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.

Introduction

Meta-analysis (description)	Number of studies	Hedge's g Cohen's d	95% CI	Z	p	Hetero geneity (I^2) (%)	Fail-safe N
Baer (2003) (general)	18	0.59 (d)	-	-	-	-	-
Grossman et al. (2004) (only MBSR)	20	0.53 (d)	[0. 23, 0.81]	-	< 0.004	-	-
Ledesma et Kumano (2009) (MBSR with cancer, only randomized studies)	10	0.48 (d)	[0.38, 0.59]	-	< 0.0001	-	-
Hoffman et al. (2010) (Anxiety and depression, pre-post)	39	0.63 (g)	[0.53, 0.73]	21.82	< 0.01	-	4,302

An increasing number of meta-analyses have investigated the effectiveness of mindfulness-based therapy (MBT). These reviews 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. 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, about the active ingredients that may account for the efficacy of MBT, and about the relevant moderator variables. It is assumed that mindfulness is a central mechanism of MBT that might enhance positive affect, decrease negative affect, and reduce maladaptive automatic emotional responses. 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 impulses reaction the empirical evidence for explaining the mechanisms of MBT remains sparse. Similarly, little is known about the potential moderators, including treatment duration, homework practice, course attendance, and the clinical and mindfulness training and practical experience of the therapists delivering MBT.

Objectives

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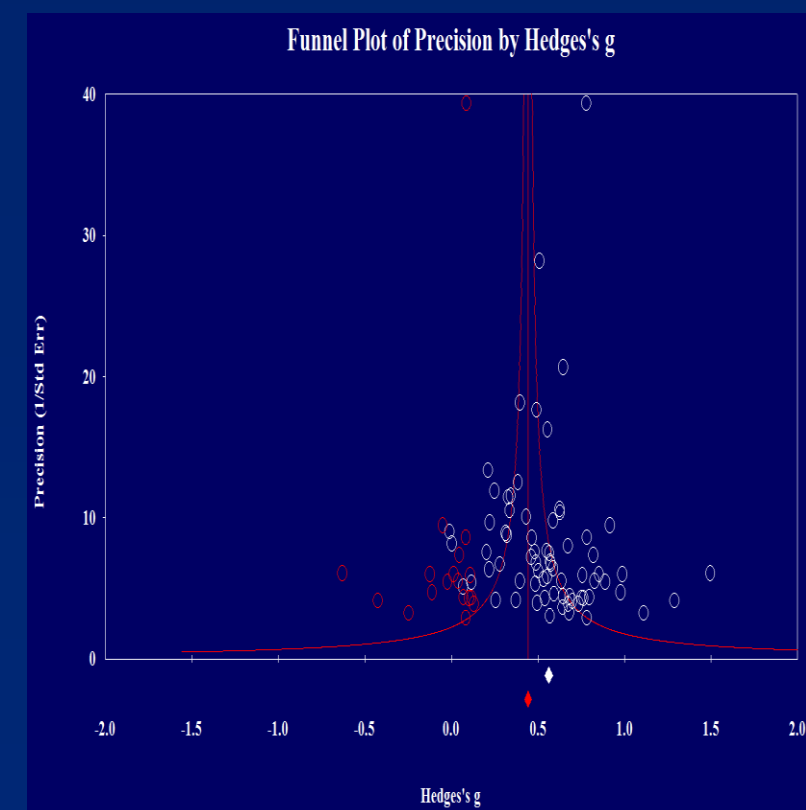(1) quantify the size of the treatment effect with the maximum available data;
(2) investigate and quantify the role of mindfulness in MBT;
(3) explore moderator variables.

Method

Eligibility criteria / Information sources
Any study examining the effects of MBT for a wide range of physical/medical conditions, psychological disorders, and non-clinical populations. Studies were identified by searching PubMed and PsycINFO from the first available date until May 10, 2013. No limits were applied for language.
Search terms: mindfulness or MBSR MBCT...
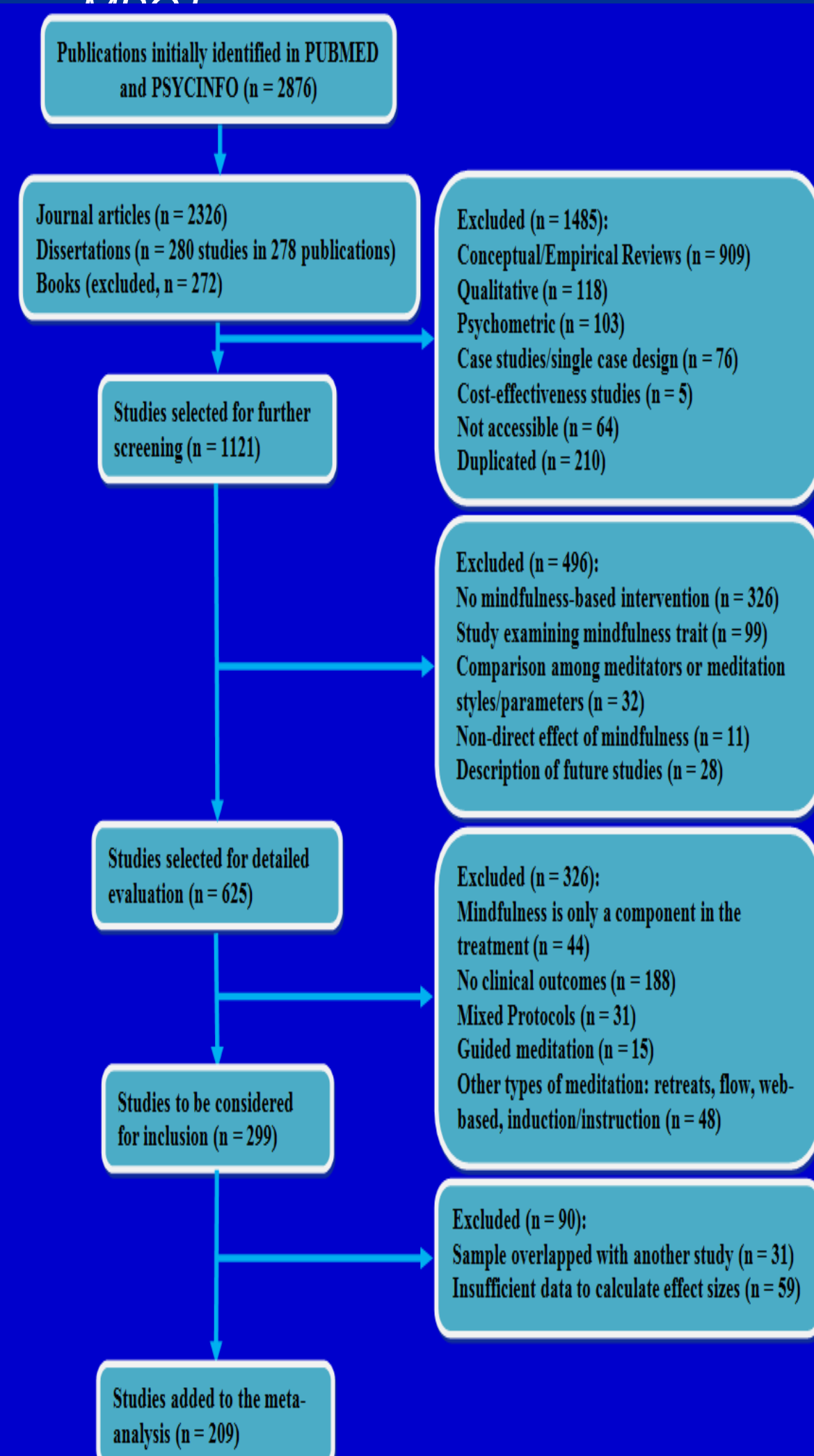
Procedure
Data items: Information was extracted from each included trial based on characteristics of the:
(1) trial (design, randomization, blinding, therapist qualifications, type of outcomes, and follow-up)
(2) intervention (treatment protocol, target population, and length of treatment/practice)
(3) control group (type of control, type of treatment, and length of treatment)
(4) participants (mean age, % males, attrition, and diagnosis)

To investigate the impact of categorical variables, we used the mean effect size and the 95% CI. For numerical variables, we used meta-regression. We completed all analyses using Comprehensive Meta-Analysis. To minimize the influence of data selection, we included data pertaining to all available outcomes. We identified two groups of outcomes: clinical and mindfulness. We included data post-treatment and at the last follow-up, when available. Each study was assessed using a quality score, inter-rater reliability was high (Kappa = .94.)

Effect sizes were computed using means/SD when available, otherwise, the effect sizes were computed using other statistics such as F, p, t, and χ^2. To assess publication bias, we computed the fail-safe N and constructed a funnel plot. We also assessed the clinical significance of MBT on both anxiety and depression.


Results

Graph illustrating the results of the studies grouped according to the study design


Funnel plot of precision by Hedge's g for pre-post studies at the end of the treatment using only clinical outcomes.

| Measure	Number of studies	Level at pre-treatment	Level at post-treatment	Level at follow-up
Anxiety (BAI)	9	mild	asymptomatic	asymptomatic
	12	moderate	mild	mild
	1	severe	mild	-
Anxiety (STAI)	22	Non-anxious	Non-anxious	Non-anxious
	16	Moderately-anxious	Non-anxious	Non-anxious
	8	Highly-anxious	Moderately-anxious	Moderately-anxious
Depression (BDI-I)	24	mild	asymptomatic	asymptomatic
	6	moderate	mild	mild
	1	severe	mild	-
Depression (BDI-II)	16	mild	mild	mild
	5	moderate	asymptomatic	asymptomatic
	4	severe	moderate	mild
Depression (CES-D)	5	Non-depressed	Non-depressed	Non-depressed
	9	Moderately-depressed	Non-depressed	Non-depressed

Table representing the clinical significance of the MBT for both anxiety (measured by BAI and STAI) and depression (measured by BDI-I, BDI-II, and CES-D)
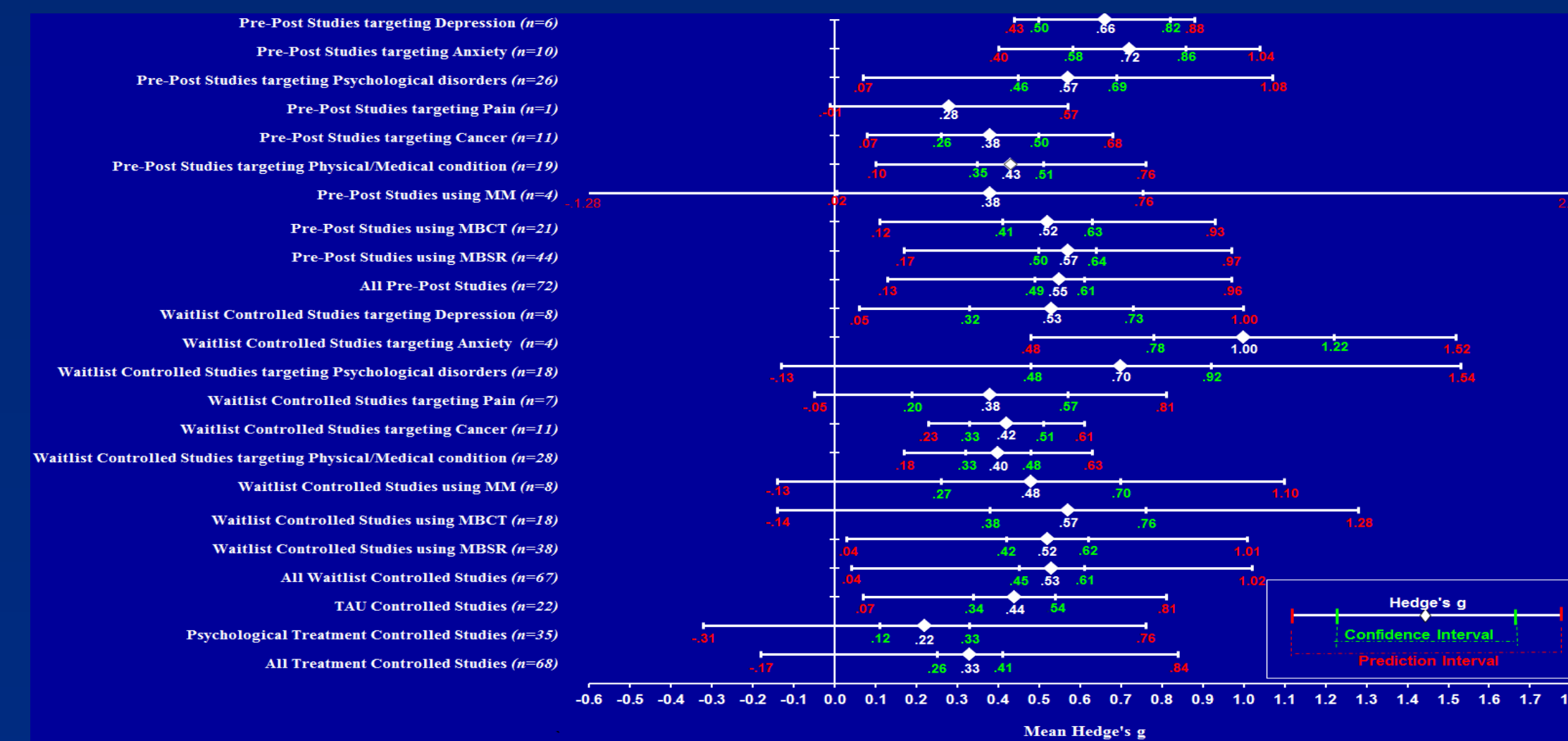

Mean Hedge's g, 95% confidence interval, and 95% prediction interval for main studies' groups. Note that the effect sizes were calculated at the end of the treatment and solely based on the clinical outcomes
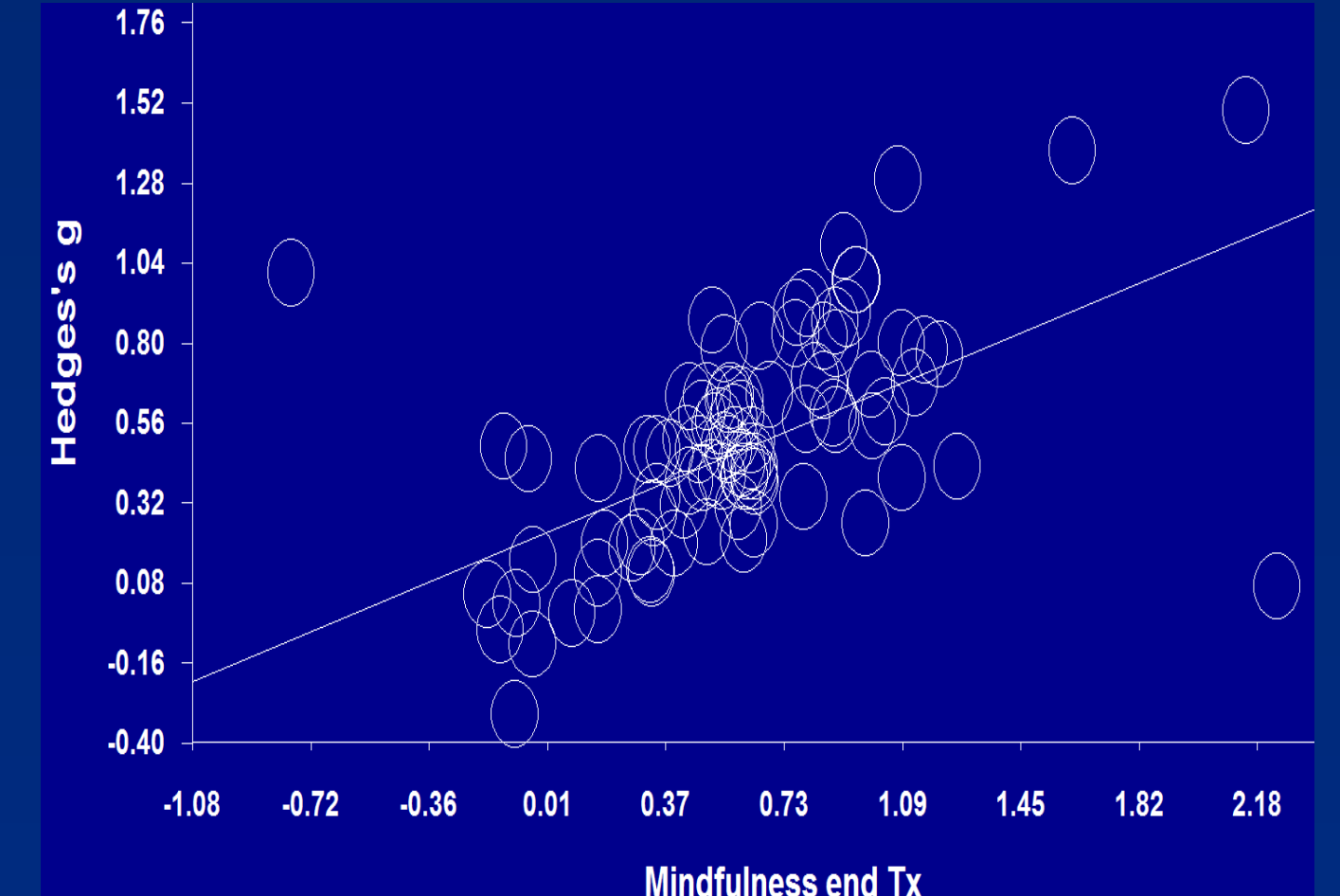
Graph showing that the average effect size of clinical outcomes is positively moderated by the mindfulness outcomes at of treatment (n = 91), (β = .41, SE = .04, p < .00001)
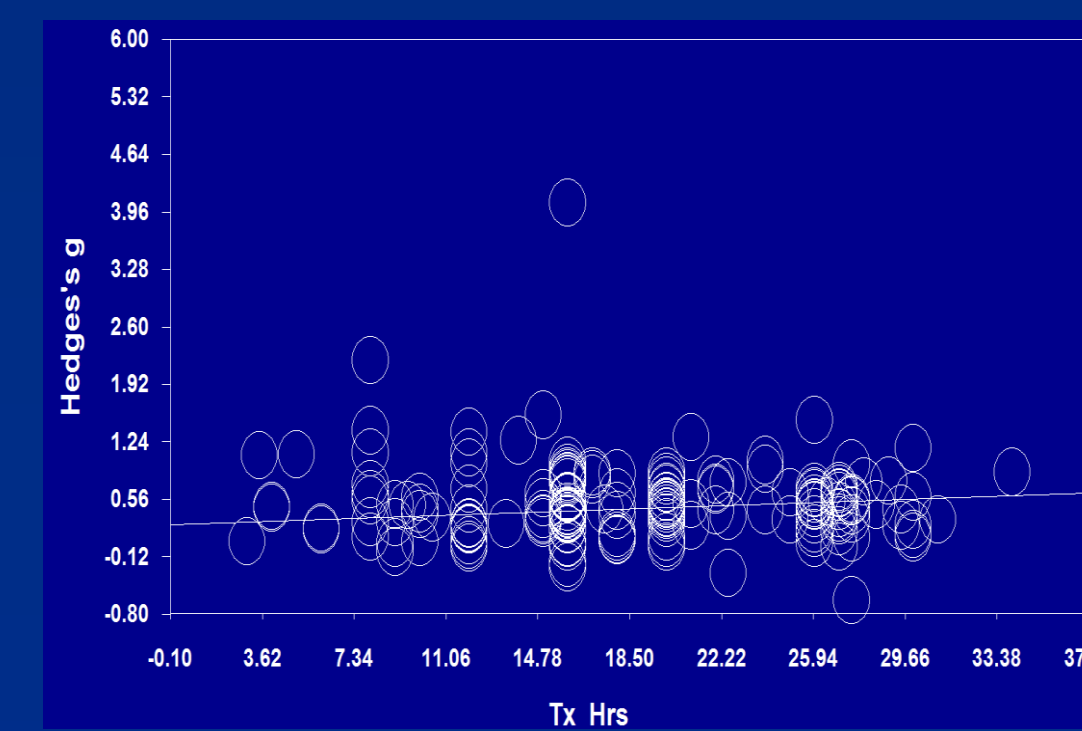
Graph showing that the average effect size of clinical outcomes is positively moderated by the duration of the treatment in hours at the end of treatment (n = 182), (β = .01, SE = .0015, p < .00001)
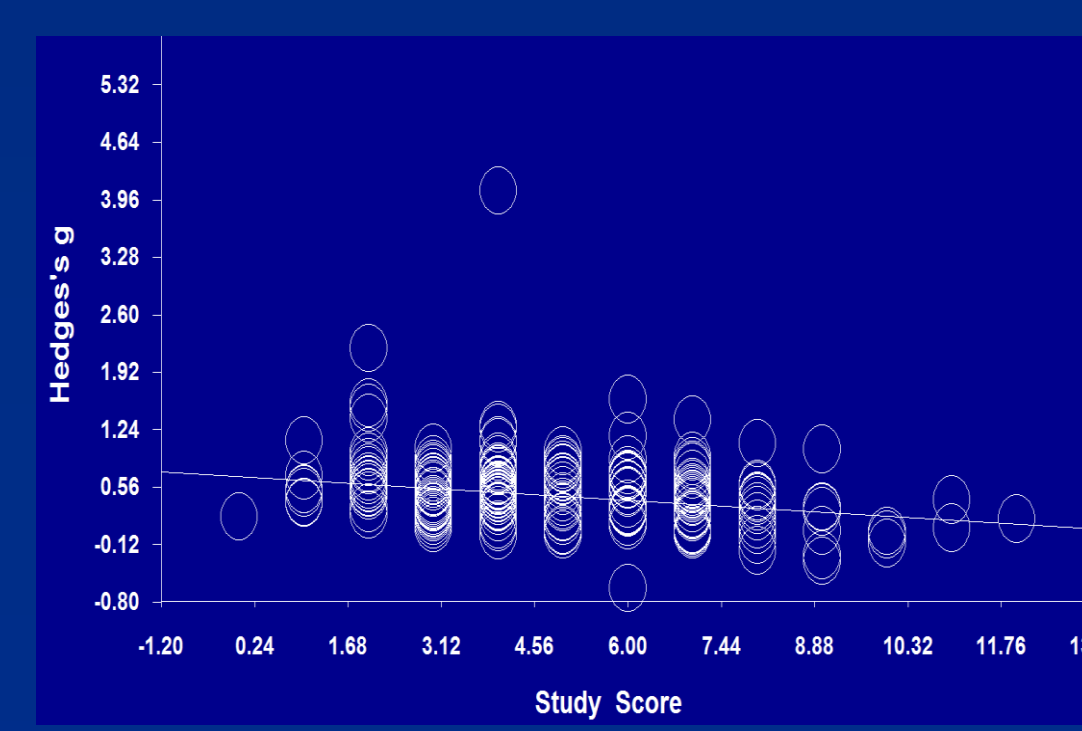
Graph showing that the average effect size of clinical outcomes is negatively moderated by the study quality score at the end of treatment (n = 207), (β = -.05, SE = .004, p < .00001)

Conclusion

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 other active treatments (including psychoeducation, supportive therapy, relaxation, and imagery), the effect sizes were small to moderate, suggesting the superiority of MBT. However, MBT was not more effective than 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.

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.

Mindfulness training of the therapist(s) but not their clinical training moderated clinical outcomes at the end of the treatment suggesting that therapists' experience with mindfulness might have a direct or an indirect effect on the clinical outcomes of the participants.

In contrast with previous meta-analyses of MBT, our results showed that the study quality score negatively moderated the efficacy of MBT, pointing to expectancy and other biases.

In summary, 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 the therapists are both strong predictors of effective MBT.

References

-Beck, A. T., & Streer, R. A. (1987). *Beck Depresion Inventory manual.* San Antonio, TX: Psychological Corporation.

- Beck, A. T., & Streer, R. A. (1993). *Beck Anxiety Inventory manual.* San Antonio, TX: Psychological Corporation.

- Baer, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice, 10*(2), 125-143.

- Borenstein, M., Hedges, L., Higgins, J., & Rothstein, H. (2009). *Introduction to Meta-analysis.* Chichester, West Sussex: John Wiley & Sons.

-Grossman, P., Niemann, L., Schmidt, S., & Walach, H. (2004). Mindfulness-based stress reduction and health benefits: A meta-analysis. *Journal of Psychosomatic Research, 57*(1), 35-43

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

-Jadad, A. R., Moore, R. A., Carroll, D., Jenkinson, C., Reynolds, D. J., Gavaghan, D. J., & McQuay, H. J. (1996). Assessing the quality of reports of randomized clinical trials: is blinding necessary? *Controlled Clinical Trials, 17*(1), 1-12.

-Kabat-Zinn, J. (1982). An outpatient program in behavioral medecine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*, 33-47.

-Ledesma, D., & Kumano, H. (2009). Mindfulness-based stress reduction and cancer: a meta-analysis. *Psycho-oncology, 18*(6), 571-579.

-Rosenthal, R. (1993). *Meta-analytic procedures for social research.* Newbury Park: CA: Sage.

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

-Wampold, B., Minami, T., Baskin, T., & Tierney, S. (2002). A meta-(re)analysis of the effects of cognitive therapy versus 'other therapies' for depression. *Journal of Affective Disorders, 68*(2-3), 159-165.