adherence of the treatment to an established protocol (ACT, MBCT, LKM, CMT, or CBT with mindfulness/acceptance); administration of measures at follow-up; use of validated mindfulness/acceptance/compassion measures (i.e., MAAS, KIMS, FMI, FFMQ, SMQ, MQ, SMVQ, AAQ-II, SeSC or CAMS-R); clinical training of therapists (i.e., clinical psychologists, trainees in clinical psychology, or social workers); and the mindfulness training of therapists (i.e., formal training in validated protocols). For controlled studies, the items included whether participants were randomized between the treatment and control groups, whether participants in both groups spent an equal amount of time in treatment, and whether evaluators or experimenters were blind regarding the treatment/control conditions and/or participants were blind regarding the study's hypotheses. For all binary items (i.e., true or false), a value of 1 was assigned if the item was true and a value of 0 if it was false. For the study design, pre-post studies were assigned a value of 0; studies with a waitlist, no-treatment, or drop-outs control group were assigned a value of 1; studies with a TAU control group were assigned a value of 2; studies with a treatment control group (other than TAU) were assigned a value of 3. For blinding, non-blinded studies were assigned a value of 0; single-blind studies were assigned a value of 1; and double-blind studies were assigned a value of 2.

The inter-rater agreement was assessed by comparing the ratings of the first author (B.K.) to the ratings of the fourth co-author (K.P.), who received a written document including specific instructions on rating the studies and a one-hour training discussion about the rating procedure.

2.9. Summary measures

The meta-analyses were performed by computing standardized differences in means. We completed all analyses using Microsoft Excel or Comprehensive Meta-Analysis, Version 2.2.057 (CMA; Borenstein, Hedges, Higgins, & Rothstein, 2005).

2.10. Synthesis of results

Effect sizes were computed using means and standard deviations (*SD*) when available. In the remaining studies, the effect sizes were computed using other statistics such as *F*, *p*, *t*, and χ^2. In within-group analyses, when the correlations between the pre- and post-treatment measures were not available, we used a conservative estimate ($r = .7$) according to the recommendation by Rosenthal (1993). For all studies, Hedge's *g*, its 95% confidence interval (95% CI), and the associated *z* and *p* values were computed. To calculate the mean effect size for a group of studies, individual effect sizes were pooled using a random effect model rather than a fixed effect model, given that the selected studies were not identical (i.e., did not have either an identical design or target the same population).

For all studies groups, the mean Hedge's *g*, the 95% confidence interval (95% CI), and the associated *p*-values were computed. We systematically assessed the heterogeneity among studies in each group using I^2 and the chi-squared statistic (*Q*). I^2 measures the proportion of heterogeneity to the total observed dispersion, and is not affected by low statistical power. Higgins, Thompson, Deeks, and Altman (2003) suggested that an I^2 of 25% might be considered low, 50% considered moderate, and 75% considered high. Only two studies reported intent-to-treat data; therefore we omitted intent-to-treat analyses.

2.11. Risk of bias across studies

To assess publication bias, we computed the fail-safe *N* (Rosenthal, 1993) and we constructed a funnel plot.

2.12. Additional analyses

According to the objectives of this meta-analysis, we conducted meta-regression meta-analyses. The aim of meta-regression analysis is to assess the relationship between one or more

variables (moderators) and the pooled effect size. In this meta-analysis, we included only pre-post results and we investigated six moderators: (1) mean effect size of mindfulness outcomes, (2) mean effect size of acceptance outcomes, (3) mean effect size of compassion outcomes, (4) mean effect size of these three strategies combined, (5) study quality score, and (6) current treatment length (as defined in the protocol). We did not include the duration patients spent under treatment as only one study reported such information. Also, only three studies reported the duration of the illness.

3. Results

3.1. Study selection

PubMed searches produced 378 articles, including 68 reviews. PsycInfo/Medline searches yielded 94 publications. We carefully assessed the identified publications and applied the exclusion criteria, resulting in 14 publications (13 different studies and a one-year follow-up study). The study selection process for PubMed is illustrated in detail in Figure 1.

3.2. Study Characteristics

The effect size (Hedge's *g*) and other characteristics for each study are shown in Table 1. The total number of participants included in our meta-analysis was 468 individuals with different psychotic spectrum disorders.

3.3. Risk of bias within studies

Table 1 presents the included studies and their quality scores. Seven studies were randomized, five used at least one validated mindfulness measure, twelve included measures at the end of the treatment, nine included follow-up measures, two assured an equal time between treatment and control groups, and four used blind evaluators. The quality score varied from a

minimum of 3 (lowest quality) to a maximum of 10 (highest quality) with a mean of 5.69 (*SD* = 2.39) and a median of 5. Inter-rater agreement was high (kappa = .94).

3.4. Results of individual studies

Hedge's *g* values for both clinical and mindfulness outcome measures, and at both post treatment and last follow-up, are presented in Table 1.

3.5. Synthesis of results

The effect size (Hedge's *g*) for both within-group and between group analyses at the end of treatment and at the last follow-up and other characteristics for each study are shown in Table 1. Effect sizes, 95% confidence intervals, and heterogeneity (i.e., I^2 and Q) for different outcomes (i.e., positive symptoms, negative symptoms, affective symptoms, thought disorder, functioning, re-hospitalization, quality of life, and mindfulness/acceptance/compassion) at both the end of treatment and at the last follow-up are available in Table 2. Results suggest higher effects in pre-post analyses (n = 12; Hedge's g = .52; 95% CI [.40, .64], $p < .0001$) in comparison with controlled analyses (n = 7; Hedge's g = .41; 95% CI [.23, .58], $p < .0001$); however heterogeneity was moderate to high, suggesting caution in drawing definite conclusions. Higher effects were also found for negative symptoms compared with positive ones in both the pre-post and controlled analyses with moderate heterogeneity. Acceptance-based treatments showed highest effects (n = 5; Hedge's g = .63; 95% CI [.40, .86], $p < .0001$) in pre-post analyses but not in controlled ones (n = 4; Hedge's g = .35; 95% CI [.12, .58], $p < .005$). The type of the control treatment (waitlist, TAU, or active treatment) might have played a role in that difference as most of the acceptance-based interventions (i.e., four out of five) had an active control treatment, which can lead to a lower comparative effect size. No differences were found between treatment modalities (i.e., individual versus group). Pre-post analyses at follow-up

suggest maintenance of the effects; however heterogeneity was very high making it difficult to draw definite conclusions about the long-term effectiveness of the interventions. Only three controlled trials had follow-up data available so statistical power was even lower in this analysis.

3.6. Risk of bias across studies

The effect size for all pre-post analyses corresponded to a *z* value of 16.28 ($p < .000001$) indicating that 817 studies with a null effect size would be needed to nullify our results (i.e., for the two-tailed *p* value to exceed .05). Using the Trim and Fill method, three studies would need to fall on the right of the mean effect size to make the plot symmetric (Figure 2). Assuming a random effects model, the new imputed mean effect size was Hedge's $g = .48$ (95% CI [.42, .53]). Similar results were obtained for controlled studies, with a *z* value of 6.23 ($p < .00001$) and a corresponding fail-safe *N* of 64. Using the Trim and Fill method, three studies would also need to fall on the right of the mean effect size to make the plot symmetric, the new imputed mean effect size was Hedge's $g = .27$ (95% CI [.17, .37]). These analyses suggest that the effect-size estimates for pre-post analyses were unbiased and robust, whereas for controlled analyses, the effect-size estimates were less robust and might vary between small to moderate values based on the strength of the control group used.

3.7. Additional analyses

At the end of treatment, the average pre-post effect size of clinical outcomes was positively moderated (medium effect) by the effects on mindfulness outcomes ($n = 5$; $\beta = .33$, $SE = .11$, $p < .005$), and positively moderated (large effect) by the effects on the mindfulness, acceptance and compassion strategies combined together ($n = 6$; $\beta = .52$, $SE = .13$, $p < .0005$) (Figure 3). For acceptance measures solely, there was a trend without reaching significance, possible affected by the small number of studies ($n = 3$; $\beta = .14$, $SE = .21$, $p = .52$, ns). Only one

study used a measure of compassion, rendering it impossible to verify whether compassion separately was a moderator of the clinical effect size. Finally, the effect size on clinical outcomes was not moderated by the study quality score (p = .47, ns) or by the treatment duration (p = .16, ns).

4. Discussion

This meta-analysis examined 13 studies (based on 14 articles) with a combined total of 468 inpatients or outpatients with different psychotic disorders. The results showed that mindfulness interventions are moderately effective in pre-post studies. When compared with a control group (waitlist, TAU, or other treatments), the effect sizes were small to moderate.

Even though mindfulness interventions do not target symptoms reduction but distress resulting from these symptoms, results showed that they were moderately effective in reducing negative and affective symptoms and in increasing functioning and quality of life. For positive symptoms, results suggest smaller effects. Findings are comparable to those obtained for CBTp (Wykes et al., 2008) and for mindfulness-based treatments for other disorders (e.g., Khoury et al., 2013). In addition, the average attrition among participants in the selected studies (12.14%) was smaller than the attrition rate usually obtained in cognitive and behavioral studies (e.g., 22.5% of 1,646 patients offered CBT in an National Health Service clinic in the UK; Westbrook & Kirk, 2005). These results suggest a higher commitment among participants to mindfulness interventions. Results are similar to previous ones obtained by Kahl et al. (2012) suggesting a trend for better acceptance of third wave treatments in particular patient groups (e.g., borderline personality disorder and psychosis) in comparison with traditional CBT. An explanation of these results was given by Gaudiano and Herbert (2006), who suggested that patients with psychosis would be more willing to engage in a treatment that focuses on modifying the person's

relationship to his or her thinking through the cultivation of mindfulness and acceptance (i.e., separating self from thinking), rather than one that focuses on directly modifying dysfunctional thought content through rational deliberation, such as the case in traditional CBT, at least during early treatment.

When interpreting findings, it is important to consider that the mindfulness interventions included in this meta-analysis varied on the basis of their content. Some protocols focused almost exclusively on mindfulness meditation (e.g., Johnson et al., 2011), whereas others included components from traditional CBTp (e.g. Shawyer et al., 2012) or instead focused more on building acceptance and personal values than meditation per se (e.g., Gaudiano & Herbert, 2006). This diversity of treatment approaches and the corresponding outcomes assessed may have been a large factor in the heterogeneity in effect sizes found in the current study. However, despite this heterogeneity, all the included interventions focus on the similar processes: changing the relationship to psychotic symptoms rather than the symptoms directly through processes of mindfulness/acceptance/compassion to better regulate negative emotions, decrease distress, and improve functioning.

One obvious question is whether the interventions also change measures of mindfulness, compassion, and acceptance. Surprisingly, only half of the studies included a validated measure of mindfulness, acceptance, and/or compassion. The results showed that participants in mindfulness interventions were more mindful and accepting at the end of the treatment, and that gains were maintained at the last follow-up. In addition, there was a strong positive correlation between the mindfulness levels of the participants and the clinical outcomes. Results are inconclusive for acceptance and compassion when each was analyzed solely; however when combined together with mindfulness, the correlation with the clinical outcomes was even higher

than the one obtained with mindfulness alone. These results provide preliminary support for the role of mindfulness strategies in the effectiveness of the interventions and suggest that acceptance and compassion might be complementary strategies, optimizing the mindfulness moderation of the clinical effects. Future studies will need to explore the mechanisms of action for mindfulness interventions and specifically the comparative role of mindfulness, acceptance, and compassion based strategies. In contrast with previous meta-analyses (e.g., Wykes et al., 2008), our results showed that the study quality score did not moderate the efficacy of mindfulness interventions. Insufficient power could explain the absence of significant moderation effects, as the meta-analysis did not include a sufficient number of studies according to the power analysis we conducted. The duration of the treatment was also not a moderator for the treatment effectiveness. Previous mindfulness-based interventions studies and meta-analyses with mixed clinical and non-clinical population found contradictory results regarding treatment duration (Carmody & Baer, 2009; de Vibe, Bjørndal, Tipton, Hammerstrøm, & Kowalski, 2012; Hofmann, Sawyer, Witt, & Oh, 2010; Klainin-Yobas, Cho, & Creedy, 2012; Sedlmeier et al., 2012), and when a significant moderation was found, it was very weak (e.g., $\beta = .01$; Khoury et al., 2013).

From a clinical side, Gaudiano et al. (2013) recommended tailoring therapy to patient severity so as not to overwhelm the individual with treatment goals and strategies. This is particularly true when a patient show cognitive challenges. In such a case, an individual modality can be more suited as it is easier to tailor the intervention to the patient's needs. However, results did not show significant differences between individual and group modalities. Future studies should further investigate potential difference among treatment modalities.

Among the limitations of this meta-analysis is the small number of included studies, which led to insufficient power and might have led to non-significant results in some subanalyses; the high heterogeneity among some study groups further reduced the scope of the obtained results. Furthermore, the assessed outcomes varied widely from study to study. Due to the limited number of available studies, we also inevitably included studies with different levels of quality, which we quantified and included in the analyses. To address our own expectancy bias, we implemented liberal selection criteria and included a large variety of studies.

Beside these limitations, results support the feasibility and effectiveness of mindfulness interventions for individuals with psychotic disorders specifically in treating negative symptoms, therefore mindfulness interventions can be a useful adjunct to pharmacotherapy. Furthermore, the findings suggest that mindfulness is a potentially active component in the treatment effectiveness. However, more research is warranted to confirm the obtained results and to investigate long-term effectiveness of mindfulness interventions. In addition, it is recommended that future studies include at least a validated measure of the strategy or strategies implemented in the intervention protocol (i.e., measure of mindfulness, acceptance, and/or compassion), and at least one validate measure of distress as it is a central target in the mindfulness interventions for psychosis. It will be important to clarify the similarities and differences between traditional CBT versus mindfulness interventions for psychosis. For example, it is unclear whether they differ in terms of their outcomes, mechanisms of action, both, or neither. Also, future studies should further investigate potential moderators (e.g., severity, duration of illness, and insight into illness) and mediators (e.g., acceptance, mindfulness, compassion) of outcomes within each clinical trial. Furthermore, future studies of mindfulness interventions should better account for nonspecific effects (e.g., support), as these are known to be effective for psychosis (Penn et al.,

2004). Beyond the scope of this meta-analysis and its implications, better consensus regarding conceptualizations and operational definitions of mindfulness are needed to enhance the assessment of the efficacy of mindfulness interventions.

5. Role of funding source

No official funding was provided to conduct the current meta-analysis. Materials (e.g., software) were provided by the Laboratory for Education on Schizophrenia and Psychoses Oriented to Intervention and Recovery of Dr. Tania Lecomte.

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*References marked with an asterisk indicate studies included in the meta-analysis.

Table 1.

Description and Effect Size Analyses of the Efficacy of the selected Studies

Study	Type Participants (*N*)	M. Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rnd Ass	% Att	Tx hrs	Clinical Measures (Mind. Measures)	Pre-Post *g* (gm)	Fup wks	PreFup *g*(gm)	Cntrl *g* post (gm)	Cntrl *g* fup	Sc
Bach & Hayes, 2002; Bach et al., 2012	inpatients with positive psychotic Sx (80)	39.3	63.75	ACT + TAU (35)	TAU (35)	yes	10.0	3	HR	-	17	-	0.54	0.48	7
Chadwick et al., 2005	outpatients with distressing psychosis (10)	33.1	60	Mindfulness + Socratic Discussion (10)	N/A	N/A	26.7	7.5	CORE (MQ)	0.47	-	-	-	-	3
Gaudiano & Herbert, 2006	inpatients with psychotic Sx (40)	40.0	64	ACT + ETAU (19)	ETAU (21)	yes	5.0	3	BPRS; CGI; SRPS; SDS; Rhosp; HR	0.95	17	-	0.32	-	8
Chadwick et al., 2009	outpatients with distressing voices (21)	41.6	-	Mindfulness + metacogniti -ve insight (11)	Waitlist (11)	yes	22.7	10	CORE; PSYRAT; BAVQ-r (SMQ; SMVQ)	.49 (.37)	-	-	0.37 (.64)	-	6

Table 1. *(continued).*

Study	Type Participants (*N*)	M. Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rnd. Ass.	% Att	Tx hrs	Clinical Measures (Mindf. Measures)	Pre-Post *g* (gm)	Fup wks	Pre-Fup *g*(gm)	Cntrl *g* post (gm)	Cntrl *g* fup	Sc
Laithwaite et al., 2009	RAP inpatients in High Security Settings (19)	36.9	100	CMT (18)	N/A	N/A	5.26	20	BDI–II; RSE; SIP–AD; PANSS; SCS; OAS (SeSC)	0.19 (0.21)	6	0.30 (0.27)	-	-	5
Dannahy et al., 2011	Outpatients with distressing voices (62)	41.1	35.48	PBCT (62)	N/A	N/A	19	18	CORE-OM; V. control / distress; VAY	0.44	4	0.47	-	-	3
Johnson et al., 2011	SZ spectrum (18)	29.4	83	LKM (18)	N/A	N/A	11.1	7	mDES; DRM; CAINS beta; TEPS; SPWB; THS; SWLS	0.5	13	0.46	-	-	3
White et al., 2011	Psychotic disorder (27)	34	77.78	ACT[1] + TAU (14)	TAU (13)	yes	11.1	10	HADS; PANSS (AAQ-II; KIMS)	0.76 (0.96)	-	-	0.55 (0.76)	-	9
Langer et al., 2012	SZ spectrum (23)	34.7	58.74	MBCT (7)	Waitlist (11)	yes	21.7	8	CGI-SCH (AAQ-II; SMQ)	1.01 (0.39)	-	-	0.55 (0.55)	0.41	7

Table 1. *(continued).*

Study	Type Participants (*N*)	M. Age	% Male	Treatment Group (*n*)	Comp. Group (*n*)	Rnd. Ass.	% Att	Tx hrs	Clinical Measures (Mindf. Measures)	Pre-Post *g* (gm)	Fup wks	Pre-Fup *g*(gm)	Cntrl *g* post (gm)	Cntrl *g* fup	Sc
Shawyer et al., 2012	SZ spectrum with CHs (44)	39.8	55.81	ABCBT(12)	Befriending (14); Wailist (17)	yes	9.1	12	PANSS; mGAF; PSYRATS; QoL; BAVQ-r; IS; VAAS; RSQ	0.31	26	0.35	0.09	0.06	9
Van der Valk et al., 2013	Early Psychosis outpatients (17)	31.8	70.58	Mindfulness (16)	N/A	N/A	18.8	8	SCL-90; (SMQ)	0.28 (0.36)	-	-	-	-	3
Gaudiano et al., 2013	MDD with psychotic features (25)	49.6	14	ADAPT (11)	N/A	N/A	21.4	24	BPRS; PDI-21; LSHS-R; WHODAS-II; BADS; VLQ (AAQ-II; CAMS-R)	0.91 (1.37)	40	1.11 (1.73)			5
Chien & Lee, 2013	Patients with SZ (96)	25.8	55	Mindfulness Based PsyEd. (48)	Usual care (48)	yes	6	12	ITAQ; BPRS; SSQ-6; SLOF; Rhosp	0.45	78	0.92	0.57	1.11	5

Note. M. = Mean; Comp. = Comparison; Rnd. Ass, = Random Assignment; Att = Attrition; Tx = Treatment; hrs = hours; Mindf. = Mindfulness; Fup = Follow-up; wks = weeks; Cntrl = Control; *g*m = Hedge's g of Mindfulness, Compassion and Acceptance outcomes; Sc = Quality Score; Scor =

Score; Sx = Symptoms; ACT= Acceptance and Commitment Therapy; TAU = Treatment As Usual; HR = Hospitalization Rate; CORE = Clinical Outcomes in Routine Evaluation; MQ = Mindfulness Questionnaire; ETAU = Enhanced Treatment As Usual; BPRS = Brief Psychiatric Rating Scale; CGI = Clinical Global Impressions Scale; SRPS = Self-ratings of psychotic symptoms; SDS = Sheehan Disability Scale; Rhosp = Rehospitalization data; PSYRATS; Psychiatric Symptom Rating Scale; BAVQ-r; Beliefs about Voices Questionnaire revised; SMQ = Southampton Mindfulness Questionnaire; SMVQ = Southampton Mindfulness Voices Questionnaire; RAP = Recovery After Psychosis; CMT = Compassionate Mind Training; BDI–II = Beck Depression Inventory – II; RSE = Rosenberg Self-Esteem measure; SIP–AD = Self-Image Profile for Adults; PANSS = Positive and Negative Syndrome Scale; SCS = Social Comparison Scale; OAS = External Shame (the Other as Shamer Scale); SeSC = Self Compassion Scale; PBCT = Person-Based Cognitive Therapy; CORE-OM = Clinical Outcomes in Routine Evaluation – Outcome Measure; V. = Voice; VAY = Voice And You; SZ = Schizophrenia; LKM = Loving-Kindness Meditation; mDES = Modified Differential Emotions Scale; DRM = Day Reconstruction Method; CAINS beta = beta version of the Clinical Assessment Interview for Negative Symptoms; TEPS = Temporal Experience of Pleasure Scale; SPWB = Scales of Psychological Well Being; THS = Trait Hope Scale; SWLS = Satisfaction with Life Scale; [1]Acceptance and Commitment Therapy with strong mindfulness component; HADS = Hospital Anxiety and Depression Scale; AAQ-II = Acceptance and Action Questionnaire-II; KIMS = Kentucky Inventory of Mindfulness Skills; CGI-SCH = Clinical Global Impression-Schizophrenia Scale; ABCBT = Acceptance-based cognitive behavior Therapy; CHs = Command Hallucinations; mGAF = Modified Global Assessment of Functioning scale; QoL = Quality of Life Enjoyment and Satisfaction Questionnaire; IS = Insight Scale; VAAS = Voices Acceptance and Action Scale; RSQ = Recovery Style Questionnaire; SCL-90; ADAPT = Acceptance Based Depression and Psychosis Therapy; PDI-21 = Peters Delusions Inventory–21 Items; LSHS-R = Launay–Slade Hallucinations Scale–Revised; WHODAS-II = World Health Organization Disability Assessment Scale–II; BADS = Behavioral Activation in Depression Scale; VLQ = Valued Living Questionnaire; CAMS-R = Cognitive and Affective Mindfulness Scale–Revised;

PsyEd. = Psychoeducation; ITAQ = Insight and Treatment Attitudes Questionnaire SSQ-6; Six-item Social Support Questionnaire; SLOF = Specific Level of Functioning scale.

Table 2.

Effect sizes and other statistics for different groups of studies at different time points

Study design	Time point	Division criteria	Studies group	*Ns*	*g*	95% CI	*p*	I^2(%)	*Q*
Within-group (pre-post analyses)	End of Tx	-	all	12	.52	[.40, .64]	< .0001	75.50	44.81
		Tx protocol	acceptance-based studies[1]	5	.63	[.40, 0.86]	< .0001	88.55	34.94
			mindfulness-based studies[2]	5	.43	[.32, .54]	< .0001	6.79	4.29
			compassion-based studies[3]	2	.36	[.07, .66]	< .05	61.83	2.62
		outcome	mindfulness	5	.96	[.43, 1.49]	< .0001	75.75	16.50
			thought disorder	1	.85	[.39, 1.30]	< .001	0	0
			negative symptoms	4	.75	[.34, 1.16]	< .001	73.34	11.25
			functioning	4	.51	[.08, .93]	<.05	81.61	16.31
			positive symptoms	7	.32	[.18, .45]	< .0081	2.08	.89
			affective symptoms[4]	6	.43	[.21, .65]	< .0001	69.39	16.34
			quality of life measures	3	.49	[.20, .78]	< .005	38.15	3.23
			acceptance measures	3	.63	[-.05, 1.3]	.07, ns	81.84	11.01
			compassion measures	1	.21	[-.38, .80]	.48, ns	0	0
	Fwp	-	all	6	.62	[.36, .87]	< .0001	92.70	68.50

Table 2 *(continued).*

Study design	Time point	Division criteria	Studies group	*Ns*	*g*	95% CI	*p*	I^2*(%)*	*Q*
Between-group	End of Tx	-	all	7	.41	[.23, .58]	< .0001	44.54	10.82
		control group type	TAU	3	.46	[.26, .65]	< .0001	0	1.1
			waitlist controls	2	.43	[-.09, .95]	.11, ns	0	.11
			treatment control group[5]	2	.33	[-.14, .81]	.17, ns	88.99	9.08
		Tx protocol	acceptance-based studies	4	.35	[.12, .58]	< .005	54.89	6.65
			mindfulness-based studies	3	.55	[.36, .75]	< .0001	0	0.36
		outcome	mindfulness	3	.99	[.48, 1.50]	< .0001	0	.97
			negative symptoms	3	.56	[.15, .96]	< .01	0	1.36
			Re-hospitalization	2	.60	[.35, .86]	< .0001	0	.44
			functioning	3	.13	[-.18, .44]	.40, ns	0	1.86
			positive symptoms	4	.19	[-.18, .55]	.31, ns	0	.94
			affective symptoms[4]	2	.20	[-.51, .91]	.59, ns	75.90	4.15
			quality of life measures	1	.20	[-.43, .84]	.53, ns	0	0
			acceptance measures	2	.27	[-.31, .84]	.36, ns	0	.10
	Fwp	-	all	3	.55	[-.06, 1.16]	.08, ns	95.02	40.17

Note. Ns= Number of studies; Tx = Treatment*;* [1]acceptance-based studies (i.e., using ACT or ABCT protocols); [2]mindfulness-based studies (i.e., Mindfulness-Based Cognitive Therapy or mindfulness with cognitive/behavioral strategies); [3]compassion-based studies (i.e., Compassionate Mind Training); [4]affective symptoms (i.e., depression, distress, anxiety and emotional dysregulation); [5]comparison with an active treatment; Fwp = Follow-up; TAU = Treatment As Usual; [5]treatment control group (i.e., befriending, psychoeducation).

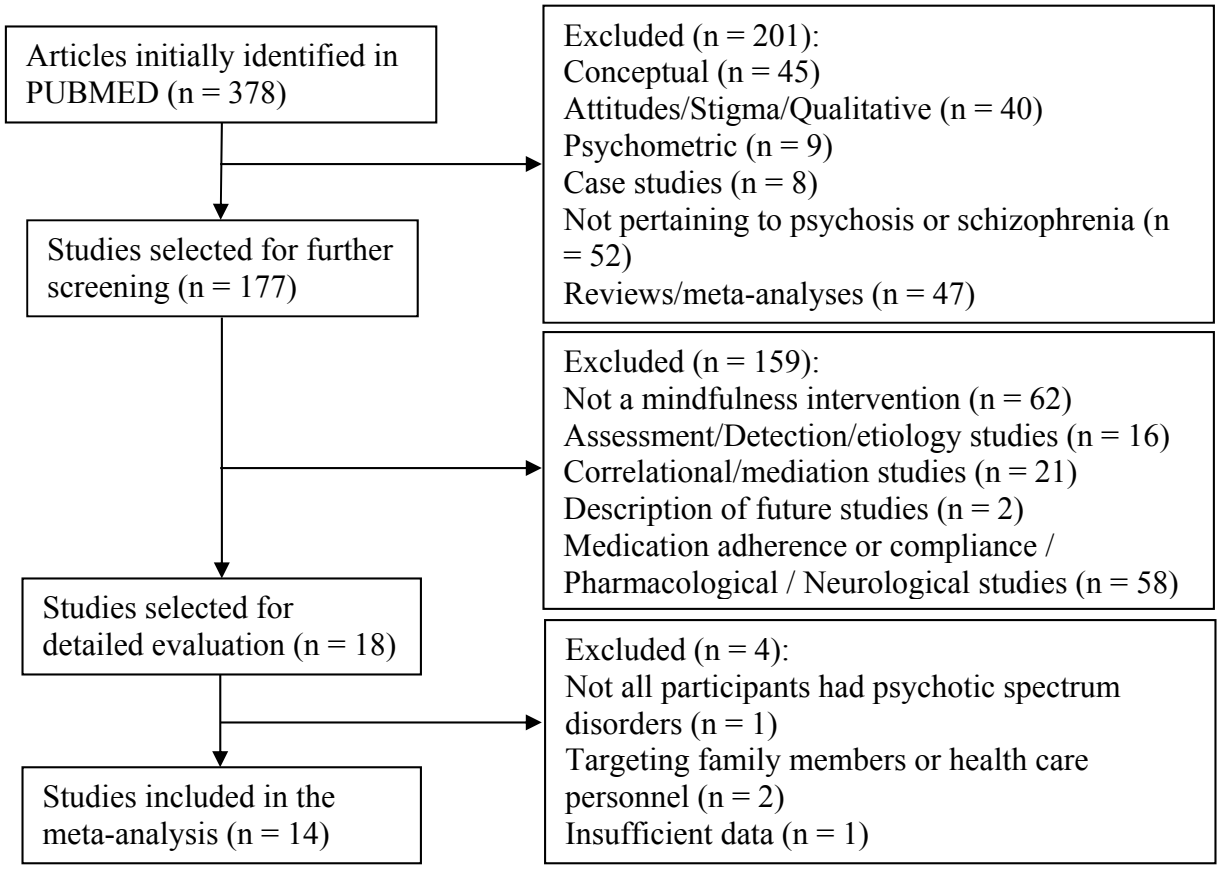

Figure 1. Flow diagram of the study selection process in PubMed.

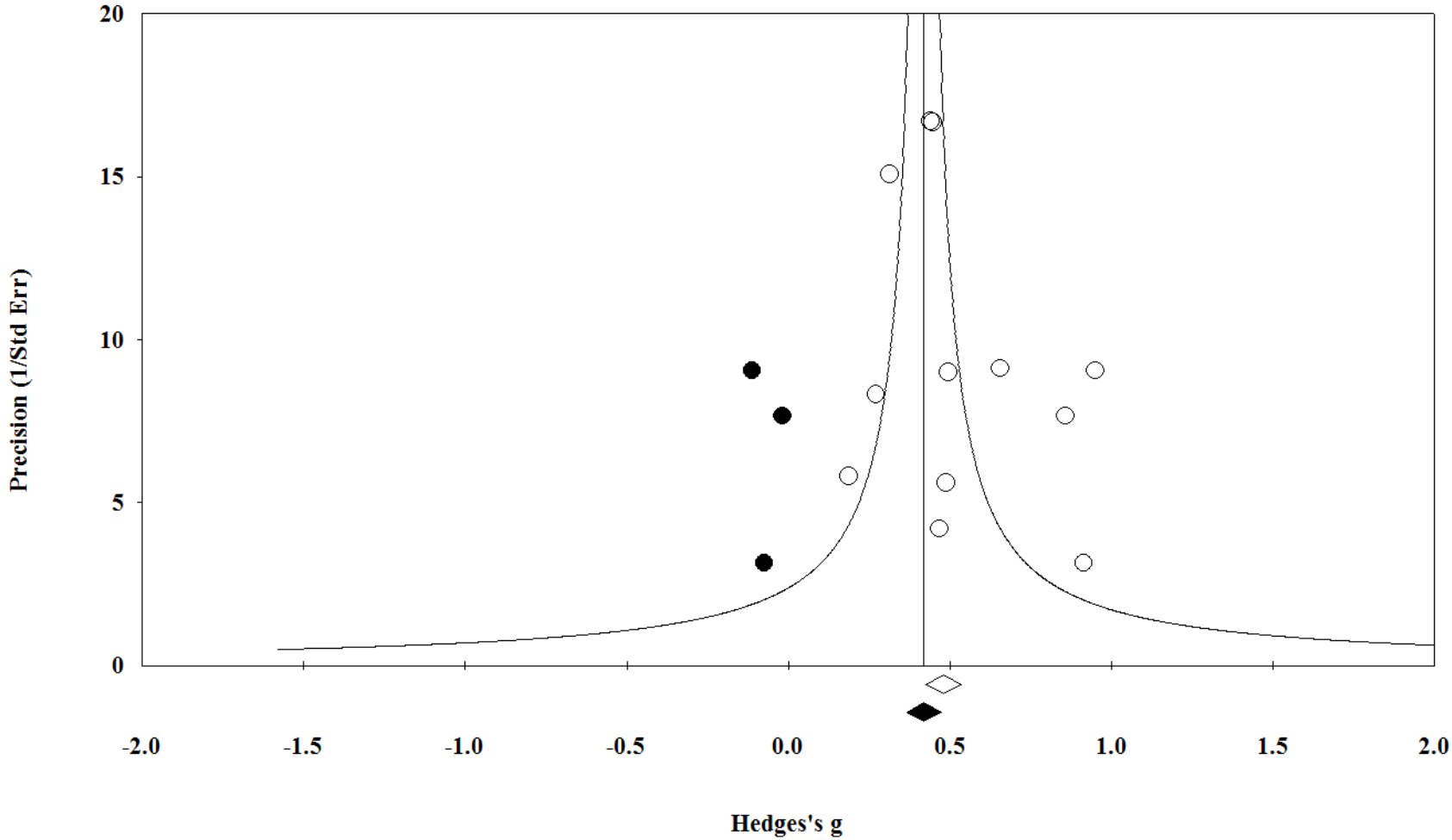

Figure 2. Funnel plot of precision by Hedge's g for pre-post data. Note that in the absence of a publication bias, the studies should be distributed symmetrically with larger studies appearing towards the top of the graph and clustered around the mean effect size and smaller studies towards the bottom.

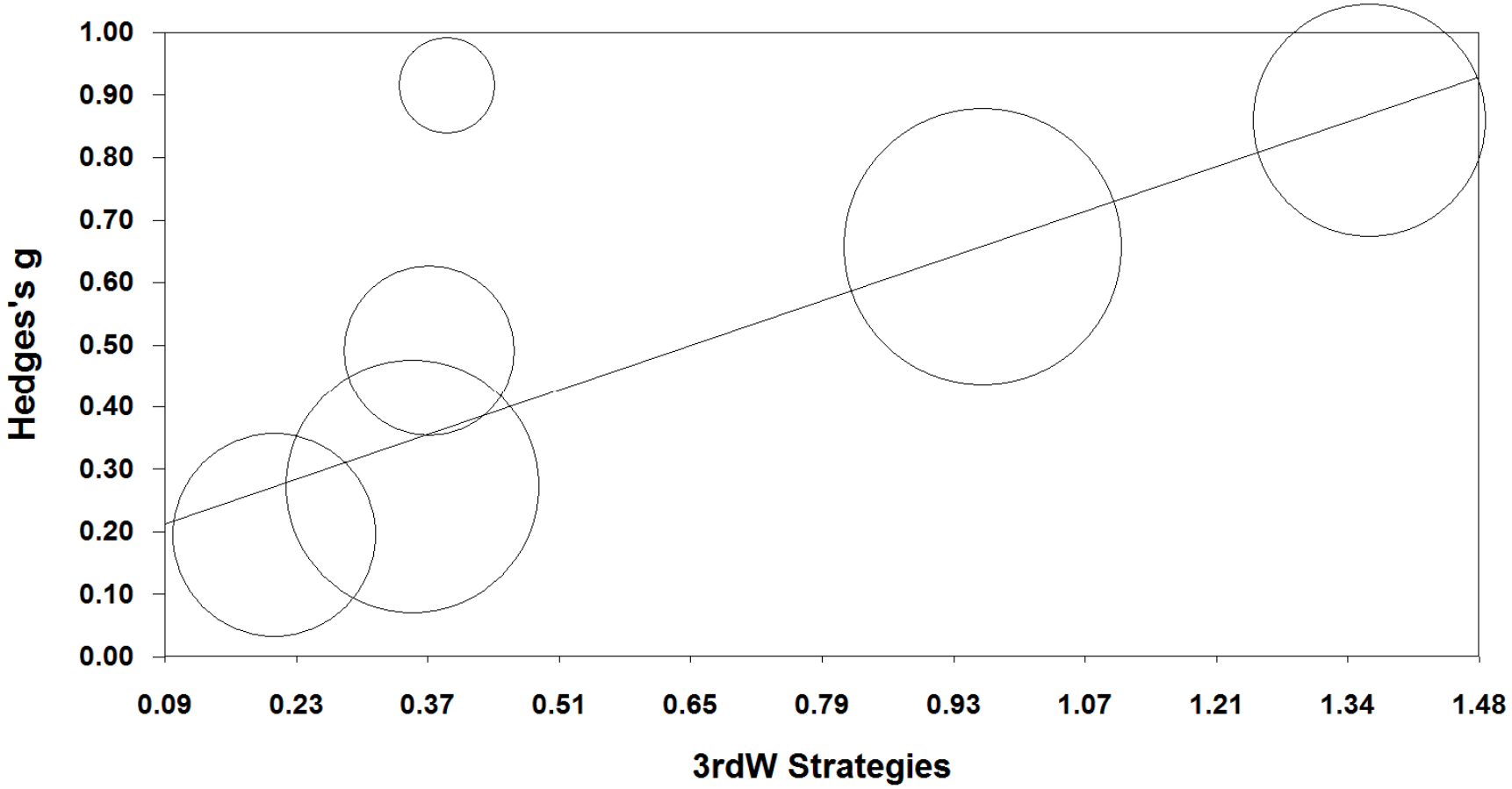

Figure 3. Relationship between third-wave strategies outcomes effect sizes and clinical outcomes effect sizes at the end of treatment.

Part –III: The study

Third wave strategies for emotion regulation in early psychosis: A pilot study

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Abstract

Aim: Emerging evidence supports the priority of integrating emotion regulation strategies in cognitive behaviour therapy for early psychosis, which is a period of intense distress. Therefore, we developed a new treatment for emotional regulation combining third wave strategies, namely, compassion, acceptance, and mindfulness (CAM) for individuals with early psychosis. The purpose of this study was to examine the acceptability, feasibility, and potential clinical utility of CAM. **Method:** A nonrandomized, noncontrolled prospective follow-up study was conducted. Outpatients from the First Psychotic Episode Clinic in Montreal were offered CAM, which consisted of eight-week 60 to 75 minutes weekly group sessions. Measures of adherence to medication, symptoms, emotional regulation, distress, insight, social functioning, and mindfulness were administered at baseline, post-treatment, and at 3-month follow-up. A short feedback interview was also conducted after the treatment. **Results:** Of the 17 individuals who started CAM, 12 (70.6 %) completed the therapy. Average class attendance was 77 %. Post-treatment feedback indicated that participants found the intervention acceptable, and helpful. Quantitative results suggest the intervention was feasible and associated with a large increase in emotional self-regulation, a decrease in psychological symptoms, especially anxiety, depression, and somatic concerns, and improvements in self-care. **Conclusion:** Overall results support the acceptability, feasibility and potential clinical utility of the new developed treatment. A significant increase in emotional self-regulation and a decrease in affective symptoms were found. No significant changes were observed on measures of mindfulness, insight, distress, and social functioning. Controlled research is warranted to validate the effectiveness of the new treatment.

Key words: early psychosis, compassion, acceptance, mindfulness, schizophrenia

1. Introduction

Psychosocial treatments for psychosis and schizophrenia have evolved over the past 20 years to target cognitive biases associated with psychotic disorders. For many individuals, psychotic symptoms can be modified through specific cognitive and behaviour strategies. Recent research is suggesting that individuals with schizophrenia present high levels of emotional deregulation on the experiential, processing and expressive levels that could exacerbate their distress and their social impairments (Trémeau, 2006). Emotional distress seems to be at its highest level at the onset of the illness and at the first psychotic episode due to the adaptation to the illness and to social stigma (Birchwood et al., 2007; Crisp, Gelder, Rix, Meltzer, & Rowlands, 2000; Reed, 2008).

In a previous paper, we discussed the role of emotional experience in the aetiology and the development of the illness and we argued for the priority of integrating emotion regulation strategies in cognitive behaviour therapy for psychosis (CBTp)(Khoury & Lecomte, 2012). More specifically, emotional regulation strategies can help individuals experiencing psychotic symptoms for the first time to better manage their reactions following a psychotic episode. Among the emotional regulation strategies for individuals with psychosis are: reappraisal, exposure, detachment, metacognition, acceptance, compassion, and mindfulness. Some of these strategies namely, exposure, reappraisal and metacognition have been used in CBTp, and have been demonstrated to be effective and valuable treatment strategies for positive and negative symptoms, as well as for anxiety and depression (A.T. Beck, Rector, Stolar, & Grant, 2009; Tai & Turkington, 2009; Wykes, Steel, Everitt, & Tarrier, 2008). More recently applied strategies such as acceptance, detachment, compassion and mindfulness, often identified as part of what is

known as the third wave of cognitive behaviour therapies, are now being considered as useful adjuncts to CBTp (Tai & Turkington, 2009).

In a recent meta-analysis including 14 trials and enrolling a total of 468 participants, we investigated the feasibility and effectiveness of third-wave cognitive-behavioural interventions for individuals with psychosis (Khoury, Lecomte, Gaudiano, & Paquin, 2013). Results suggest that the effects on combined clinical outcomes were between small and moderate, were maintained at follow-up, and were higher for negative symptoms compared with positive ones. Third wave strategies such as compassion, acceptance, and mindfulness, were strong moderators of the treatment's effectiveness. In addition, the practice of meditation did not present adverse effects on psychotic symptoms, and was well accepted and tolerated by participants. In fact, participants showed higher levels of mindfulness following the treatment and at follow-up. In addition, two recent systematic reviews found that meditation and mindfulness techniques are useful adjuncts to usual care for psychotic disorders in reducing distress, hospitalization rates, and increasing feelings of self-efficacy (Davis & Kurzban, 2012; Helgason & Sarris, 2013).

To date, few studies have tested these treatment strategies in early psychosis, which is a period of intense distress, stigma, and social isolation (Brunet, Birchwood, Upthegrove, Michail, & Ross, 2012; Crisp et al., 2000; Lolich & Leiderman, 2008; Reed, 2008). Learning emotion regulation strategies might prove useful in diminishing distress associated with psychotic experience. As such, we developed an 8-sessions group-based treatment for individuals with early psychosis using third wave strategies, namely compassion, acceptance, and mindfulness (we called it CAM).

The purpose of this pilot study was to determine the treatment's acceptability for participants, its feasibility and potential clinical utility for individuals with early psychosis. We hypothesized that CAM would be 1) feasible and favourably received; and associated with improvements in 2) emotional self-regulation; 3) symptoms, particularly affective ones; 4) insight, 5) distress; and 6) maintained at 3-month follow-up.

2. Method

2.1. Participants

Twenty seven individuals from the first psychotic episode clinic at the Louis-H Lafontaine Hospital in Montreal (Canada) were approached to participate in this study. Inclusion criteria consisted of: a first psychotic episode, currently followed by the first episode clinic, fluent in French, no known organic disorder or mental retardation, and capacity to offer informed consent.

Among the approached participants, 17 agreed to participate and provided data at pre-treatment, among them 12 only completed the treatment (i.e. attended four sessions or more) and provided data after the treatment, and 10 provided data at follow-up (i.e., three months later). Average therapy attendance among the participants was 6.17 sessions (SD = 1.34) out of 8. Among the non-completers, three attended one session and two attended two sessions. Among the reasons of quitting the group, one refused to sign the consent form, one was too ill and realized he couldn't follow the sessions, one was asked by his case manager to leave the group as he was disturbing other participants (had a comorbid diagnosis of attention deficit/hyperactivity disorder), one started working full-time and could no longer attend the group, and one did not provide any reason for quitting. Only one of the non-completers accepted to provide data at post-

treatment, however the data was discarded as the participant was overly confused and psychotic at the time of the assessment. Demographics of the participants are presented in Table 1.

2.2. Instruments

All of the measures were taken at baseline, post-treatment and three-month follow-up, except for the social demographic measure taken only at baseline, and the brief feed-back interview conducted at the end of treatment.

2.2.1. Social Demographic Questionnaire. This questionnaire is based on the Canadian version of the PSR Toolkit (Arns, 1998) and includes information regarding the age, number of hospitalizations, occupation, schooling level, and the age at the first psychiatric consultation. Further questions regarding diagnosis, alcohol and drug consumption, medication and previous treatments were added.

2.2.2. Medication Adherence Questionnaire. Medication adherence was assessed with a combination of the MAS/MCS (Willey et al., 2000), which asks the participants if they have been taking their medication as directed, and if not what are their intentions regarding taking their medication. Three questions also pertain to the frequency of forgetting, missing or modifying the dose intentionally.

2.2.3. Brief Psychiatric Rating Scale-Expanded. The BPRS is a semi-structured interview assessing the presence and the severity of psychiatric symptoms on a 7-point Likert scale. The expanded version includes 24 items (Lukoff, Nuechterlein, & Ventura, 1986), and can be divided among the following factors: positive symptoms, negative symptoms, anxiety-depression, and manic-excitement (Ventura, Nuechterlein, Subotnik, Gutkind, & Gilbert, 2000). A total score of the 24 items can also be calculated.

2.2.4. Social functioning Scale (Birchwood, Smith, Cochrane, & Wetton, 1990)**.** The SFS is widely used to assess many dimensions of social functioning, namely social engagement/withdrawal, interpersonal behaviours, pro-social activities, recreation and hobbies, skills of independent living (independence/competence), and employment/occupation.

2.2.5. Emotional self-regulation. In evaluating the emotional self-regulation of participants, we used the Cognitive Emotion Regulation Questionnaire (CERQ) (N. Garnefski & Vivian Kraaij, 2007). This measure is a self-report questionnaire consisting of nine distinct subscales (with four items in each subscale) covering cognitive and emotional dimensions (focus on thought/rumination, catastrophizing, self-blame, blaming others, positive refocusing, refocus on planning, positive reappraisal, putting into perspective). In addition, the scale incorporates an acceptance dimension, and it has been used with clinical populations (Garnefski & Kraaij, 2006; N. Garnefski & V. Kraaij, 2007), but not yet with psychotic-related disorders.

2.2.6. Psychological Distress. The Psychological Distress Manifestation Measure Scale (Poulin, Lemoine, Poirier, & Lambert, 2005) is a short self-report questionnaire with 23 manifestations grouped in 4 factorial dimensions: self-depreciation (7 items), irritability (5 items), anxiety/depression (5 items), and social disengagement (6 items).

2.2.7. Freiburg Mindfulness Inventory (FMI) – short version. To measure the level of mindfulness, we used the Freiburg Mindfulness Inventory – short version (Buchheld, Grossman, & Walach, 2001). The short version (14 items) is a self-report questionnaire that was developed and validated by Walach and collegues (2006). The items can be grouped in four factors: attention to the present moment; non-judgmental, non-evaluative attitude toward self and others; openness to one's own negative and positive sensations, perceptions, mood states, emotions and

thoughts; and process-oriented, insightful understanding of experience at a more general level than immediate experience. The FMI-short version showed good reliability, and construct validity.

2.2.8. Cognitive Insight. In evaluating the participants' ability to understand their symptoms and their behaviours, we used the Beck Cognitive Insight Scale (BCIS) (Aaron T. Beck, Baruch, Balter, Steer, & Warman, 2004). The BCIS comprises 15-items where respondents are asked to rate how much they agree with each statement by using a 4-point scale that ranges from 0 (*do not agree at all*) to 3 (*agree completely*). This self-report instrument contains two scales. The first scale measures objectivity, reflection, and openness to feedback, whereas the second addresses decision-making such as: jumping to conclusions, certainty about being right, and resistance to correction. The BCIS shows good psychometric properties.

2.2.9. Feedback Interview. In the feedback interview, participants were asked open-ended questions regarding what they mostly liked in the therapy, what they mostly disliked, what skills they learned, what skills they aim to implement in their lives, in which areas of their lives they perceive amelioration, if any, and whether they recommend this therapy to a friend and why.

2.3. Procedure

The study was approved by the Hospital's and University's research and ethics boards. Interested participants were contacted by a research assistant, who explained to them the consent form. The understanding of the consent form was assessed via a short questionnaire consisting of 10 true/false items about different aspects of the project. A well-informed consent was determined by getting the right answers for the 10 items after no more than three trials. After

signing the consent form, each participant was interviewed separately by a trained research assistant for the BPRS. Participants then completed the remaining questionnaires with the help of a research assistant. Three groups were conducted over the course of twelve months.

2.3.1. Treatment protocol (CAM). The treatment included eight sessions, each of 60 to 75 minutes. Two therapists conducted the sessions. One of the therapists (i.e., first author) had mindfulness experience and both therapists had clinical training with the target population, and were supervised by an experienced clinician in the field (i.e., second author). Participants had access to their usual treatment at the clinic, which included, medication, regular follow-ups with the psychiatrist (biweekly), and case management by a social worker, occupational therapist or psychiatric nurse (weekly). No other psychological treatment (individual or group) was offered to the participants of this study during the treatment or follow-up periods. Other groups (e.g., cognitive behaviour therapy and cognitive remediation) are also available at the clinic. CAM was based on the integration of strategies for emotion regulation in early psychosis. Mindfulness was introduced gradually and practiced using concrete exercises at the beginning (e.g., mindful eating, and breathing). Later on, mindfulness meditation practice was introduced but exercises lasted less than 15 minutes in order to decrease the risk of experiencing intense psychotic symptoms while meditating. We provided meditation mats for the mindfulness exercises. Acceptance, detachment, and compassion skills were taught through concrete strategies, such as acceptance of thoughts and emotions, defusion from own thoughts, and building compassion towards self and others. We chose to not use abstract or theoretical material (e.g., metaphors) given the cognitive difficulties of many individuals with psychotic disorders. The treatment also included exercises on individual values, and personal objectives. Other strategies of emotion regulation were also discussed (e.g., narrative writing and social support). A treatment manual

was developed and each participant was provided a copy. The manual included materials for each session and practice exercises. A summary for each session is presented in Table 2.

2.4. Statistical analyses

Considering the modest sample size, the preliminary nature of this study, and the importance of balancing Type I and Type II error, unadjusted *p*-values are reported. Also, approaching significance results ($p < 0.10$) are noted accordingly. Independent-samples t-tests and Wilcoxon-Mann-Whitney tests were conducted to examine potential pre-treatment differences between completers and non-completers of treatment. Preliminary analyses also investigated differences in medication adherence at different time points. Differences between the three therapy groups were explored using oneway ANOVA. Primary analyses using paired t-tests aimed to explore the differences in clinical measures between baseline (pre-treatment) and both post-treatment and 3-month follow-up. Effect sizes were also reported accordingly. Qualitative data from the treatment feedback interview was reviewed for themes related to perceived benefits and challenges of CAM.

3. Results

3.1. Completers versus non-completers

Preliminary analyses were conducted to examine the comparability between completers and non-completers of the treatment. No significant differences were found between the two groups on sociodemographic data or on any other baseline measure, except for social functioning. Indeed, non-completers had lower social functioning namely on the interpersonal behaviours subscale of the SFS ($t(15) = -2.14$, $p < .05$). Social demographic data for completers are presented in Table 1.

3.2. Medication Adherence

Most participants (11/12) reported taking their medication as prescribed at baseline, and one participant reported planning to take the medication as directed. No significant differences were observed between baseline and post-treatment ($t(11) = 1.00$, $p = .34$, ns), nor at the three-month follow-up. Given these results, medication adherence data were excluded from the main analyses.

3.3. Differences between therapy groups

One-Way ANOVA tests were conducted at three time points (pre, post, and follow-up) to investigate the differences between the three CAM groups. No significant differences on clinical measures were found between the three groups at any of the three time points.

3.4. Potential intervention effects

Table 3 provides means and standard deviations for all the measures as well as within-group effect sizes for differences between baseline/post-treatment and baseline/3-month follow-up assessments. Analyses revealed large improvements ($d = 1.00$) in regulating negative emotions (i.e., self-blaming, rumination, and catastrophizing) among participants at three-month follow-up. Participants also showed a moderate improvement ($d = 0.61$) in total regulation of emotions (i.e., positive and negative) at three-month follow-up, although results only approached significance ($p = 0.06$). For the BPRS total score, results showed a small effect ($d = 0.25$) at follow up, not statistically significant ($p = 0.11$). Positive symptoms showed a small improvement at post treatment ($d = 0.36$), and depression-anxiety subscale showed a moderate to large improvement at follow-up ($d = 0.68$), but results were a trend toward significance in both cases. The symptoms that mostly improved were: anxiety ($d = 0.92$), depression ($d = 0.91$), self-

neglect ($d = 0.71$), and somatic concerns ($d = 0.50$). The values of effect sizes were calculated at 3-month follow-up, and results were statistically significant for anxiety, self-neglect, and somatic concerns ($p < 0.05$), and approached significance for depression ($p = 0.065$). No significant improvements were found for social functioning, insight, and distress measures.

Regarding who improved or not, six participants (50 %) showed improvements on overall symptoms from baseline to post-treatment and follow-up, while two showed deteriorations and four did not show any change. Participants who did not improve ($n = 6$) had significantly lower symptoms at baseline ($t(10) = -5.01$, $p < .005$), specifically lower positive psychotic symptoms ($t(10) = -2.70$, $p < .05$), a higher level of mindfulness ($t(10) = 2.84$, $p < .05$), and better social functioning ($t(10) = 3.00$, $p < .05$) compared with those who improved ($n = 6$). The two groups did not differ on measures of insight, emotional regulation, distress, and sociodemographic measures.

In regards to mindfulness, eight participants (67 %) showed improvements from baseline to post-treatment and follow-up, while three showed a slight decline and one did not show any change. Even though the results are not statistically significant, the effect size at follow-up for mindfulness was moderate ($d = 0.40$).

3.5. Qualitative results

The attendance rate was 77 % for the treatment completers. The majority of participants ($n = 8$) reported that the treatment was a positive experience, describing it as "*nice, wonderful, interesting and nourishing*", while one participant considered the experience as negative and "*not enough nourishing*", and three were ambivalent, describing their experience as "*ok, normal, ordinary, or convenient*". Regarding the components of the treatment, mindfulness was the most

retained (n = 8), liked (n = 4), and practiced (n = 8), followed by interactions with the other group members and/or the therapists (n = 5), while compassion and acceptance were less reported by participants. The most common complaint was the lack of attendance among other participants. Nine of the twelve participants reported changes in their daily lives following the treatment and nine reported that they would recommend the therapy to a friend.

4. Discussion

Overall results support the feasibility of the new developed treatment, supporting our first hypothesis. The majority of the participants found the treatment positive and helpful. The aim of the treatment is to help individuals in early psychosis to regulate negative emotions associated with the illness and accompanying stigma. The treatment focused on mindfulness, acceptance and compassion as strategies to regulate negative emotions. Qualitative results indicate that the majority of participants were able to learn and integrate these strategies, especially mindfulness. We used a group format as it is recommended for individuals with early psychosis to increase peer-to-peer interactions, feelings of normalcy, and modelling (Saksa, Cohen, Srihari, & Woods, 2009). Most of the participants expressed an interest in the group format and some of them complained about the lack of attendance of some participants.

As expected, participants reported large improvements in regulating negative emotions (specifically self-blaming, rumination, and catastrophizing), and moderate to large improvements on affective symptoms (specifically depression, anxiety, and somatic concerns). Results showed also a large improvement on self-care, which could be related to an increase in self-awareness. These results support our second and third hypotheses, and are consistent with the theoretical background of this study regarding the role of emotional self- regulation in treating psychosis.

Results from previous studies that integrated third wave interventions for psychosis suggested small to moderate effects on psychotic symptoms (Khoury et al., 2013), a finding that was not supported in our study. Plausible reasons for the absence of such effects are the small number of participants and the low baseline levels of positive symptoms (M = 9.92, SD = 5.32) and negative symptoms (M = 6.83, SD = 2.08) among participants.

Most of the results were stronger at 3-month follow-up than immediately following the 8-week CAM sessions, suggesting that the treatment might be more beneficial in the long run, as suggested by many CBT studies (Wykes et al., 2008). More longitudinal results will be needed to reach conclusive results.

Participants did not show statistically significant improvements on the mindfulness measure, although an improvement at follow-up was observed and mindfulness was mentioned qualitatively by most. Long-term improvements on mindfulness were also observed elsewhere (Khoury et al., 2013). An explanation of the absence of measured improvements in mindfulness could be linked to the scale itself, as the FMI is designed to detect improvements among skilled meditators whereas the participants here had no previous experience in meditation. In addition, many of the strategies taught in the treatment pertained to general aspects of mindfulness (e.g., eating mindfully, loving-kindness/compassionate meditation) rather than direct mindfulness meditation practice. Furthermore, we did not measure the daily mindfulness practice of participants. In fact, some anecdotally mentioned weekly meditation practice whereas others appeared to have more difficulties grasping the idea of mindfulness, qualifying the group exercises as learning to ‘eat more slowly’ or ‘relaxation’. It is recommended that future studies measure the daily mindfulness practice of participants and perhaps use a more comprehensive

measure of mindfulness (e.g., Mindfulness and Awareness Scale (Brown & Ryan, 2003) or Five-Facet Mindfulness Questionnaire (Baer et al., 2008)).

Regarding the lack of improvements in social functioning, insight, and distress, the former two were not directly addressed in the brief CAM treatment, whereas the latter might need further investigation, perhaps considering using another measure of distress.

The current study has several limitations. First, the uncontrolled study design precludes any causal inferences about the efficacy of the tested treatment (i.e., perhaps everyone in the first episode program improved similarly, or the improvements here were linked to other mechanisms than the treatment, such as social interaction within a group setting or the regular follow-up at the clinic). The study did not include measures of compassion or acceptance, or concrete behavioural measures of mindfulness practice which are essential components of the treatment. Finally, we did not record the reasons for irregular attendance among some participants.

In conclusion, the CAM group protocol for emotional regulation appears acceptable, feasible, and shows promise in terms of potential clinical treatment for early psychosis. Further studies are warranted in order to determine its efficacy in improving acceptance, compassion, and mindfulness practice, and in diminishing distress and symptoms.

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Table 1.

Social demographic data of participants completing the CAM intervention (N=12)

Measure	
Age, years [Mean (SD)]	29.08 (8.13)
Sex (male/female)	8 / 4
Years of education [Mean (SD)]	10.83 (1.47)
DSM IV Diagnosis, n	
Paranoid schizophrenia	6
Schizophrenia, not otherwise specified	2
Psychosis, not otherwise specified	4
Age of first visit to a psychiatrist [Mean (SD)]	21.88 (6.00)
Age of first hospitalization [Mean (SD)]	21.92 (5.92)
Number of psychiatric hospitalizations [Mean (SD)]	3.00 (2.98)
Marital status, n	
Single, never married	10
Married/remarried	1
Divorced	1
Country of birth, n	
Canada	11
Haiti	1
Race, n	
Occidental	7
First nation/Inuit	1
Asian	1
African/Caribbean	2
Others	1
Work status (employed/unemployed)	3 / 9
Did jail time (yes/no)	4 /8
Had therapy in the last 6 months (yes/no)	5 / 7
Alcohol/Drug use, n	
Alcohol only	1
Drugs only	1
Both	1
None	9

Table 2.

Highlights of the protocol sessions

Session 1	Presenting to the group
	Explaining the module
	Introduction to mindfulness
	Mindfulness Exercise: eating an apple mindfully
Session 2	Values: define your own values, differences between values and goals
	Group discussion about values
	Mindfulness exercise: calming and self-soothing breathing
Session 3	What prevents me from advancing in the direction of my own values?
	Group discussion
	Mindfulness Exercise: Imagine yourself in a peaceful and safe place
Session 4	Acceptance: what is it? Difference between acceptance and resignation
	Detachment: being an external observer
	What you do when faced with threatening feelings or thoughts
	Group Discussion
	Mindfulness Exercise: Exposure via imagery to a difficult memory or thought while practicing calming and self-soothing breathing (from session 2)

Table 2 *(continued).*

Session 5	Compassion: what is it?
	The role of compassion in the acceptance of threatening thoughts and emotions
	Group discussion about how to generate compassion towards oneself
	Mindfulness Exercise: compassion towards oneself using Loving-Kindness Meditation
Session 6	The role of compassion towards others in one's own well-being
	Group discussion about how to generate compassion towards others
	Mindfulness Exercise: compassion towards others using Loving-Kindness Meditation
Session 7	Other ways to increase wellness: narrative writing and social support
	Group discussion about ways to feel good in short term versus long term
	Mindfulness Exercise: half-smile
Session 8	Revision of the Module
	The role of positive emotions such as hope and optimism in well-being
	Feedback from participants
	Mindfulness Exercise: *Vipassana* Meditation

Table 3.

Means, Standard Deviations and Effect Sizes (Cohen's d) for all measures at Pre, Post and 3-month Follow-up

Outcome	T0 (baseline)	T1 (post-therapy)	Effect size (*d*)		T2 (3-months follow-up)	Effect size (*d*)	
Measure	*Mean* (*SD*)	*Mean* (*SD*)	Pre-Post	*p*-value	*Mean* (*SD*)	Pre-Follow-up	*p*-value
Symptoms							
BPRS total	41.83 (13.59)	37.83 (6.86)	0.279	0.156	38.70 (9.75)	0.246	0.109
Positive	9.92 (5.32)	7.08 (3.60)	0.361	0.087$^{\Delta}$	8.40 (3.97)	0.203	0.343
Negative	6.83 (2.08)	6.00 (2.04)	0.404	0.166	6.70 (2.79)	0.200	0.575
Depression-anxiety	10.50 (5.20)	9.00 (3.84)	0.318	0.250	8.10 (2.81)	0.676	0.082$^{\Delta}$
Manic-excitement	7.92 (2.87)	9.25 (5.03)	-0.198	0.382	7.70 (2.36)	0.136	0.522
Mindfulness							
FMI total	38.25 (7.36)	38.92 (7.54)	0.089	0.507	41.30 (9.20)	0.403	0.186
Emotional regulation							
CERQ total	114.42 (17.14)	115.75 (20.24)	0.070	0.775	125.60 (19.29)	0.611	0.060$^{\Delta}$
Positive	61.25 (12.76)	62.17 (13.60)	0.070	0.777	63.70 (14.12)	0.182	0.540
Negative	53.17 (9.21)	53.58 (11.84)	0.038	0.877	61.90 (8.08)	1.003	0.007**
Insight							
BCIS total	39.00 (8.19)	36.92 (4.98)	-0.269	0.230	36.40 (6.43)	-0.341	0.239
Psychological distress							
PDMMS total	54.00 (20.81)	54.17 (16.71)	-0.008	0.958	51.80 (17.50)	0.114	0.905
Social functioning							
SFS total	122.17 (18.21)	124.83 (18.60)	0.144	0.548	121.30 (23.66)	-0.040	0.985

$^{\Delta}p < .10$ (approaching significance). * $p < .05$. ** $p < .01$.

General Discussion

General Discussion

In this thesis, the point was made for the pertinence of using emotion regulation strategies, such as acceptance, compassion and mindfulness, in treating individuals with psychotic disorders. In fact, many researchers and clinicians support such argument. For example, Greenberg and Pascual Leone (2006) consider emotion regulation as central to recovery, pointing out that it must be the first goal of an effective treatment. More treatments are integrating emotion regulation strategies as part of their protocols (e.g., Acceptance and Commitment Therapy, Mindfulness-Based Cognitive Therapy, Dialectical Behavior Therapy, Compassion Focused Therapy, and Emotion Focused Therapy). Some of the protocols have been briefly described elsewhere (Benoit & Khoury, 2012). Among the emotion regulation strategies, mindfulness in particular is now considered a central mechanism (Khoury & Lecomte, 2012; Khoury, Lecomte, & Lalonde, 2012).

In fact, an increasing number of studies during the last decade are using mindfulness either as a central part of their protocols (e.g., Mindfulness-Based Stress Reduction, Mindfulness-Based Cognitive Therapy, and Mindfulness-Based Relapse Prevention) or as an additional component (e.g., Dialectical Behavior Therapy, Acceptance and Commitment Therapy, and Person-Based Cognitive Therapy). Protocols with a mindfulness component are growing fast in numbers and are now implemented for almost every psychological disorder (including all DSM axis-I and many axis-II disorders), physical or medical conditions, and among non-clinical populations. As reflected in the meta-analyses presented in this thesis, one of the problems in this growing body of literature is the large difference among the mindfulness protocols regarding the ways mindfulness is implemented and/or practiced, outcomes are measured, and treatment is offered to participants. Some of the protocols are individually-based

while others are group-based, some of them are conducted or supervised by qualified mindfulness teachers and qualified clinicians while others lack these qualifications. One of the most common shortcomings in these interventions is that over half of them did not measure mindfulness among participants, whereas it was assumed that mindfulness was a central component in the treatment. Other differences among the mindfulness treatments are the number of sessions, total duration of treatment and the home practice recommended by therapists.

To assess the effectiveness of mindfulness based interventions and to delineate the factors contributing to their effectiveness, we conducted a comprehensive meta-analysis including all treatments where mindfulness meditation is a central component. The results showed that mindfulness is moderately to highly effective in treating all sorts of psychological disorders and physical/medical conditions. The effects were also maintained at an average of six months following the end of the treatment (last session). Findings suggested higher effects on psychological disorders than on physical/medical conditions. In addition, mindfulness based interventions were shown to be more effective than psychoeducation, supportive therapy, and relaxation, even though the effect sizes were moderate to small. In comparison with traditional Cognitive Behavioral Therapies, mindfulness based interventions were shown to be equally effective, even though the results are not statistically significant. Perhaps one of the most significant findings is that mindfulness strongly moderated the effectiveness of the treatments, most likely via regulating negative emotions associated with the psychological disorder or medical illness. For example, even when physical symptoms (e.g., pain) did not decrease, the associated distress and affective symptoms (e.g., anxiety, depression, and emotional stress) showed significant statistical and clinical improvements. Another significant outcome is the role of mindfulness training and experience of therapist(s) in ameliorating the effect size of the

treatments. These results suggest that future treatments should require that therapists have previous experience or follow a formal curriculum in mindfulness. In addition, therapists can have indirect influence on participants, for example a mindful, compassionate and accepting therapist can have positive influence on the mindfulness, compassion and acceptance of the participants as well as on their clinical outcomes (Grepmair et al., 2007). Indirect effects are part of what is called the "common factors" in psychotherapy. In a recent article, Wampold referred to those factors as "humanism" and argued that they are central to any treatment's effectiveness (Wampold, 2012). In summary, the findings of this meta-analysis encourage conducting more rigorous mindfulness based studies to establish their effectiveness in comparison with, or in addition to other equivalent treatments (e.g., CBT) and to delineate their mechanisms of action.

The next question was the degree to which results regarding the effectiveness of the mindfulness based therapy could also be found in individuals with psychotic disorders. A further question is the potential role of mindfulness and other emotion regulation strategies in the effectiveness of interventions in psychosis/schizophrenia. We already argued in our first article and book chapter (i.e. introduction) for the importance of these strategies in addressing the distress associated with the illness and in increasing the levels of well-being and functioning among individuals with psychosis or schizophrenia. Therefore, we conducted our second meta-analysis, which included all existing interventions using any of the third wave emotion regulation strategies (i.e., mindfulness, acceptance, and compassion) for psychosis/schizophrenia. Even though the effects were small for positive symptoms, there were larger for negative and affective symptoms, indicating a significant reduction in distress, depression and anxiety associated with experiencing intense psychotic symptoms, and an increase in functioning and quality of life. Benefits were also maintained at follow-up, suggesting long-term effects of these interventions.

Another important finding was that mindfulness was a strong moderator of treatment efficacy and acceptance/compassion were complementary strategies increasing its effectiveness, suggesting again emotion regulation as the mechanism of action in these interventions. In fact, the results suggest that these interventions are beneficial in helping individuals regulate their negative emotions via teaching them to better adapt to their symptoms, and as result decrease their distress and increase their levels of functioning and their global well-being.

Studies targeting psychotic disorders and integrating emotional regulation strategies showed large heterogeneity and differences in the obtained effect sizes. These variances are due to differences in the design (e.g., pre-post versus controlled), the protocols (e.g., ACT, MBCT, and PBCT), the target population (e.g., inpatients versus outpatients), and symptoms targeted (e.g., positive, negative, affective, functioning, or rehospitalization/relapse). Psychotic disorders are also somewhat heterogeneous and can involve a large spectrum of symptoms. Beside these differences, findings encourage the implementation of interventions using emotion regulation strategies as adjunct to pharmacotherapy in treating individuals with psychotic disorders.

Findings from both meta-analyses suggest a central role for emotion regulation strategies in the effectiveness of the investigated interventions. In addition, results showed low attrition rates among participants (16.29 % in the first meta-analysis and 12.14 % in the second), values that are lower than the ones usually obtained in similar interventions (e.g., CBT) suggesting high commitment among participants to these interventions. A plausible reason behind the low attrition rates is the focus of these interventions on reducing distress rather than symptoms, an objective that is likely to increase the collaboration among participants.

The next objective in this thesis was to develop a new treatment for early psychosis using our findings from existing research. On the basis of the results from both meta-analyses, we

came to the conclusion that mindfulness should be a central component of a new treatment and that acceptance and compassion can be complementary to mindfulness in increasing the treatment's efficacy. Therefore we thought to design a treatment that combines mindfulness, acceptance and compassion. A challenge we faced when designing the treatment was to adapt it for individuals with early psychosis. As we know, early psychosis is a period of intense distress associated with dysfunction , stigma, and social isolation (Brunet, Birchwood, Upthegrove, Michail, & Ross, 2012; Crisp, Gelder, Rix, Meltzer, & Rowlands, 2000; Lolich & Leiderman, 2008; Reed, 2008) and the diagnosis itself of schizophrenia can be further stigmatizing (Tranulis, Lecomte, El Khoury, Lavarenne, & Brodeur-Côté, 2013). In addition, many individuals suffer cognitive difficulties before and following a psychotic episode, rendering it challenging for them to assimilate some of the intervention's material. Therefore, we used strategies involving senses and bodily sensations beside thoughts and emotions in teaching mindfulness. For example, we started by a simple exercise focusing of eating mindfully an apple and we moved slowly towards bodily sensations during sitting meditation and to contemplating thoughts and emotions later in the treatment module. In teaching acceptance, we also focused on discussing specific life events pertaining to the participants and how to accept them as a way to feel better and to move in the direction of values and life goals. We avoided metaphors and abstract or theoretical material as they are hard to understand and participants might not relate to them. In teaching compassion, we used material from Compassionate Mind Training (Gilbert, 2009) as it was already implemented and validated with individuals with different psychotic disorders. We concentrated on practices that can help participants to self-sooth. We also integrated elements from Loving-Kindness meditation (Salzberg, 1995) as it has both self-soothing and mindfulness elements. The module was designed in such way that each session has a specific theme, a mindfulness practice related

to the discussed theme at the end of the session, and homework to practice the taught element. The treatment was also designed in a group format to increase feelings of normalcy and modeling among participants.

Finally, to validate the effectiveness of the new developed treatment, we conducted a non-controlled pilot study. Twelve individuals completed the treatment. Qualitative results suggest the feasibility, and acceptability of the new treatment. Most of the participants reported integrating these strategies in their daily life. Quantitative results showed large improvements in regulating negative emotions (e.g., self-blaming, rumination, and catastrophizing), and on self-care, moderate to large improvements on affective symptoms (specifically depression, anxiety, and somatic concerns). Improvements were higher at three-month follow-up suggesting a potential increasing long-term effect of the new treatment.

The attrition rate obtained in this pilot study (30%) was higher than the ones found in other studies with similar populations and using similar strategies, but similar to others using a group format. Reasons behind such high attrition rate are perhaps the inclusion of individuals with comorbid disorders (e.g., social anxiety, attention deficit hyperactivity disorder, and borderline personality disorder) and having heterogeneous groups in ages (e.g., young males in their twenties with middle-aged women). These factors among others rendered some groups less cohesive and perhaps influenced the sense of belonging to the group, leading as consequence to higher attrition rates.

This thesis helped in answering many questions regarding the role and utility of emotion regulation strategies in psychotherapy specifically in treating a psychotic population; however, other questions remain unanswered. Perhaps a central one is regarding how to match an intervention for emotion regulation with a specific target population. Interventions can vary in

the strategies they use, the delivering format, the duration of sessions and homework practice. Individuals with psychosis vary also in their diagnosis, stage of illness, symptoms, and specific needs. Future research must aim at delineating the factors that can render an intervention more effective for a specific target population.

It is noteworthy that mindfulness was implemented according to the common Western protocols emphasizing on non-judgmental observation, awareness, and acceptance of internal and external phenomena. However, this implementation of mindfulness is rather narrow and excludes important components of mindfulness according to Buddhist traditions. In fact, the earliest teachings of Buddha involves the combination of (1) concentration associated with calm abiding (*Samatha*) practice to acquire direct experience, and (2) discriminative analysis associated with insight (*Vipassana*) practice to acquire insight and wisdom. Unfortunately, Western mindfulness failed to implement the first component of mindfulness and partially implemented the second one. For example, Buddhist teachings emphasize the overly changing and impermanent aspect of all phenomena (internal and external) including one self's ego. Moreover, Buddhist teachings point out that attachment to the ego is a permanent source of suffering. Unfortunately, these important principles are largely missed in the Western teachings of mindfulness. Perhaps a further integration of Buddhist teachings in contemporary mindfulness-based therapy could be beneficial. In fact, some new protocols based on Buddhist teachings are currently under development and validation (e.g., Rapgay & Bystrisky, 2009; Rapgay, Bystrisky, Dafter, & Spearman, 2011). These attempts, even though somewhat partial and preliminary are rather encouraging.

Beside third wave strategies, many other interventions also aim at regulating emotions in severe mental illness including psychotic disorders (for e.g., mentalization; Bateman & Fonagy,

2004; metacognitive training; Hutton, Morrison, Wardle, & Wells, 2013; Kumar et al., 2013; narrative training; Lysaker et al., 2011; Lysaker, Glynn, Wilkniss, & Silverstein, 2010). These interventions utilize different strategies in regulating emotions. For example, metacognitive training aims at regulating emotions via targeting the associated attribution biases (Hutton et al., 2013; Kumar et al., 2013; Naughton et al., 2012). Narrative treatment aims at normalizing the experience of the person and to increase self-compassion, helping as result in regulating negative emotions and in reducing distress (e.g., Lysaker et al., 2011; Lysaker et al., 2010; Pérez-Álvarez, García-Montes, Vallina-Fernández, Perona-Garcelán, & Cuevas-Yust, 2011). Mentalization focuses on regulating emotions via increasing the ability to recognize one's own and others' mental states (such as thoughts, beliefs, and intentions) as explanations of behaviours (Fonagy & Bateman, 2006).

Another important factor in the selection of a treatment by most institutions and service providers is cost-effectiveness. Many studies have compared cost-effectiveness of different types of psychotropic medications. Few studies have explored the cost-effectiveness of psychosocial treatments for psychosis or schizophrenia and overall results are inconclusive with some suggesting reductions in cost when including a psychosocial treatment (e.g., Karow et al., 2012; Kuipers et al., 1998; Startup, Jackson, Evans, & Bendix, 2005), while others reported insignificant cost reductions (e.g., van der Gaag, Stant, Wolters, Buskens, & Wiersma, 2011), even if clinical improvements were documented. Findings are more conclusive for early interventions in psychosis, suggesting both clinical and cost effectiveness (e.g., Cocchi, Mapelli, Meneghelli, & Preti, 2011). However, no study compared the cost-effectiveness among different psychosocial treatments. On the basis of treatment duration and the available data, one can conclude that short-term cognitive behavioral therapies (e.g., traditional CBT or third wave

interventions) might be among the most cost effective psychosocial interventions in addition to family interventions, which are also shown to be effective (e.g., Devaramane, Pai, & Vella, 2011; Heekerens, 2008; Pharoah, Mari, Rathbone, & Wong, 2010). In addition, technology and specifically the Internet present an additional support for delivering cognitive behavioral and mindfulness-based interventions at a low cost, and results support their effectiveness for a wide range of disorders (e.g., Andersson et al., 2012; Hedman et al., 2013; Ljótsson et al., 2010). For example, a randomized web-based mindfulness training for 50 individuals with psychotic disorders or suicidal thoughts showed a significant decrease in stress, distress and improvement in regulating negative emotions (Glück & Maercker, 2011). These results suggest the potential of designing and delivering short-term, clinically effective and highly cost-effective treatments for severe mental illnesses including schizophrenia. Álvarez-Jiménez and colleagues (2012) argued that internet-based technologies have the potential to transform psychosis treatments by enhancing their accessibility, fostering engagement with mental health services, and maintaining treatment benefits over the long term. However, it is noteworthy that internet-based applications should be only used as adjuncts to a treatment as therapeutic relationship as been shown to be central in a treatment's efficacy (e.g., Horvath & Bedi, 2002; Horvath, Del Re, Flückiger, & Symonds, 2011; Horvath & Symonds, 1991; Martin, Garske, & Davis, 2000).

Whether the intervention is cognitive-behavioral, metacognitive, mindfulness-based, third-wave based, or mentalization-based, and despite the method of delivering the intervention, emotion regulation remains a central component for its effectiveness. In fact, emotion regulation appears central in most psychosocial interventions and for all psychological disorders. Individuals with psychosis or schizophrenia, showing large dysregulations in experiencing, expressing and processing their own emotions and understanding and relating to the emotions of

others are certainly an ideal target for emotion regulation strategies. More rigourous studies exploring the most clinically and cost effective strategies in delivering emotion regulation based treatments for individuals with psychotic disorders are warranted.

In summary, emotion regulation appears to be a central component in treating different psychological disorders and/or physical or medical conditions including psychotic spectrum disorders. Mindfulness meditation seems to be effective in regulating emotions, and mindfulness based therapy is effective in treating a wide range of disorders and conditions. Other strategies, namely acceptance and compassion, can be complementary to mindfulness in regulating emotions and are shown to be effective in treating psychotic spectrum disorders. A new treatment using mindfulness, acceptance, and compassion is feasible and preliminary results suggest that it enhances emotional regulation and decreases affective symptoms among individuals in early psychosis. More research is warranted to validate long-term effectiveness of the new developed treatment.

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