

Original articles

# The effects of mindfulness-based stress reduction therapy on mental health of adults with a chronic medical disease: A meta-analysis

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## Abstract

**Objectives:** The objective of this study was to examine the effectiveness of mindfulness-based stress reduction (MBSR) on depression, anxiety and psychological distress across populations with different chronic somatic diseases. **Methods:** A systematic review and meta-analysis were performed to examine the effects of MBSR on depression, anxiety, and psychological distress. The influence of quality of studies on the effects of MBSR was analyzed. **Results:** Eight published, randomized controlled outcome studies were included. An overall effect size on depression of 0.26 was found, indicating a small effect of MBSR on

depression. The effect size for anxiety was 0.47. However, quality of the studies was found to moderate this effect size. When the studies of lower quality were excluded, an effect size of 0.24 on anxiety was found. A small effect size (0.32) was also found for psychological distress. **Conclusions:** It can be concluded that MBSR has small effects on depression, anxiety and psychological distress in people with chronic somatic diseases. Integrating MBSR in behavioral therapy may enhance the efficacy of mindfulness based interventions.

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**Keywords:** Mindfulness; Mental health; Depression; Chronic medical disease; Meta-analysis

## Introduction

Many chronic somatic diseases are highly prevalent in industrialized countries. About 45% of healthy 40-year-old men and 30% of healthy 40-year-old women, for example, will develop coronary heart disease in later life [1]. It is estimated that 85% of older adults is affected by one or more chronic diseases [2]. In more recent studies that defined chronic pain as pain of >3 months duration, prevalence rates of chronic pain ranged from 10.8–23.7% [3,4]. For mental disorders, the presence of chronic somatic diseases is a risk factor. An increased risk of developing an anxiety disorder has been found among people with arthritis [5], coronary heart diseases [6]. An increased prevalence of depression has been found for many chronic physical somatic diseases in

both cross-sectional and longitudinal studies, e.g., cardiovascular diseases [6], cancer [7], and arthritis [5]. It is estimated that between 20% and 30% of cancer patients will experience depressive symptomatology [8,9].

Mindfulness-based stress reduction (MBSR) is a treatment for psychological distress, depressive symptoms, and anxiety for people with chronic disease that is rapidly growing in popularity in the United States. Developed by Kabat-Zinn [10,11], the MBSR program consists of 8–10 sessions for groups of up to 30 participants. Central here is the practice of mindfulness. Mindfulness is the skill to non-judgmentally observe emotions, sensations, or cognitions. Mindfulness is moment-to-moment awareness and is trained through meditation exercises that have been adapted from Buddhist traditions. Besides these meditation skills, yoga exercises and psycho-education are also part of the program. Whereas MBSR was originally developed for people with chronic pain, it was later also applied to people with chronic diseases such as cancer [12], fibromyalgia [13], and heart failure [14]. Apart from MBSR, mindfulness is also an

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important component of other treatments such as acceptance and commitment therapy [15], dialectic behavioral treatment [16], and cognitive therapy [17].

Two meta-analyses have so far studied the effects of MBSR on mental health [18,19]. Grossman et al. [18] conducted a meta-analysis of 20 controlled and uncontrolled studies on the effects of MBSR on physical and mental health of medical and non-medical samples. They found an effect size of  $d=0.54$  for controlled studies on mental health. No effect sizes for specific symptomatology (depression, anxiety) were reported. Baer [19] included both controlled and uncontrolled studies focusing on populations with somatic diseases, clinical populations, and nonclinical populations. Effect sizes of  $d=0.70$  for anxiety (eight studies) and  $d=0.84$  for depression (five studies) across the different populations were reported. Average effect sizes at posttreatment across medical and psychological outcomes of  $d=0.37$  were found for patients with chronic pain and  $d=0.55$  for patients with other somatic disorders. Both meta-analyses included only two published, controlled studies on the effects of mindfulness on mental health in populations with somatic diseases. No effect sizes for depression and anxiety in these populations were calculated. Qualities of studies that might moderate the effects on mental health were not systematically analyzed.

On the basis of the fact that, in recent years, many more controlled studies on MBSR in somatic medical populations have been published, we decided to conduct a new meta-analysis on the effects of MBSR in people with chronic somatic diseases. The objective was to analyze the overall effects of MBSR on psychological distress, depression, and anxiety.

## Methods

### *Selection of studies*

Studies were selected through a search of two computerized databases of the literature: Medline and PsychINFO. Medline (1966–2008) yielded 5512 results using mindfulness as keyword and randomized controlled trial as limitation. PsychINFO (1960–2008) yielded 1114 results, using mindfulness as keyword. The abstracts of potentially eligible studies were read and those that reported effects of MBSR on populations with chronic somatic diseases were retrieved and studied, as were the primary studies used in earlier meta-analyses [18,19]. Furthermore, the reference lists of retrieved studies were examined and those that possibly met inclusion criteria were collected. We included studies in which (1) the effects of MBSR (2) on adults (3) with a chronic medical disease<sup>1</sup> (4) were compared to a

control condition (5) in a randomized controlled trial and in which (6) sufficient data were reported for the calculation of standardized effect sizes.

### *Data extraction*

Outcome measures of mental health were included. Mental health constructs comprised scales such as overall psychological distress, depression, and anxiety. All decisions on the inclusion and allocation of outcome measures or moderators were based on consensus between two of the authors, E. Bohlmeijer and R. Prenger. Relevant data for each measure included in the analysis were extracted and entered into Comprehensive Meta-Analysis version 2.2.021 (CMA). If data were available, we examined immediate, pre- to postintervention change to assess both the effects of mindfulness and follow-up effects.

### *Methodology and calculation of effect sizes, $d$ , from primary studies*

In a meta-analysis the effects found in the primary studies are converted into a standardized metric effect size which is no longer placed on the original measurement scale and can therefore be compared with measures from other scales [20]. Standardized effect sizes,  $d$ , are calculated as  $d=(M_1-M_0)/Sd_0$ ; where,  $M_1$  and  $M_0$  are the means at post- and pretest, and  $Sd_0$  is the pre-test standard deviation of measures of depression. The standardized effect sizes,  $d$ , show by how many standard units ( $z$  scores) a group has progressed after treatment at  $t_1$  as compared with their mean baseline score at  $t_0$ .

We were interested in obtaining the effect size of the experimental effect minus the effect (of spontaneous recovery) in the control group. Therefore, we calculated the standardized pre to post change score of both the experimental group ( $d_E$ ) and the control group ( $d_C$ ). Then we calculated their difference, i.e.,  $\Delta(d)=d_E-d_C$ . These incremental effect sizes show by how many standard units the experimental group has been removed from the control group. An effect size of 0.5 thus indicates that the mean of the experimental group is half a standard deviation larger than the mean of the control group. Lipsey and Wilson [21] have shown that an effect size of .56–1.2 can be assumed as large, whereas effect sizes of .33–.55 are moderate, and effect sizes of 0–.32 are small.

For this meta-analysis, Hedges'  $g$  effect sizes were calculated using CMA. Hedges'  $g$  is a variation of Cohen's  $d$  that corrects for biases due to small sample sizes [22]. If no means and standard deviations were reported, other test statistics ( $\chi^2$ ,  $T$ ,  $F$ ) were converted into Hedges'  $g$ .

Basically, meta-analysis amounts to pooling individual effect sizes (Hedges'  $g$ ) and obtaining a best overall estimate of the treatment effect within its 95% confidence interval (95% CI). To calculate pooled mean effect sizes, we used the computer program CMA, developed for support in meta-analysis. As we expected considerable heterogeneity, we

<sup>1</sup> Chronic illnesses refer to any conditions which involve some disability, caused by irreversible pathological change. We also included illnesses that need not be irreversible but cause enduring disability (e.g., cancer).

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