



King's Research Portal

DOI:

[10.1016/j.brat.2017.10.005](https://doi.org/10.1016/j.brat.2017.10.005)

Document Version

Peer reviewed version

[Link to publication record in King's Research Portal](#)

Citation for published version (APA):

Winnebeck, E., Fissler, M., Gärtner, M., Chadwick, P., & Barnhofer, T. (2017). Brief training in mindfulness meditation reduces symptoms in patients with a chronic or recurrent lifetime history of depression: A randomized controlled study. *Behaviour Research and Therapy*, 99, 124-130. Advance online publication. <https://doi.org/10.1016/j.brat.2017.10.005>

Citing this paper

Please note that where the full-text provided on King's Research Portal is the Author Accepted Manuscript or Post-Print version this may differ from the final Published version. If citing, it is advised that you check and use the publisher's definitive version for pagination, volume/issue, and date of publication details. And where the final published version is provided on the Research Portal, if citing you are again advised to check the publisher's website for any subsequent corrections.

General rights

Copyright and moral rights for the publications made accessible in the Research Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognize and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the Research Portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the Research Portal

Take down policy

If you believe that this document breaches copyright please contact librarypure@kcl.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.

Accepted Manuscript

Brief training in mindfulness meditation reduces symptoms in patients with a chronic or recurrent lifetime history of depression: A randomized controlled study

Emilia Winnebeck, Maria Fissler, Matti Gärtner, Paul Chadwick, Thorsten Barnhofer



PII: S0005-7967(17)30209-7

DOI: [10.1016/j.brat.2017.10.005](https://doi.org/10.1016/j.brat.2017.10.005)

Reference: BRT 3206

To appear in: *Behaviour Research and Therapy*

Received Date: 5 June 2017

Revised Date: 4 October 2017

Accepted Date: 9 October 2017

Please cite this article as: Winnebeck, E., Fissler, M., Gärtner, M., Chadwick, P., Barnhofer, T., Brief training in mindfulness meditation reduces symptoms in patients with a chronic or recurrent lifetime history of depression: A randomized controlled study, *Behaviour Research and Therapy* (2017), doi: 10.1016/j.brat.2017.10.005.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Running head: MINDFULNESS TRAINING IN DEPRESSION

Brief Training in Mindfulness Meditation Reduces Symptoms in Patients with a Chronic or
Recurrent Lifetime History of Depression: A Randomized Controlled Study

Emilia Winnebeck, Maria Fissler, Matti Gärtner

Freie Universität Berlin

Paul Chadwick

King's College London

Thorsten Barnhofer

Freie Universität Berlin

Author Note

Maria Fissler, Emilia Winnebeck, Matti Gärtner, Thorsten Barnhofer, Freie
Universität Berlin, Dahlem Center for Neuroimaging of Emotions, Habelschwerdter Allee 45,
14195 Berlin, Germany; Paul Chadwick, King's College London, Institute of Psychiatry,
Psychology & Neuroscience, Department of Psychology, Box PO 77, Henry Wellcome
Building, De Crespigny Park, Denmark Hill, London SE5 8AF.

Thorsten Barnhofer is now at the University of Exeter, Sir Henry Wellcome Building
for Mood Disorders Research, Perry Road, Exeter, UK EX4 4QG. Julia M. Huntenburg is
now at the Max-Planck Institute for Human Cognitive and Brain Sciences, Max-Planck
Research Group for Neuroanatomy and Connectivity, Stephanstrasse 1a, 04103 Leipzig,

Germany. Matti Gärtner is now at Charité University Medicine Berlin, Clinic for Psychiatry and Psychotherapy, Hindenburgdamm 30, 12203 Berlin.

This research was funded by German Research Foundation Grant BA2255 3-1, awarded to Thorsten Barnhofer. Thorsten Barnhofer is supported by a Heisenberg Fellowship from the German Research Foundation (BA2255 2-1). The funders had no role in study design; in the collection, analysis and interpretation of data; in the writing of the report; and in the decision to submit the article. We thank our participants for giving their time to take part in the study. The study is registered at ClinicalTrials.gov (NCT02801513).

The authors are grateful to Marie Gummersbach, Titus Schröter, and Julia M. Huntenburg for their help with the recruitment of participants and the conducting of assessments.

Correspondence concerning this article should be addressed to Thorsten Barnhofer, University of Exeter, Mood Disorders Centre, Sir Henry Wellcome Building for Mood Disorders Research, Perry Road, Exeter, UK EX4 4QG. Email: t.barnhofer@exeter.ac.uk.

Abstract

Background: Training in mindfulness has been introduced to the treatment of depression as a means of relapse prevention. However, given its buffering effects on maladaptive responses to negative mood, mindfulness training would be expected to be particularly helpful in those who are currently suffering from symptoms. This study investigated whether a brief and targeted mindfulness-based intervention can reduce symptoms in acutely depressed patients.

Methods: Seventy-four patients with a chronic or recurrent lifetime history were randomly allocated to receive either a brief mindfulness-based intervention (MBI) encompassing three individual sessions and regular home practice or a control condition that combined psycho-educational components and regular rest periods using the same format as the MBI. Self-reported severity of symptoms, mindfulness in every day life, ruminative tendencies and cognitive reactivity were assessed before and after intervention.

Results: Treatment completers in the MBI condition showed pronounced and significantly stronger reductions in symptoms than those in the control condition. In the MBI group only, patients showed significant increases in mindfulness, and significant reductions in ruminative tendencies and cognitive reactivity.

Conclusions: Brief targeted mindfulness interventions can help to reduce symptoms and buffer maladaptive responses to negative mood in acutely depressed patients with chronic or recurrent lifetime history.

Keywords: Mindfulness, depression, rumination, cognitive reactivity, mediation

Brief Training in Mindfulness Meditation Reduces Symptoms in Patients with a Chronic or Recurrent Lifetime History of Depression: A Randomized Controlled Study

Training in mindfulness meditation was originally introduced to the treatment of depression as a means of preventing relapse in highly vulnerable patients. While it was initially suggested that patients had to be in full remission in order to be able to engage beneficially with the practice, it has now become obvious that preventative effects are negligible in those who are in full recovery (Segal et al., 2010). In fact, a recent meta-analysis suggests that preventative effects increase with levels of residual symptoms (Kuyken et al., 2016), and there is now accumulating evidence that Mindfulness-Based Cognitive Therapy (MBCT), a complex intervention for relapse prevention combining training in mindfulness and elements from cognitive therapy (Segal, Williams, & Teasdale, 2013), can have significant effects in patients with diagnostic levels of depression, in particular in those with chronic and treatment-resistant courses (Barnhofer et al., 2009; Eisendrath et al., 2016; Eisendrath et al., 2008; Finucane & Mercer, 2006; Kenny & Williams, 2007; Strauss, Hayward, & Chadwick, 2012; Sundquist et al., 2015; Van Aalderen, Donders, Peffer, & Speckens, 2015).

While the use of mindfulness training for the purpose of relapse prevention relies on the gradual building of mental skills to help patients respond more adaptively at times of potential relapse, use of mindfulness training in acute depression emphasises the stress-buffering effects of a mindful stance in the face of negative mood and distress— an approach that is consistent with the original use of Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990) in patients with chronic pain and other conditions with acute distress (Kabat-Zinn, 2003). Such effects are assumed to arise through adoption of a meta-cognitive or ‘decentered’ perspective that serves to reduce reactivity to stress/negative mood and to mitigate stress/negative mood appraisals (Creswell & Lindsay, 2017). From a stress-buffering perspective (Creswell & Lindsay, 2014), beneficial effects of mindfulness training are likely

to increase with levels of stress or vulnerability. Training in mindfulness may thus not only serve as a transformative practice reducing vulnerability in the longer term, but may have beneficial applications in addressing acute symptoms and distress, countering processes that maintain symptoms particularly in patients in whom tendencies to engage in maladaptive ways of coping have become highly automatic and habitual.

Importantly, if patients are effectively trained in the strategic use of a mindful stance, such effects may arise already after relatively short periods of training (Huffziger & Kühner, 2009; Singer & Dobson, 2007). In line with this, there is now a considerable number of studies that have demonstrated beneficial effects of brief mindfulness-based interventions (Menezes & Bizarro, 2015; Tang, Lu, Feng, Tang, & Posner, 2015; Tang, Tang, Tang, & Lewis-Peacock, 2017; Tang et al., 2007; Tang et al. 2010; Xue, Tang, Tang, & Posner, 2014; Zeidan, Johnson, Diamond, David, & Goolkasian, 2010). Yet, many of these studies were aimed at investigating mechanisms and principles in non-clinical or analogue samples. The aim of the current study was to further extend this research to the clinical domain, namely the treatment of chronic and recurrent courses of depression, in order to inform a broader clinical use of mindfulness techniques in the treatment of depression.

For this purpose, we investigated the effects of a brief targeted mindfulness-based intervention (MBI) that consisted of three individual sessions to support intensive guided home practice over a period of two weeks. The intervention combined training of the capacity to regulate attention and relate to experience from a decentered perspective with the cultivation of openness and acceptance while providing participants with a detailed rationale for the use of these practices in the context of current depression. Emphasising the importance of intensive and regular practice (Crane et al., 2014), but taking into account limitations for engagement due to current symptoms, the training entailed intensive home practice using guided meditations shorter than the standard practices of MBIs but administered at greater frequency. We compared this program to the effects of a control condition that used psycho-

education and asked participants to take regular rest periods and disengage from maladaptive thinking, but did not provide any training in techniques to facilitate such decentering.

We hypothesized that the mindfulness-based intervention would lead to significantly stronger reductions in severity of depressive symptoms than the control condition (primary outcome). Furthermore, we expected participants in the mindfulness training to show significantly stronger increases in their mindfulness skills and significantly stronger decreases in their tendencies to engage in maladaptive repetitive patterns of thinking and their cognitive reactivity to negative mood than participants in the control condition (secondary outcomes).

Method

Participants

Depressed patients were recruited through advertisement in newspapers, in public transport, and on the internet. Inclusion criteria at initial assessment were a) a current diagnosis of Major Depression as assessed by Structured Clinical Interview for DSM IV (First, Spitzer, Gibbon, & Williams, 2002), b) a chronic or recurrent lifetime history of depression, with onset before age 19 and either chronic persistence of symptoms or a history of at least three previous episodes of depression, two of which needed to have occurred during the last two years, c) self-reported severity of current symptoms on a clinical level as indicated by Beck Depression Inventory-II (Beck, Steer, & Brown, 1996) scores above 19, d) age 25 to 60 thus excluding cases of late life depression given that such cases might differ in etiology, and e) fluency in spoken and written German. Exclusion criteria were a) history of psychosis or mania, current eating disorder, OCD, current self-harm, current substance abuse or dependence, b) history of traumatic brain injury and c) current treatment with CBT. We allowed patients who were currently taking antidepressants into the study provided that the medication had not been changed during the last four weeks before entry into the study.

Design

Patients were randomly allocated to receive either the mindfulness-based intervention or the control training and were assessed one week before the start of the intervention and one week after the end of the two-week intervention.

Measures

Structured Clinical Interview for DSM-IV-TR (SCID; First et al., 2002). The Research Version of the Structured Clinical Interview for DSM-IV-TR Axis I Disorders was used to assess current and past diagnostic status at pre-treatment and current diagnostic status at post-treatment. Note that the time frame for the post-assessment, two weeks, partly overlapped with the intervention period.

Beck Depression Inventory-II (BDI-II, Beck, Steer, & Brown, 1996, German translation: Hautzinger, Keller, & Kuehner, 2009). Self-reported severity of depressive symptoms was assessed using the Beck Depression Inventory-II (BDI-II, Beck, Steer, & Brown, 1996), a widely used self-report measure, which consists of 21 groups of statements, referring to the presence of symptoms of depression. For the purposes of the current study, participants were asked to answer questions with reference to the past week. Internal consistency in the current sample was $\alpha = .77$ at pre-treatment and $\alpha = .89$ at post-treatment.

Ruminative Response Style Questionnaire – Brooding Subscale (RRSQ-B, Treynor, Gonzalez, & Nolen-Hoeksema, 2003). The brooding subscale of the RRSQ consists of five items that capture moody pondering and self-criticism, covering maladaptive aspects of ruminative thinking unconfounded with depressive symptoms (Treynor et al., 2003). Huffziger and Kühner (2012) report good internal consistency and retest reliability of the German translation of the scale. Internal consistency of the brooding sub-scale in the current sample was $\alpha = .86$ at pre-treatment and $\alpha = .82$ at post-treatment.

Five Facet Mindfulness Questionnaire (FFMQ, Baer, Smith, Hopkins, Krietemeyer, & Toney, 2006). The FFMQ consists of 39 items that measure levels of dispositional mindfulness in everyday life across five facets: observing (“I notice smells and

aromas of things”), describing (“I’m good at finding words to describe my feelings”), acting with awareness (“I find myself doing things without paying attention”), non-judging of inner experience (“I disapprove of myself when I have illogical ideas”) and non-reactivity to inner experience (“When I have distressing thoughts or images, I don’t let myself be carried away by them”). Michalak et al. (2016) report good psychometric properties of the German version of the FFMQ. The internal consistency of the total scale in our sample was $\alpha = .92$ at pre-treatment and $\alpha = .92$ at post-treatment. Internal consistencies of the subscales at pre-treatment and post-treatment were $\alpha = .71$ and $\alpha = .72$ for the Observing subscale, $\alpha = .91$ and $\alpha = .92$ for the Describing subscale, $\alpha = .83$ and $\alpha = .86$ for the Acting with Awareness subscale, $\alpha = .90$ and $\alpha = .91$ for the Non-Judging of Inner Experience subscale, and $\alpha = .80$ and $\alpha = .88$ for the Non-Reactivity to Inner Experience subscale.

The Leiden Index of Depression Sensitivity-Revised (LEIDS-R; Van der Does, 2002). The Leiden Index of Depression Sensitivity (LEIDS-R; Van der Does, 2002; Williams, Van der Does, Barnhofer, Crane, & Segal, 2008) is a self-report measure of cognitive reactivity to sad mood. It consists of 34 items that are aimed at assessing tendencies to engage in maladaptive (four subscales: hopelessness, aggression, control/perfectionism, harm avoidance, and rumination) or adaptive (one subscale: acceptance/coping) thinking in response to low mood. Previous research has demonstrated correlations with task-based assessments of cognitive reactivity (Williams et al., 2008). For the current purposes, we used a total score of the maladaptive subscales. As the adaptive acceptance/coping scale does not map directly onto the understanding of acceptance underlying MBIs and is quite heterogeneous in nature, we decided not to include this scale in our analyses. Internal consistency of the total score for maladaptive reactivity was $\alpha = .92$ at pre-treatment and $\alpha = .90$ at post-treatment.

Interventions

Both interventions were delivered in a series of two 1.5-hour weekly individual sessions plus a third 50-minute follow-up session, delivered in therapy rooms by one of three trained clinical psychologists, and included intensive daily home practice. Each of the therapy sessions was discussed in supervision meetings with the principal investigator that were held on a regular basis. Participants of both groups received a 60-page booklet that described in detail the practices for each day along with their rationale and related psycho-educational material. Furthermore, all participants received an mp3-player with audio-tracks for the home practice: meditations for the MBI group and ambient music for the control group. Participants were asked to record their practice in protocol sheets.

In both groups, the sessions followed a set and manualized structure. We matched the time spent on instructions and practice between the MBI and the control group so that they only varied in contents. During the first session, the therapist introduced the rationale of the specific treatment, described relevant aspects of it, and familiarized the participant with the main practices for the coming week. The second session started with a review of experiences from the first week. The therapist addressed any questions and difficulties with the practices that had arisen during the previous week, and then introduced the main practices for the second week and their rationale. The third session served to debrief participants and to help them establish ways of continuing the practices on their own following the end of the study should they wish to do so, including identification of feasible amounts and patterns of practice.

Participants were encouraged to continue any current medication over the treatment phase without making changes. All participants agreed not to start any other kind of treatment (i.e. psychotherapy) within the duration of the study. In order to assess credibility and expectancy, we asked participants to rate, on a scale from 0 (not at all) to 9 (very much), how strongly they would recommend the treatment to a friend and how much they believed the treatment would help them.

Mindfulness-Based Intervention (MBI). Participants in the meditation training were asked to engage in formal meditation practice for about 25 minutes twice per day on each day of the week using recorded guided meditations, the rationale for which was described in the therapy sessions and the respective sections of the handouts. Practices were shorter in duration than the practices in standard mindfulness-based interventions such as MBCT, and did not include prolonged periods of silence (no longer than 3 min), in order to allow for more flexibility in scheduling the practices and to reduce demands on cognitive resources, but followed a similar sequence leading from body scan meditation and mindful movement to sitting meditations focusing on the breath, body sensations, sounds, thoughts, and open awareness, to practices that were more specifically focused on relating to difficult experiences with openness and acceptance. As important steps of the guidance were conveyed through the booklet, the practices evolved in smaller, more frequent steps building on each other than is common in standard MBIs. In addition to formal meditation practices, participants were asked to engage in shorter informal practices, such as breathing spaces, that served to generalize a mindful stance to activities in daily life.

Psycho-Education and Resting. The psycho-educational rationale of the control condition was based on a diathesis-stress model linking depression to the interplay of predispositional vulnerabilities and current stress. Psycho-educational components included information about the signs of depression, its causes, the influence of genetic and environmental factors, in particular stress and its expression in the way we think, and the need to balance stress by deliberately taking time to rest. Based on this rationale, participants were instructed to rest, relax, and disengage from negative thinking as an initial and preliminary step towards recovery. Participants were asked to schedule regular rest periods. Length and frequency of the rest periods mirrored the time demands of the meditation training. Participants received audio files with ambient music that they were free to use should they feel that the music might facilitate rest, relaxation, and disengagement from negative thinking.

After the first week of the intervention, participants' experiences with the practices were reviewed and participants were guided in establishing habits to support further practice.

Participants recorded adherence to the daily practice on protocol sheets over the time of the intervention.

Procedure

Potential participants were screened over the phone by the recruitment team for the main inclusion and exclusion criteria. Those likely to meet eligibility were invited to an initial assessment session with blinded assessors to complete the Structured Clinical Interview for DSM-IV and the self-report questionnaires. Participants who met inclusion criteria continued this session to fill in self-report questionnaires and then took part in EEG and imaging assessments, which determined sample size and are reported elsewhere (Fissler et al., in submission). Following the pre-treatment assessment, the study manager randomly allocated depressed participants to receive either the mindfulness training or the control training. One week after the end of the two-week intervention period, participants took part in the post-treatment assessment session, which followed the same sequence as the pre-treatment session. After the end of the study, all participants of the control group were offered the opportunity to receive the mindfulness training. Participants were recruited over a period of 12 months.

Randomization was conducted following a simple randomization protocol using a computer generated randomization sequence (permuted blocked randomization with blocks of size 4), generated by a researcher outside of the research group, and sealed envelopes that remained concealed until assignment to the groups.

The study protocol for the trial was approved by the ethics committee of the Charité University Medicine Berlin, Campus Mitte (EA4/055/13). All participants provided written consent prior to any research activity.

Results

Participants

The flow of participants through the study is depicted in Figure 1. Of the $n = 602$ people who had contacted the research team in response to advertisements searching for depressed participants, 545 participants were assessed for eligibility in telephone interviews, while 57 people could not be reached for interviews. 460 of the 545 people interviewed did not participate further after the telephone interview, because they a) did not meet the inclusion criteria ($n = 441$) or b) declined to participate or didn't show up for their appointment ($n = 19$). Eighty-five participants were assessed for their eligibility via personal interviews in the Freie Universität Berlin, of which 11 participants were excluded for not meeting the inclusion criteria. This left a sample of 74 participants to be randomized into the study, of which $n = 38$ were allocated to the mindfulness intervention and $n = 36$ were allocated to the control condition. Of those who had been randomized, two participants of the mindfulness group and four of the control group dropped out after the first session and before the post-treatment assessments. Full data sets were, therefore, available for $n = 36$ participants allocated to MBI and $n = 32$ participant allocated to the control group. These group sizes allowed detection of a minimal difference of 5 points on the BDI-II with 90% power at an α -level of .05.

Sociodemographic and clinical characteristics

The two groups did not differ in age, MBI: $M = 42.3$, $SD = 12.4$, control: $M = 40.7$, $SD = 12.2$; $F(1, 66) = .29$, $p = .59$, or gender distribution, MBI: n (female) = 22 (61 %), control: n (female) = 19 (59 %); $\chi^2(1) = .02$, $p = .88$, nor were there significant differences in age of onset, MBI: $M = 18.3$, $SD = 8.2$, control: $M = 17.0$, $SD = 10.8$; $F(1, 66) = .30$, $p = .58$, number of previous episodes, MBI: $Med = 6.5$, range = [1, 14], control: $Med = 6.0$, range = [2, 35]; Independent samples median test $p = .98$, or use of antidepressants, MBI: $n = 9$ (25%), control: $n = 11$ (35%); $\chi^2(1) = .87$, $p = .42$. There were also no significant group differences in the number of those with comorbid anxiety disorders, MBI: $n = 17$ (47%), control: $n = 14$ (43%); $\chi^2(1) = .08$, $p = .77$, or a comorbid somatoform disorder, MBI: $n = 2$ (6%), control: $n = 4$ (12%); $\chi^2(1) = 1.01$, $p = .41$.

Adherence to Home Practice and Treatment Credibility

Patients in the mindfulness condition reported a rate of adherence to formal practice of $M = 93.43\%$, $SD = 10.10$, range = [64, 100]. Rate of adherence to rest periods in the control condition was similarly high, $M = 92.74\%$, $SD = 8.06$, range = [68, 100]. Patients in the mindfulness condition reported a significantly stronger belief that the intervention would be helpful for them and would have recommended them more strongly to a friend.

Pre- to Post-Treatment Changes

Means and standard deviations of BDI-II, SCID-I symptom scores, FFMQ, RSQ Brooding, and LEIDS-R scores at pre- and post-treatment assessment are listed in Table 1. Pre- to post-treatment changes were analysed using a series of repeated measures ANOVAs. Analysis of BDI-II scores yielded a significant main effect of time, $F(1, 66) = 148.1$, $p = .000$, $\eta^2 = .69$, that was qualified by a significant time by treatment interaction, $F(1, 66) = 13.7$, $p = .000$, $\eta^2 = .17$. Pairwise comparisons indicated significant reductions in symptoms in both groups, MBI: $M_{i-j} = -17.41$, $SE = 1.50$, $p = .000$, control: $M_{i-j} = -9.30$, $SE = 1.59$, $p = .000$, with changes more pronounced in the MBI than the control group. Post-treatment levels of symptoms differed significantly between the two groups, $M_{i-j} = 9.54$, $SE = 1.84$, $p = .000$, while there had been no significant difference at pre-treatment, $M_{i-j} = 1.42$, $SE = 1.69$, $p = .40$. Results remained virtually unchanged when treatment expectancy and credibility ratings were entered into the analysis. Pre-treatment BDI-II scores were significantly correlated with level of treatment response, $r = -.68$, $p = .000$, in the mindfulness group, and $r = -.46$, $p = .008$, in the control group, i.e. the higher the pre-treatment BDI-II scores, the stronger the response to treatment in terms of change in BDI-II scores.

Analysis of SCID-I symptom scores yielded a significant main effect, $F(1, 66) = 287.4$, $p = .000$, $\eta^2 = .81$, and a significant time by treatment interaction, $F(1, 66) = 58.9$, $p = .000$, $\eta^2 = .47$. As in the analysis of self-reports, observer-rated symptoms showed significant reductions in both groups, with changes more pronounced in the mindfulness group, $M_{i-j} = -$

6.05, $SE = .33$, $p = .000$, than in the control group, $M_{i-j} = -2.28$, $SE = .35$, $p = .000$. There was a significant difference in levels of symptoms between the groups at post-treatment assessment, $M_{i-j} = 3.86$, $SE = .36$, $p = .000$, but not at pre-treatment assessment, $M_{i-j} = .08$, $SE = .33$, $p = .79$. Results remained virtually unchanged when treatment expectancy and credibility ratings were entered into the analysis. Pre-treatment SCID-I symptom scores were significantly correlated with level of treatment response, $r = -.70$, $p = .000$, i.e. the higher the pre-treatment SCID-I symptom score, the stronger the response to treatment in terms of change in SCID-I symptom scores.

Similar patterns emerged from analyses of changes in FFMQ, RSQ brooding and LEIDS-R scores. Analysis of FFMQ total scores showed a main effect of time, $F(1, 66) = 45.1$, $p = .000$, $\eta^2 = .40$, that was qualified by a significant time by treatment interaction, $F(1, 66) = 21.7$, $p = .000$, $\eta^2 = .24$, due to increases in mindfulness in the MBI group, $M_{i-j} = 20.45$, $SE = 2.46$, $p = .000$, while levels of mindfulness did not change significantly in the control group, $M_{i-j} = 3.68$, $SE = 2.61$, $p = .16$. Results from analyses of the FFMQ subscales followed the same pattern with the exception of the Describing scale: for the Observe scale, there was a significant main effect of time, $F(1, 66) = 11.9$, $p = .001$, $\eta^2 = .15$, that was qualified by a significant time by treatment interaction, $F(1, 66) = 5.3$, $p = .024$, $\eta^2 = .07$, due to increases in the ability to observe in the MBI group, $M_{i-j} = 3.01$, $SE = .71$, $p = .000$, while levels of this ability did not change significantly in the control group, $M_{i-j} = .59$, $SE = .76$, $p = .43$; for the Describe scale, there was a significant main effect of time, $F(1, 66) = 11.1$, $p = .001$, $\eta^2 = .14$, but no significant time by treatment interaction, $F(1, 66) = .1$, $p = .750$, $\eta^2 = .002$, due to similar increases in the ability to describe experience across both groups, $M_{i-j} = 1.52$, $SE = .45$, $p = .001$; for the Acting with Awareness subscale, there was a significant main effect of time, $F(1, 66) = 20.4$, $p = .000$, $\eta^2 = .23$, that was qualified by a significant time by treatment interaction, $F(1, 66) = 14.7$, $p = .000$, $\eta^2 = .18$, due to increases in the ability to act with awareness in the MBI group, $M_{i-j} = 5.02$, $SE = .82$, $p = .000$, while levels of the ability to act

with awareness did not change significantly in the control group, $M_{i-j} = .40$, $SE = .87$, $p = .64$; for the Non-Judging of Inner Experience subscale, there was a significant main effect of time, $F(1, 66) = 19.9$, $p = .000$, $\eta^2 = .23$, that was qualified by a significant time by treatment interaction, $F(1, 66) = 10.6$, $p = .002$, $\eta^2 = .13$, due to increases in the ability not to judge inner experience in the MBI group, $M_{i-j} = 5.59$, $SE = .99$, $p = .000$, while levels of the ability not to judge inner experience did not change significantly in the control group, $M_{i-j} = .87$, $SE = 1.05$, $p = .40$; for the Non-reactivity to Inner Experience subscale, there was a significant main effect of time, $F(1, 66) = 29.7$, $p = .000$, $\eta^2 = .31$, that was qualified by a significant time by treatment interaction, $F(1, 66) = 21.1$, $p = .000$, $\eta^2 = .24$, due to increases in non-reactivity in the MBI group, $M_{i-j} = 5.15$, $SE = .70$, $p = .000$, while levels of non-reactivity did not change significantly in the control group, $M_{i-j} = .43$, $SE = .74$, $p = .55$. Analysis of changes in RSQ brooding showed a main effect of time, $F(1) = 7.91$, $p = .006$, $\eta^2 = .10$, qualified by a significant time by treatment interaction, $F(1) = 11.68$, $p = .001$, $\eta^2 = .15$, due to significant decreases in the MBI group, $M_{i-j} = -2.02$, $SE = .44$, $p = .000$, while there were no significant changes in the control group, $M_{i-j} = -.19$, $SE = .47$, $p = .68$. Analysis of LEIDS-R scores also yielded a significant main effect, $F(1) = 8.42$, $p = .005$, $\eta^2 = .11$, while the treatment by group interaction was marginally significant, $F(1) = 3.60$, $p = .06$, $\eta^2 = .05$, with pairwise comparisons showing significant reductions in the mindfulness group, $M_{i-j} = -7.10$, $SE = 2.03$, $p = .001$, while there was no significant change in the control group, $M_{i-j} = -1.48$, $SE = 2.15$, $p = .49$.

Within the MBI group, pre- to post changes in BDI-II scores were significantly correlated with changes in FFMQ subscales, $r = -.48$, $p = .003$ (correlations with FFMQ subscales were $r = -.38$, $p = .022$, for Observe, $r = -.28$, $p = .100$, for Describe, $r = -.44$, $p = .007$, for Acting with Awareness, $r = -.26$, $p = .122$, for Non-Judging of Inner Experience, $r = -.29$, $p = .085$ for Non-Reactivity to Inner Experience), while the relation with changes in

RSQ-Brooding was not significant, $r = .31$, $p = .065$. The relation with changes on the LEIDS did not reach significance, $r = .21$, $p = .22$.

There were no adverse events.

Discussion

The current findings show that brief mindfulness training can have significant beneficial effects in acutely depressed patients with a chronic or recurrent lifetime history. In line with our hypothesis, patients who received the MBI reported significantly stronger reductions in severity of depressive symptoms than patients in the control condition. This result is consistent with a growing body of research that indicates good effects of standard MBIs in patients with acute depression (Barnhofer et al., 2009; Eisendrath et al., 2016; Eisendrath et al., 2008; Finucane & Mercer, 2006; Kenny & Williams, 2007; Strauss et al., 2012; Sundquist et al., 2015; Van Aalderen et al., 2015), particularly in those with a chronic or treatment-resistant course. By demonstrating effects of a brief intervention in patients with a recurrent or chronic course of the disorder, the current study extends previous findings from experimental research showing that induction of a mindful mode of processing can have immediate beneficial effects on mood in currently depressed patients (Huffziger & Kühner, 2009) or patients who are currently in remission (Singer & Dobson, 2007).

Given the role of maladaptive responses to negative mood in maintaining symptoms of depression, use of mindfulness training and techniques in patients with acute depression builds on a straightforward rationale. The stress buffering account by Lindsay and Creswell (2014) posits that mindfulness is likely to exert its beneficial effects by reducing stress-reactivity and mitigating stress appraisals. Our findings are in line with this view and point towards analogue mechanisms of action in response to the distress of acute depression. The training reduced cognitive reactivity and engagement in maladaptive ruminative thinking suggesting that it helped participants to become better able to regulate responses to negative mood, while increases in mindfulness skills indicate an increased capacity to observe and

describe experience, act with awareness and relate to experience in a non-judgmental and non-reactive way, potentially supporting more adaptive stress/negative mood appraisals.

Furthermore, the results of the study seem broadly consistent with the suggestion that mindfulness training may be particularly helpful in groups with increased levels of stress and vulnerability, a view that is in line with current findings on the effects of MBCT for relapse prevention where trials have commonly demonstrated moderation of outcome by levels of vulnerability (Kuyken et al., 2015; Williams et al., 2014). Rather than precluding the use of mindfulness training, acute and chronic symptoms might thus actually represent an important indication. Further research will have to test this assumption over a broader spectrum of severity. It is possible that acceptability of the approach might reach a tipping point at very high levels of symptom severity or vulnerability, although there was no indication for this in our data as pre-treatment levels of symptoms were linearly related to treatment response. In order to address potential difficulties with engagement, delivery of the training will likely have to be adapted for patients with acute symptoms, as was the case here. For the current purpose, we used guided meditations that were shorter than the standard meditations of MBIs and that did not include prolonged periods of silence in order to reduce likelihood of patients engaging in persistent maladaptive thinking, a strategy that has previously been used in mindfulness interventions for patients with psychosis (Chadwick et al., 2016) and is consistent with findings indicating a relation between frequency of practice and the development of 'decentering' skills (Soler et al., 2014). Self-reported rate of adherence to meditation practices was high throughout and above levels commonly reported from standard MBIs (see for example Crane et al., 2014), indicating that training in mindfulness as delivered in our intervention is feasible and acceptable for patients with current symptoms.

The current study has several limitations that need to be taken into account when interpreting the findings. These include its reliance on self-report, and therefore propensity for reporting bias, and the small sample size. Medication use during the study period and

compliance with instructions to refrain from making changes to the existing medication regime were not monitored. Therapist adherence to the protocol was not formally assessed. The emphasis of this study was deliberately on investigating only immediate effects; future research is needed to assess in how far improvements can be sustained, a key priority in chronic depression. The treatments differed in how credible they were judged to be by participants, although differences in expectancy did not explain the effects on symptoms reduction. Furthermore, we did not compare mindfulness against other established treatment strategies for acute depression. In fact, effects of mindfulness training in this context are unlikely to be superior to those of cognitive or behavioral interventions (Sundquist et al., 2017), yet due to its training character and portability mindfulness training may provide a particularly helpful approach in situations where therapist contact is reduced and wide reach is an important consideration. Given the assumption that the use of mental training might be particularly helpful in patients in whom maladaptive patterns of thinking have become highly automatic and habitual, this study focused on patients with long lifetime histories of depression as indicated by a chronic or recurrent course and early onset. Further research will have to test whether results generalize to the broader population of depressed patients. This study focused on more chronic forms of depression given encouraging preliminary results for the use of mindfulness in the treatment of chronic depression from our previous research (Barnhofer et al., 2009) and observations that preventative effects of the training are more pronounced in those with recurrent histories (Kuyken et al., 2016).

Altogether, the current findings support the use of mindfulness training to reduce symptoms in patients with acute and chronic depression, suggesting a need to broaden our perspective on its indications and to rethink the current emphasis on the use of mindfulness training mainly for purposes of relapse prevention.

References

Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report

- assessment methods to explore facets of mindfulness. *Assessment*, *13*(1), 27–45.
<http://doi.org/10.1177/1073191105283504>
- Barnhofer, T., Crane, C., Hargus, E., Amarasinghe, M., Winder, R., & Williams, J. M. G. (2009). Mindfulness-based cognitive therapy as a treatment for chronic depression: a preliminary study. *Behaviour Research and Therapy*, *47*(5), 366–73.
<http://doi.org/10.1016/j.brat.2009.01.019>
- Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. San Antonio, TX: Psychological Corporation.
- Chadwick, P., Strauss, C., Jones, A.-M., Kingdon, D., Ellett, L., Dannahy, L., & Hayward, M. (2016). Group mindfulness-based intervention for distressing voices: A pragmatic randomised controlled trial. *Schizophrenia Research*, *175*(1–3).
<http://doi.org/10.1016/j.schres.2016.04.001>
- Crane, C., Crane, R. S., Eames, C., Fennell, M. J. V, Silverton, S., Williams, J. M. G., & Barnhofer, T. (2014). The effects of amount of home meditation practice in Mindfulness Based Cognitive Therapy on hazard of relapse to depression in the Staying Well after Depression Trial. *Behaviour Research and Therapy*, *63*, 17–24.
<http://doi.org/10.1016/j.brat.2014.08.015>
- Creswell, J. D., & Lindsay, E. K. (2017). Mechanisms of mindfulness training: Monitor and Acceptance Theory (MAT). *Clinical Psychology Review*, *51*, 48-59.
<http://dx.doi.org/10.1016/j.cpr.2016.10.011>
- Creswell, J. D., & Lindsay, E. K. (2014). How Does Mindfulness Training Affect Health? A Mindfulness Stress Buffering Account. *Current Directions in Psychological Science*, *23*(6), 401–407. <http://doi.org/10.1177/0963721414547415>
- Eisendrath, S. J., Delucchi, K., Bitner, R., Fenimore, P., Smit, M., & McLane, M. (2008). Mindfulness-based cognitive therapy for treatment-resistant depression: a pilot study. *Psychotherapy and Psychosomatics*, *77*(5), 319–20. <http://doi.org/10.1159/000142525>

- Eisendrath, S. J., Gillung, E., Delucchi, K. L., Segal, Z. V., Nelson, J. C., McInnes, L. A., ...
Feldman, M. D. (2016). A Randomized Controlled Trial of Mindfulness-Based
Cognitive Therapy for Treatment-Resistant Depression. *Psychotherapy and
Psychosomatics*, 85(2), 99–110. <http://doi.org/10.1159/000442260>
- Finucane, A., & Mercer, S. W. (2006). An exploratory mixed methods study of the
acceptability and effectiveness mindfulness -based cognitive therapy for patients with
active depression and anxiety in primary care. *BMC Psychiatry*, 6,7, Article Number 14.
<http://doi.org/10.1186/1471-244X-6-14>
- First, M. D., Spitzer, R. L., Gibbon, M., & Williams, J. B. W. (2002). *Structured Clinical
Interview for DSM-IV TR Axis I Disorders, Research Version*. New York, NY:
Biometrics Research, New York State Biometric Institute.
- Fissler, M., Winnebeck, E., Schroeter, T., Gummersbach, M., Huntenburg, J. M., Gärtner, M.,
& Barnhofer, T. (in submission). Brief Training in Mindfulness May Normalize Blunted
Error-Related Negativity in Chronically Depressed Patients.
- Hautzinger, M., Keller, F., & Kuehner, C. (2009). *Beck Depressionsinventar Revision*.
Frankfurt: Pearson Assessment.
- Huffziger, S. & Kühner, C. (2009). Rumination, distraction, and mindful self-focus in
depressed patients. *Behaviour Research and Therapy*, 47, 224–230.
<https://doi.org/10.1016/j.brat.2008.12.005>
- Huffziger, S. & Kühner, C. (2012). The rumination components brooding and reflection:
factor structure and psychometric properties of the German version RSQ-10D. *Zeitschrift
für Klinische Psychologie und Psychotherapie*, 41, 38–46. <http://doi.org/10.1026/1616-3443/a000118>
- Kabat-Zinn, J. (1990). *Full catastrophe living: using the wisdom of your body and mind to
face stress, pain, and illness*. New York, NY: Delta Trade Paperbacks.
- Kabat-Zinn, J. (2003). *Mindfulness-Based Interventions in Context : Past, Present, and*

- Future. *Clinical Psychology: Science and Practice*, (2002), 144–156.
<http://doi.org/10.1093/clipsy/bpg016>
- Kenny, M. A., & Williams, J. M. G. (2007). Treatment-resistant depressed patients show a good response to Mindfulness-based Cognitive Therapy. *Behaviour Research and Therapy*, 45(3), 617–25. <http://doi.org/10.1016/j.brat.2006.04.008>
- Kuyken, W., Hayes, R., Barrett, B., Byng, R., Dalglish, T., Kessler, D., Lewis, G., ... Byford, S. (2015). Effectiveness and cost-effectiveness of mindfulness-based cognitive therapy compared with maintenance anti-depressant treatment in the prevention of depressive relapse/recurrence: results of the PREVENT randomised controlled trial. *Lancet*, 386, 63-73. [http://dx.doi.org/10.1016/S0140-6736\(14\)62222-4](http://dx.doi.org/10.1016/S0140-6736(14)62222-4)
- Kuyken, W., Warren, F., Taylor, R. S., Whalley, B., Crane, C., Bondolfi, G., ... Dalglish, T. (2016). Efficacy of Mindfulness-Based Cognitive Therapy in prevention of depressive relapse: an individual patient data meta-analysis from randomized trials. *JAMA Psychiatry*, 73(6), 1–24. <http://doi.org/10.1001/jamapsychiatry.2016.0076>
- Menezes, C. B., & Bizarro, L. (2015). Effects of a brief meditation training on negative affect, trait anxiety and concentrated attention. *Paideia*, 25(62), 393–401.
<http://doi.org/10.1590/1982-43272562201513>
- Michalak, J., Zarbock, G., Drews, M., Otto, D., Mertens, D., Ströhle, G., Schwinger, M., Dahme, B., & Heidenreich, T. (2016). Assessment of mindfulness with the German version of the Five Facet Mindfulness Questionnaire (FFMQ-D). *Zeitschrift für Gesundheitspsychologie*, 24, 1–12. <http://doi.org/10.1026/0943-8149/a000149>
- Segal, Z. V., Williams, J. M. G., & Teasdale, J. D. (2013). *Mindfulness-based cognitive therapy for depression* (2nd edition). New York, NY: Guilford Press.
- Segal, Z. V, Bieling, P., Young, T., MacQueen, G., Cooke, R., Martin, L., ... Levitan, R. D. (2010). Antidepressant monotherapy vs sequential pharmacotherapy and mindfulness-based cognitive therapy, or placebo, for relapse prophylaxis in recurrent depression.

- Archives of General Psychiatry*, 67(12), 1256–64.
<http://doi.org/10.1001/archgenpsychiatry.2010.168>
- 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: Guildford Press.
- Singer, A. R. & Dobson, K. S. (2007). An experimental investigation of the cognitive vulnerability to depression. *Behaviour Research and Therapy*, 45, 563 -575.
<https://doi.org/10.1016/brat.2006.05.007>
- Soler, J., Cebolla, A., Feliu-Soler, A., Demarzo, M. M. P., Pascual, J. C., Baños, R., & García-Campayo, J. (2014). Relationship between meditative practice and self-reported mindfulness: the mindsens composite index. *PLOS ONE*, 9(1): e86622.
<https://doi.org/10.1371/journal.pone.0086622>
- Strauss, C., Hayward, M., & Chadwick, P. (2012). Group person-based cognitive therapy for chronic depression: a pilot randomized controlled trial. *British Journal of Clinical Psychology*, 51(3), 345–50. <http://doi.org/10.1111/j.2044-8260.2012.02036.x>
- Sundquist, J., Lilja, Å., Palmér, K., Memon, A. A., Wang, X., Johansson, L. M., & Sundquist, K. (2015). Mindfulness group therapy in primary care patients with depression, anxiety and stress and adjustment disorders: Randomised controlled trial. *British Journal of Psychiatry*, 206(2), 128–135. <http://doi.org/10.1192/bjp.bp.114.150243>
- Sundquist, J., Palmér, K., Johansson, L. M., & Sundquist, K. (2017). The effect of mindfulness group therapy on a broad range of psychiatric symptoms: a randomized controlled trial in primary health care. *European Psychiatry*, 43, 19-27.
<http://dx.doi.org/10.1016/j.eurpsy.2017.01.328>
- Tang, Y.-Y., Lu, Q., Feng, H., Tang, R., & Posner, M. I. (2015). Short-term meditation increases blood flow in anterior cingulate cortex and insula. *Frontiers in Psychology*, 6(FEB). <http://doi.org/10.3389/fpsyg.2015.00212>

- Tang, Y.-Y., Lu, Q., Geng, X., Stein, E. A., Yang, Y., & Posner, M. I. (2010). Short-term meditation induces white matter changes in the anterior cingulate. *Proceedings of the National Academy of Sciences of the United States of America*, *107*(35), 15649–52. <http://doi.org/10.1073/pnas.1011043107>
- Tang, Y.-Y., Ma, Y., Wang, J., Fan, Y., Feng, S., Lu, Q., ... Posner, M. I. (2007). Short-term meditation training improves attention and self-regulation. *Proceedings of the National Academy of Sciences of the United States of America*, *104*(43), 17152–6. <http://doi.org/10.1073/pnas.0707678104>
- Tang, Y.-Y., Tang, Y., Tang, R., & Lewis-Peacock, J. A. (2017). Brief mental training reorganizes large-scale brain networks. *Frontiers in Systems Neuroscience*, *11*. <http://doi.org/10.3389/fnsys.2017.00006>
- Treynor, W., Gonzalez, R., & Nolen-Hoeksema, S. (2003). Rumination Reconsidered : A Psychometric Analysis. *Cognitive Therapy and Research*, *27*(3), 247–259. doi: 10.1023/A:1023910315561
- Van Aalderen, J. R., Donders, A. R. T., Peffer, K., & Speckens, A. E. M. (2015). Long-term outcome of Mindfulness-Based Cognitive Therapy in recurrently depressed patients with and without a depressive episode at baseline. *Depression and Anxiety*, *32*(8), 563–569. <http://doi.org/10.1002/da.22369>
- Van der Does, W. (2002). Cognitive reactivity to sad mood: Structure and validity of a new measure. *Behaviour Research and Therapy*, *40*(1), 105–120. [http://doi.org/10.1016/S0005-7967\(00\)00111-X](http://doi.org/10.1016/S0005-7967(00)00111-X)
- Williams, J. M. G., Crane, C., Barnhofer, T., Brennan, K., Duggan, D. S., Fennell, M. J. V, ... Russell, I. T. (2014). Mindfulness-based cognitive therapy for preventing relapse in recurrent depression: A randomized dismantling trial. *Journal of Consulting and Clinical Psychology*, *82*(2), 275–86. <http://doi.org/10.1037/a0035036>
- Williams, J. M. G., Van der Does, A. J. W., Barnhofer, T., Crane, C., & Segal, Z. S. (2008).

Cognitive Reactivity, Suicidal Ideation and Future Fluency: Preliminary Investigation of a Differential Activation Theory of Hopelessness/Suicidality. *Cognitive Therapy and Research*, 32(1), 83–104. <http://doi.org/10.1007/s10608-006-9105-y>

Xue, S.-W., Tang, Y.-Y., Tang, R., & Posner, M. I. (2014). Short-term meditation induces changes in brain resting EEG theta networks. *Brain and Cognition*, 87(1). <http://doi.org/10.1016/j.bandc.2014.02.008>

Zeidan, F., Johnson, S. K., Diamond, B. J., David, Z., & Goolkasian, P. (2010). Mindfulness meditation improves cognition: evidence of brief mental training. *Consciousness and Cognition*, 19(2), 597–605. <http://doi.org/10.1016/j.concog.2010.03.014>

Table 1

Means and Standard Deviations of Symptoms and Cognitive Vulnerability/Resilience Measures at Pre- and Post-Assessment in the MBI Group and the Psycho-Education and Resting Group

	Mindfulness		Psycho-Education and Resting	
	Pre	Post	Pre	Post
BDI-II	27.1 (7.2)	9.7 (6.1)	28.5 (6.7)	19.2 (6.1)
SCID-Symptoms	7.19 (1.30)	1.13 (1.51)	7.28 (1.46)	5.00 (1.66)
FFMQ Total	112.2 (20.4)	132.7 (17.8)	110.7 (17.9)	114.4 (16.9)
FFMQ-Observing	24.3 (5.2)	27.3 (4.8)	25.0 (5.2)	25.5 (5.3)
FFMQ-Describing	26.7 (7.2)	28.4 (6.3)	24.6 (6.9)	26.0 (7.2)
FFMQ-Acting with Awareness	21.0 (5.4)	26.0 (4.0)	20.2 (5.0)	20.6 (5.5)
FFMQ-Non-Judging	24.4 (7.9)	30.0 (6.4)	23.9 (7.2)	24.8 (6.8)
FFMQ-Non-Reactivity	15.7 (4.4)	20.8 (4.0)	16.8 (4.0)	17.2 (3.7)
RRSQ-Brooding	12.3 (3.3)	10.3 (3.0)	12.3 (3.6)	12.5 (3.9)
LEIDS-R	48.7 (13.2)	41.6 (16.2)	52.4 (14.9)	50.9 (17.4)

Note. BDI-II = Beck Depression Inventory II, SCID-Symptoms = Structured Clinical Interview for DSM-IV Major Depression Symptom Score, FFMQ = Five Facet Mindfulness Questionnaire, FFMQ-Observing = Five Facet Mindfulness Questionnaire – Observing Subscale, FFMQ-Describing = Five Facet Mindfulness Questionnaire – Describing Subscale, FFMQ-Acting with Awareness = Five Facet Mindfulness Questionnaire – Acting with Awareness Subscale, FFMQ-Non-Judging = Five Facet Mindfulness Questionnaire – Non-Judging of Inner Experience Subscale, FFMQ-Non-Reactivity = Five Facet Mindfulness Questionnaire – Non-Reactivity to Inner Experience Subscale, RRSQ-Brooding = Ruminative Response Style Questionnaire – Brooding Subscale, LEIDS-R = Leiden Index for Depression Sensitivity-Revised.

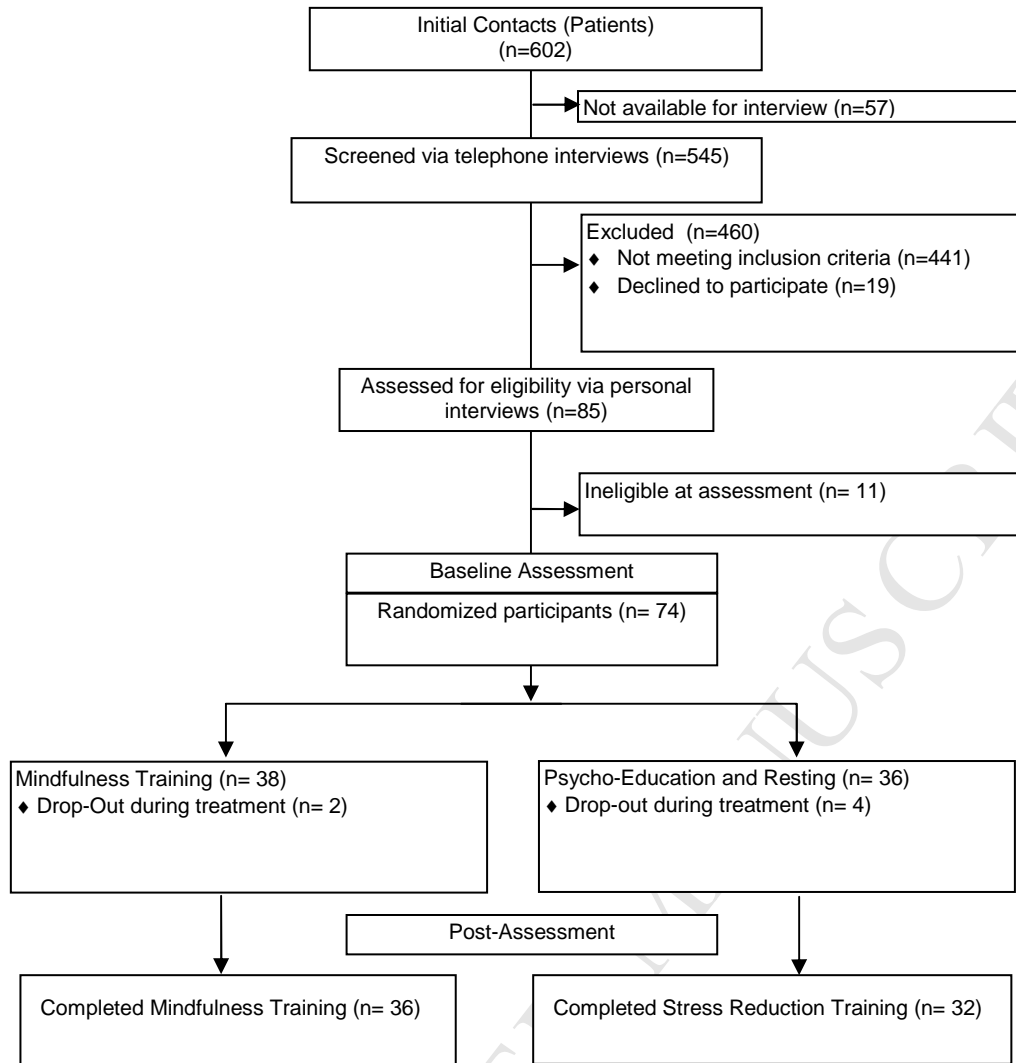


Figure 1. Flow of participants through the study

- We compared brief mindfulness training against resting control in acutely depressed patients.
- Patients in the mindfulness condition showed stronger reductions in symptoms.
- The results support the use of mindfulness in the treatment of acute depression.