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Can mindfulness and acceptance be learnt by self-help?: A systematic review and
meta-analysis of mindfulness and acceptance-based self-help interventions

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Abstract

There is growing evidence that mindfulness and acceptance-based interventions have positive consequences for psychological and physical health. The most well-established of these interventions typically involve relatively large resource commitments, in terms of both the provider and participant. A number of recent studies have begun to explore whether the benefits of such interventions can be generalised to less intensive methods. Methods include pure and guided self-help utilising resources such as books and workbooks, computer programmes and applications and audio-visual materials. This paper presents a systematic review and meta-analysis of studies that have evaluated the effectiveness and acceptability of low-intensity interventions including mindfulness and acceptance-based components. Fifteen RCTs (7 acceptance-based, 4 mindfulness-based and 4 multi-component interventions including elements of mindfulness and/or acceptance) were identified and reviewed. Interventions that included mindfulness and/or acceptance-based components produced significant benefits in comparison to control conditions on measures of mindfulness/acceptance, depression and anxiety with small to medium effect sizes. Engagement with the self-help interventions varied but on average two-thirds of participants completed post-intervention measures. Emerging research into low-intensity mindfulness and acceptance-based interventions is hopeful. Recommendations for research and practice are presented.

Keywords: self-help, mindfulness, acceptance

Can Mindfulness and Acceptance be Learnt by Self-help?: A Systematic Review and
Meta-analysis of Mindfulness and Acceptance-Based Self-help Interventions

The ‘third wave’ of behavioral and cognitive interventions has been characterized as paying greater attention to the context and function of cognitions, emotions and behavior, and placing more emphasis on contextual and experiential processes of change (e.g. Hayes, 2004). Many third wave approaches are grounded in the idea that paying mindful attention to, and cultivating acceptance of, present moment experience can allow people to develop a more healthy relationship with their experience, which can lead to a reduction in psychological distress (cf. Hayes, Follette & Linehan, 2004).

Acceptance and mindfulness are two closely related concepts. Mindfulness has been described as “paying attention in a particular way, on purpose, in the present moment and non-judgmentally” (Kabat-Zinn, 1994, p. 4). And, in the context of third wave approaches, acceptance refers to an openness to, and ability to remain present with, current experience. Paying mindful attention to and developing a more accepting relationship with present moment experience is thought to be helpful, because it can enable people to let go of habitual, unhelpful reactions to current experience and instead choose more helpful ways of responding. For example, when a negative thought has the function of driving ruminative processes, it may contribute to the maintenance of depression. However, when such a thought is mindfully observed and accepted, it can be experienced as a mental event that will pass, rather than a truth, and hence is less likely to lower mood and drive rumination (Segal, Williams & Teasdale, 2013). Consistent with this, there is growing evidence that paying attention in this particular way has positive consequences for both psychological health (Brown

& Ryan, 2003; Keng, Somski & Robins, 2011) and physical health (Grossman, Niemann, Schmidt & Walach, 2004) in clinical (Chiesa & Serretti, 2011; Hoffman et al., 2010; Vollestad, Nielsen & Nielsen, 2012) and non-clinical (Chiesa & Serretti, 2010; Erberth & Sedlmeier, 2012; Sedlmeier et al., 2012) populations.

The potential benefits of mindfulness and acceptance underpin a range of approaches to the teaching, training and therapeutic attempts to increase mindfulness and acceptance in both clinical and community contexts. Three well-established and thoroughly evaluated third wave interventions are mindfulness based stress reduction (MBSR; Kabat-Zinn, 1990), mindfulness based cognitive therapy (MBCT; Segal, Williams & Teasdale, 2002; 2013) and acceptance and commitment therapy (ACT; Hayes & Wilson, 1994).

In MBSR and MBCT participants are taught to develop mindfulness skills through a range of formal and informal mindfulness practices, including, amongst others, the body scan, mindfulness of the breath, body, sounds and thoughts, mindful movement and mindfulness of everyday activities. Participants are invited to follow these practices both during their eight, weekly classes and as part of the daily homework exercises.

A key aspect of the classes is the “enquiry process”, during which participants speak about their experiences of mindfulness practice and the MBCT/MBSR teacher embodies a kind, curious and present moment-focused attitude towards these experiences (Segal et al., 2013). This is thought to provide participants with a model of how they can relate to their experiences during mindfulness practice. MBSR and MBCT are very similar in content, but differ in that MBCT has a more specific focus on depression and negative automatic thoughts, while MBSR has a wider focus on stress more generally.

These interventions are associated with increased mindfulness and improved psychological well-being in non-clinical populations (Erberth & Sedlmeier, 2012), a reduction in risk of depressive relapse for people with a history of three or more episodes of depression (Ma & Teasdale, 2004; Teasdale et al., 2000), an improvement in health-related quality of life in clinical populations with physical illness (Florback, Arendt, Ornbol, Fink & Waklach, 2011) and decreases in symptoms of stress, depression and anxiety in clinical populations with psychiatric disorders (Chiesa & Serretti, 2011; Florback et al., 2011; Hoffman, Sawyer, Witt & Oh, 2010; Vollestad et al., 2012). There is variability in size of the effect of mindfulness-based approaches, in part depending upon the outcome variable in question (Erberth & Sedlmeier, 2012). Moderate pre-post effects are typical, with larger effects being observed with participants with depression and anxiety disorders (Hoffman et al., 2010).

ACT is grounded in functional contextualist philosophy and based on relational frame theory (Hayes, 2004). According to this theory, emotional distress results from 'cognitive fusion', in which unhelpful verbal rules and evaluative thoughts dominate the control of behavior at the expense of contact with present-moment experience, which is avoided. These rules and evaluations drive maladaptive behaviors, for example deliberate attempts to suppress feelings, which are ineffective and so lead to further unhelpful evaluations and consequent distress. ACT aims to alleviate suffering by increasing 'psychological flexibility' and hence reducing cognitive fusion, experiential avoidance and maladaptive behaviors. Psychological flexibility is cultivated through teaching mindfulness and acceptance skills and encouraging commitment to behavioral change linked to clients' values. ACT employs a variety of techniques including, amongst others, exploring how

experiential avoidance and cognitive control strategies can be unhelpful, using mindfulness exercises and related techniques to encourage psychological flexibility, eliciting and clarifying client values, and using metaphor to help clients grasp important concepts and ideas. ACT has been applied to a variety of conditions and client groups and has a growing evidence base for its efficacy (e.g. Bach & Hayes, 2002; Ost, 2008; Powers, Zum Vorde Sive Vording & Emmelkamp, 2009; Ruiz, 2012; Sharp, 2012; Veehof, Oskam, Schreurs & Bohlmeijer, 2011).

Other notable mindfulness and acceptance-based interventions include dialectical behavioral therapy (DBT) and person based cognitive therapy (PBCT), each of which also has a developing evidence base (e.g. Dannahy et al., 2011; Kliem, Kroger & Kosfelder, 2010; Ost, 2008; Strauss, Hayward & Chadwick, 2012). These are multi-component interventions but each of them has a basis in principles of mindfulness and acceptance. Typically these interventions include, amongst other elements, a rationale and orientation toward a mindful, accepting approach to experience, the regular brief mindfulness meditation practices (usually 5-10 minute practices) and other exercises designed to promote mindfulness and acceptance in daily living both in group settings and in at home. One meta-analysis found no significant difference between the outcomes of pure mindfulness based interventions and multi-component interventions at least in the case of anxiety disorders (Vollestad et al., 2012).

Given the measured benefits of mindfulness and acceptance based interventions, the possibility of extending their reach has recently begun to be explored. The dissemination of mindfulness and acceptance based interventions delivered in their traditional format may be limited by the availability of adequately experienced group leaders (e.g. Mental Health Foundation, 2010). Mindfulness and

acceptance based interventions are typically offered in a group format, making them relatively efficient in terms of therapist input, however the resource is still quite high in comparison to many low-intensity interventions (cf. Bennet-Levy et al., 2010).

Methods to extend their reach, might include i) the dissemination of training and supervision in mindfulness and acceptance-based approaches to a wider group of health professionals and other trainers, ii) the development of briefer and/or larger group-based practices and iii) the development of “low-intensity” or self-help mindfulness and acceptance based approaches. This article focuses on the potential of guided and unguided self-help interventions that include mindfulness and/or acceptance components. We explore evidence for the effectiveness and acceptability of self-help interventions including mindfulness and acceptance elements to date, and present a roadmap for future research on this important topic.

What is Self-Help?

The term ‘self-help’ tends to be applied loosely and interchangeably with other terms such as ‘self-management’, ‘self-instruction’, ‘self-care’ or ‘psychoeducational’ interventions (Lewis et al., 2003). NICE (2004) describe self-help as “A self-administered intervention designed to treat depression [sic], which makes use of a range of books or a self-help manual that is based on an evidence-based intervention and is designed specifically for the purpose” (p. 358). In addition to books, workbooks and manuals, self-help interventions can also be delivered by computer programme or application and in other audio, visual or multimedia formats.

Does Self-Help Work?

Most published studies of self-help have explored interventions based on the principles of cognitive behaviour therapy (CBT; cf. Bennett-Levy et al., 2010).

Recent reviews and meta-analyses have indicated that both pure self-help and guided

self-help may be of benefit to people experiencing common problems such as anxiety and depression (Newman et al., 2011; Coull & Morriss, 2011). There is some evidence that guided self-help is more effective than pure self-help (Gellately et al., 2007; Richards & Richardson, 2012), indeed there seems to be little difference in treatment effects between guided self-help and face-to-face comparators (Cuijpers et al., 2009; Lewis, Pearce & Bisson, 2012). Whilst effects are comparatively smaller, pure self-help, which has the potential for a much greater reach at lower cost, has been found to be effective for both depression (Cuijpers et al., 2011) and anxiety (Lewis et al., 2012). Both book-based and multimedia/ internet-based self-help interventions have been evaluated and found to be more effective than control conditions, in at least some studies (Gellately et al., 2007; Marks, Cavanagh & Gega, 2007; Newman et al., 2011). Recent meta-analyses have suggested that multimedia interventions may be more effective than book based approaches at least in the context of CBT approaches to anxiety disorders (Lewis et al., 2012; Haug, Nordgreen, Ost & Havik, 2012).

The promising evidence based for the acceptability and effectiveness of CBT based self-help approaches raises the question of whether these benefits might extend to the dissemination of other evidence based therapeutic methods, including mindfulness and acceptance based therapies. There may be a number of benefits to the development of self-help mindfulness and acceptance orientated interventions in both community and clinical settings. These might include (i) increased access and availability to interventions which may otherwise be costly or locally unavailable, (ii) extended reach to people who might otherwise not access such interventions, (iii) reductions in stigma associated with accessing interventions in mental health settings, (iv) cost effectiveness, (v) ease of updating material as new evidence becomes

available, and (vi) increases in self-efficacy, learnt resourcefulness and self-agency in change for the learner.

Disadvantages of offering mindfulness and acceptance based self-help might include (i) the removal of a group context, (ii) the absence of a responsive teacher and teacher guided enquiry process, both of which are thought to contribute to learning mindfulness and acceptance (cf. Segal et al., 2013), and (iii) the advantages of self-guided programmes may be outweighed by the social isolation associated with self-learning (Botella, Garcia-Palacios, Banos & Quero, 2009).

For the purposes of this review, self-help approaches are characterized by two particular features i) that they require either no or reduced practitioner input (Newman et al., 2011), and ii) that self-help materials should aim to provide instruction, guide and encourage the user to develop skills, manage their difficulties and make changes, rather than just providing information (Anderson, Lewis & Araya, 2005; Lewis et al., 2003). Studies that explore the benefits of augmenting standard therapy approaches with self-help materials are not included.

Self-help interventions that include mindfulness and/or acceptance components might include the guided or unguided use of (i) internet-based interventions, (ii) computer applications (apps) for use predominantly on mobile devices such as smartphones and tablets, (iii) book-based guides to mindfulness or acceptance, which are sometimes accompanied with a CD, and (iv) predominantly audio-based self-help materials. Each of these options will be explored in this review.

We now present a systematic review and meta-analysis of the evidence base for the mindfulness and acceptance based self-help interventions outlined above, with a focus primarily on their effectiveness in enhancing mindfulness and present-moment acceptance. Whilst symptom reduction is not typically a primary goal of

mindfulness or acceptance based interventions, face-to-face interventions applying these approaches are often associated with symptom change, and so our secondary question is whether self-help interventions that include mindfulness and/or acceptance components are also associated with a reduction in symptoms of depression and anxiety.

Method

Literature Search

We searched MEDLINE, ISI Web of Knowledge, PsycInfo and Cochrane Library Databases from inception until May 1st 2013 using the term ‘mindful* or acceptance’ in combination with the terms ‘self*help’, ‘*book’, ‘computer’, ‘app*’, ‘audio*’ or ‘*phone’ and “randomi*ed” or “RCT”. Reference lists and relevant journals were also searched manually to identify potentially eligible studies.

We included in our review: i) published reports of empirical studies, ii) that employed self-help mindfulness or acceptance-based interventions including self-practice for adult populations, iii) where no or reduced therapist support was offered (meeting the Newman et al. (2011) criteria for either self-administered therapy, predominantly self-help, or minimal-contact therapy), iv) that used a randomised controlled design, v) included an outcome measure of mindfulness, acceptance, depression and/or anxiety, vi) were published in indexed peer-reviewed English language publications, and vii) offered sufficient data (post-intervention means and SDs or *F* values), either in the paper, or by contacting the authors, to calculate the effect sizes required for meta-analysis of at least one key outcome. We excluded: i) lab-based studies testing the effects of ‘one-off’ or a brief series of mindfulness

meditation practices without self-practice, and ii) studies reporting only descriptive or qualitative data.

Eligible studies

The initial search produced 467 citations (after de-duplication), which were subjected to inclusion and exclusion criteria. 48 of these met initial inclusion criteria. Full papers were retrieved and examined for eligibility. Fifteen were found to meet the full set of inclusion and exclusion criteria, see Figure 1.

Data Analysis

The between-group post-intervention means and standard deviations on measures of mindfulness, acceptance, depressive symptoms and/or anxiety symptoms were extracted and entered into Review Manager (RevMan) version 5.2 (Cochrane Collaboration, 2012) and SPSS version 19 (IBM Corp, 2010). The following formula was used to calculate post-intervention between group effect sizes:

$$SMD_i = \frac{m_{1i} - m_{2i}}{s_i} \left(1 - \frac{3}{4N_i - 9} \right)$$

where,

$$s_i = \sqrt{\frac{(n_{1i} - 1)sd_{1i}^2 + (n_{2i} - 1)sd_{2i}^2}{N_i - 2}}$$

Any psychometrically established measure of our primary and secondary outcomes were considered suitable for inclusion. If more than one measure of depression or anxiety outcomes was available the measure with the strongest concurrent validity was chosen. If more than one reliable measure of mindfulness and acceptance outcomes was reported, the mindfulness measure was chosen as it is generally considered as a meta-construct which embraces acceptance (Baer, 2011). The number of participants in each condition was also extracted. Intention-to-treat data were used where available. If a study included more than one control condition the inactive control condition was selected as the comparator as this was the most common comparison condition used across the studies, and offers a basic test of intervention efficacy.

Forest plots of post-intervention between-group effect sizes were produced for each of the three outcome variables using RevMan (mindfulness/acceptance, depressive symptoms and anxiety symptoms). SPSS syntax created by Field and Gillett (2010) was used for statistical analysis. To explore publication bias, funnel plots were produced in RevMan and Orwin's failsafe N was calculated for each analysis.

Results

Table 1 presents summary data from the 15 identified studies.

Study Design

The 15 studies followed a RCT design and compared an self-help intervention including mindfulness or acceptance components with a no-intervention control group (n=3), waitlist control (n=5), a monitored online discussion forum (n=3),

psychoeducation (n=1) or an active psychotherapy intervention condition (n=2). One study compared a self-help intervention to both a waitlist control group and an enhanced self-help intervention including a moderated online discussion forum.

Eight studies reported on primarily internet-based interventions, five on book-based interventions and two on interventions based on audio recordings. Internet interventions included downloadable audio files in MP3 format. One internet-based intervention included apps and sensor devices, another included a workbook and CD. Four studies evaluated purely mindfulness-based interventions, with seven studies evaluated ACT-based interventions and four studies evaluated interventions that included a mindfulness or acceptance component, CBT (2), behavioural activation (1), integrative psychological therapy (1)).

Sample Size and Characteristics

Study sample sizes ranged from 24-551 participants. The studies recruited and randomised a total of 2286 participants, of whom 1416 were allocated to mindfulness and acceptance-based self-help interventions (870 to control conditions). The discrepancy in numbers between the treatment and control groups is accounted for by two factors. First, two large studies (Fledderus et al, 2012; Morledge et al., 2013) report on three-arm trials, including two mindfulness/acceptance treatments. Second, one study (Meyer et al., 2009) used an 80:20 weighted randomization sequence “to ensure that a sufficiently large number of participants would take part in the treatment and would be able to provide feedback that could be used for further program development” (p. 6, Meyer et al., 2009).

The duration of interventions ranged from two to nine weeks. Five studies were conducted with non-clinical samples (community samples, teachers, students),

three studies investigated self-referred participants with symptoms of depression and/or anxiety, stress, exhaustion or insomnia, 1 study investigated self-referred participants meeting DSM criteria for Major Depressive Episode, one with veterans with combat related PTSD and five with populations with physical illness (chronic pain (3), tinnitus (1), irritable bowel syndrome (1)).

Outcome Measures

Ten of the studies included self-report measures of mindfulness and/or acceptance (mindfulness measure=4, acceptance measure=8). Mindfulness measures were: the Mindfulness Attention and Awareness Scale (MAAS Brown & Ryan, 2002); the Freiberg Mindfulness Inventory (FMI; Buchheld, Grossman, & Walach, 2001); the Kentucky Inventory of Mindfulness Skills (KIMS; Baer, Smith, & Allen, 2004) and the Five Facet Mindfulness Questionnaire (Baer, Smith, Hopkins, Krietemeyer & Toney, 2006).

Acceptance measures were: the second version of the Acceptance and Action Questionnaire (AAQ-II; Bond et al., 2011); the Chronic Pain Acceptance Questionnaire (CPAQ; McCracken, Vowles & Eccleston, 2004) and the Tinnitus Acceptance Questionnaire (TAQ; Westin et al., 2008).

Twelve studies included a measure of depressive symptoms and twelve studies measured anxiety symptoms. Measures of depressive and anxiety symptoms are well established (see Table 1) and have good psychometric properties.

Guided versus Unguided Self-Help

Support from a therapist ranged from none to eight hours per participant. Six studies reported on self-administered therapies (with no therapist support); four

studies reported on predominantly self-help based interventions (<90 minutes of therapist support) and five studies reported on minimal contact therapies (>90 minutes support, but less than standard therapeutic interventions; Newman et al., 2011).

Engagement and Attrition

All studies reported the number of randomised participants completing post-treatment measures (mean = 73%, range 48% - 98%). Post-treatment data completion was more common in control (mean = 84%, range 50%-100%) than mindfulness and acceptance intervention conditions (mean = 63%, range 41%-100%). Most studies reported intention-to-treat analysis, five studies reported only study completer data.

Most studies report some intervention engagement metrics. These included the number of weeks participants engaged in study (Fledderus et al. 2012; Johnsson et al., 2010), number of participants completing each session, section or module (Buhrman et al., 2013; Carlbring et al., 2013; Meyer et al., 2009), time logged-on to program (Carlbring et al., 2013), number of emails shared between the supporter and participant (Fledderus et al, 2012; Ljotsson et al., 2010), number of meditation practices reported (Gluck & Maerker, 2011; Warnecke et al., 2011), time spend engaged in meditation practice (Niles et al., 2012), number of discussion forum posts (Ljotsson et al., 2010) number of online quizzes completed (Muto et al., 2011), number reading the self-help book and completing exercises (Jeffcoat & Hayes, 2012; Niles et al. 2012), active engagement with intervention tools (Lappalainen et al., 2013) and treatment discontinuation (Hesser et al. 2012). Overall, these studies report relatively high levels of engagement in the intervention conditions, but lower rates of treatment completion.

Nine studies reported on the number of participants meeting study defined criteria for engagement or completion (6/12 training sessions, Gluck & Maeker, 2011; completed at least 3 weeks of treatment, Johnson et al., 2010; 'finished treatment', Thorsell et al., 2011; 'reported reading the entire book and doing all the exercises, Jeffcoat & Hayes, 2012) 'reached the fifth step of treatment and engaged in exposure exercises', Ljotsson et al., 2010; "completed all seven sections on the program", Buhrman et al, 2013; 'remained engaged by showing online activity beyond week 5', Morledge et al., 2013; tool used on at least half of study weeks or reported having used it weekly, Lappalainen et al., 2013; completed all 7 modules, Carlbring et al., 2013). In these nine studies 744 participants were allocated to a self-help the intervention condition and 359 (48%) met study defined intervention engagement or completion criteria.

Five studies explore the dose-response relationship between engagement metrics and study outcomes. All found in favour of higher engagement, typically reporting correlations between practice engagement, sessions completed or intervention completion and study outcomes.

Study Quality

The modified Jadad criteria (Jadad et al., 1996) were used to provide an index of the quality of included studies, we evaluated the design of each study as follows: (a) the study was described as randomised, (b) participants were adequately randomised, (c) the study was described as double blind, (d) the method of double blinding was appropriate, and (e) a full description of dropouts and withdrawals (participant flow) was provided. One point was assigned for each Jadad criterion with

a maximum of 5 points. As shown in Table 1, total Jadad scores for included studies ranged from 2 to 4, with a median score of 3.

Therapy Process

Three studies attempted mediation analyses exploring the relationship between process variables (mindfulness and acceptance) and symptom outcomes (Jeffcoat & Hayes, 2012; Muto, 2011, Gluck & Maerker, 2011). Each of these found support for a meditational hypothesis that mindfulness and acceptance predicate symptom change.

Cost-Effectiveness

No studies reported any cost-effectiveness analysis for mindfulness-based self-help interventions.

Meta-Analysis Findings

Post-intervention means and standard deviations were extracted from the final set of 15 papers for the mindfulness/acceptance intervention and for their control conditions. Where possible post-intervention means and standard deviations are for the intention-to-treat sample (n=10 studies) but 5 studies only report complete data. Three separate meta-analyses were conducted for (i) post-intervention mindfulness/acceptance skills, (ii) depressive symptoms and (iii) anxiety symptoms. All analyses used a random effects model given the heterogeneity of the study populations.

Figure 2 shows forest plots for post-intervention between-group effect sizes for the three outcomes: (a) mindfulness/acceptance, (b) depression symptoms, and (c) anxiety symptoms.

Figure 2a is a forest plot of the 10 studies that included a measure of mindfulness/acceptance skills (total N=1392). The mindfulness/acceptance-based interventions resulted in significantly greater mindfulness/acceptance skills than control conditions ($z(9)=3.61$, $p<.001$) with a medium effect size ($g=0.49$, 95% confidence interval 0.23 to 0.76). The resulting effect sizes were not significantly heterogeneous ($\chi^2(9)=7.83$, $p=.55$) meaning that further moderator analyses were not warranted.

Figure 2b shows a forest plot for the 12 studies that included a measure of depressive symptoms (total N=1230). The study by Jeffcoat and Hayes (2012) has been entered twice as they separately report depressive symptom outcomes for participants who scored above the cut-off on the depression scale on the DASS at baseline (DEP) and from those who scored below this cut-off at baseline (NOT DEP). Participants in the mindfulness and acceptance-based interventions showed significantly fewer depressive symptoms at post-intervention than those in control conditions ($z(12)=2.83$, $p<.001$) with a small to medium effect size ($g=-0.37$, 95% confidence interval -0.19 to -0.56). The resulting effect sizes were sufficiently homogeneous ($\chi^2(12)=10.23$, $p=.60$) and therefore moderator analyses were not conducted.

Figure 2c shows a forest plot for the 12 studies that included a measure of anxiety symptoms (total N=1531). As above, the study by Jeffcoat and Hayes (2012) has been entered twice as they separately report anxiety symptom outcomes for participants who scored above the cut-off on the anxiety scale on the DASS at

baseline (ANX) and from those who scored below this cut-off at baseline (NOT ANX). Participants undertaking the mindfulness and acceptance-based interventions showed significantly fewer anxiety symptoms at post-intervention than those in control conditions ($z(12)=2.83$, $p=.005$) with a small to medium effect size ($g=-0.34$, 95% confidence interval 0.10 to -0.57). Moderator analyses were not conducted as effect sizes were not significantly heterogeneous ($\chi^2(12)=14.06$, $p=.30$).

Inclusion of multicomponent studies (Carlbring et al., 2013; Lappalailen et al., 2013; Ljottson et al., 2010; Meter et al., 2009) could inflate the apparent effects of mindfulness or acceptance on symptom severity, particularly where interventions included components that are known effective treatments for depression/anxiety (e.g. behavioural activation, CBT) that could partially or wholly account for symptom change in these studies. Therefore, sub-group meta-analysis were conducted to explore the effects of mindfulness and acceptance self-help interventions on depression and anxiety outcomes excluding these multicomponent studies. Participants in the 'pure' mindfulness and acceptance-based interventions showed significantly both fewer depressive symptoms at post-intervention than those in control conditions ($z(8)=2.16$, $p=.03$) with a small to medium effect size ($g=-0.28$, 95% confidence interval -0.03 to -0.54), and fewer anxiety symptoms at post-intervention than those in control conditions ($z(11)=2.51$, $p=.01$) with a small to medium effect size ($g=-0.32$, 95% confidence interval -0.07 to -0.57).

Figure 3 shows funnel plots of effect sizes (x-axis) by standard error (y-axis) for each outcome. For mindfulness/acceptance (figure 3a) and depression (figure 3b) effects sizes appear to be evenly distributed around the mean effect size and there is no indication from these plots of publication bias. Fail-Safe N analysis (Rosenthal & Rubin, 1988) showed that an additional 230 and 176 RCTs respectively showing no

intervention effect would be needed to reduce the overall effect size to being non-significant. There was some indication of publication bias in the anxiety funnel plot (figure 3c). The smaller sample-size studies (shown towards the bottom of the plot) have effect sizes larger than the mean effect size, and indeed the two studies with the largest standard errors (smallest sample sizes) show the largest effect sizes in favour of the mindfulness or acceptance-based intervention. However, the Fail-Safe N analysis showed that 174 studies with zero effect would be needed to reduce the mean effect size to non-significance.

Discussion

Mindfulness and acceptance-based self-help resources are widely available within the public domain. This systematic review and meta-analysis summarises the empirical evidence to date regarding the effectiveness of self-help interventions that include mindfulness and/or acceptance components in teaching the skills of mindfulness and acceptance and evaluates the extent to which these interventions are associated with symptom change. Studies were found reporting on the effects of internet-based interventions, books/workbooks and audio recordings designed to promote mindfulness and acceptance. No studies regarding singular use of computer apps for mindfulness or acceptance were found.

The meta-analyses revealed that self-help interventions that include mindfulness and/or acceptance components resulted in a significantly higher level of mindfulness/acceptance skills and significantly lower levels of anxiety and depressive symptoms than control conditions, with small to medium effect sizes. Due to the multi-component nature of some of the interventions reviewed, sub-group analyses were conducted. The effects of mindfulness and acceptance-based self-help

interventions remained statistically significant when multi-component studies were excluded suggesting that these effects cannot be easily accounted for by their additional components. These findings suggest that mindfulness and acceptance can be learnt by self-help, and moreover that self-help interventions that include mindfulness and/or acceptance components can also lead to reductions in depression and anxiety. This extends a growing body of literature supporting the potential benefit of using self-help approaches for the dissemination of evidence based interventions.

These findings echo the literature on traditional mindfulness and acceptance-based interventions, which indicates that they are associated with increases in mindfulness and acceptance and improvements in symptoms of depression and anxiety in clinical and non-clinical groups. That literature further suggests that symptom outcomes are mediated by changes in mindfulness, self-compassion and/or psychological flexibility (Kuyken et al., 2010; Wicksell, Olsson & Hayes, 2010), and thus that face-to-face mindfulness and acceptance-based approaches exert at least part of their effect by helping people to change their relationship with the content of their experience; for example, helping people to move towards experiencing negative thoughts as mental events rather than as truths (cf. Segal et al., 2002). It seems reasonable to hypothesize that the same or similar mediators may be involved with regard to mindfulness and acceptance-based self-help approaches, and our finding that mindfulness/acceptance skills are significantly improved by self-help interventions is at least consistent with this possibility. Many studies reviewed included both measures of mindfulness or acceptance and symptom measures, but few were adequately powered to explore the hypothesised relationship between these process and outcome variables. Where they did the findings were typically consistent with this mediational hypothesis, however further research is needed.

Although moderator analyses were not indicated by the homogeneity analyses, post-hoc tests suggest larger effects for guided mindfulness and acceptance-based self-help than for unguided self-help. This concords with the broader literature on self-help interventions (e.g. Gellately et al., 2007; Richards & Richardson, 2012), and should be further investigated. No difference in effects between internet and book/audio based interventions was observed.

Study Dropout and Intervention Engagement and Completion

Most studies reported a full participant flow, and these indicated that on average 73% (range 48%-98%) completed post-intervention measurements. This figure is comparable to attrition in studies of other self-help and minimal contact therapies; e.g. internet-based treatments average completion 69% (range 17-98%; Melville, Casey & Kavanagh, 2010). Rates of attrition from studies of pure self-help therapies tend to be higher than supported interventions (Eysenbach, 2005), and this is echoed here, where data from two large unsupported treatment studies (N = 953) reported that almost half of their participants did not complete post-treatment data.

Intervention engagement (e.g. number of intervention sections/sessions/modules completed, number of mindfulness practices recorded) and completion metrics varied between studies. Where studies identified intervention engagement or completion criteria just under half of those allocated to the intervention condition met those targets. Most studies reported data on levels of participants' engagement with the mindfulness or acceptance-based self-help materials or practice and where analysis was attempted indicated that engagement with self-help interventions was associated with study outcomes. This highlights the

importance of designing and delivering self-help interventions with engagement in mind (cf. Cavanagh, 2010; Cavanagh & Millings, 2013a).

Limitations

Our systematic review found that studies addressing the question of whether mindfulness and acceptance can be learnt by self-help are characterised by heterogeneity in their interventions, methods and measures and any conclusions drawn from the results of this meta-analysis are limited by this fact. However, this methodological heterogeneity was not reflected in heterogeneity of effects, as indicated by the non-significant tests of homogeneity associated with our meta-analyses. This suggests that across this range of approaches to teaching the skills of mindfulness and acceptance in self-help contexts the effects are largely similar across studies, irrespective of the intervention approach or format used or measurement instrument adopted. Post-hoc analysis supported this homogeneity revealing no difference in effect size between intervention approaches (ACT versus mindfulness versus multi-component interventions), control conditions (active versus inactive), or study populations (non-clinical versus mental health versus physical health).

The studies reviewed investigated mindfulness, acceptance and multi-component interventions. Acceptance and commitment therapy (ACT) was the most common approach adopted (7/15 studies pure ACT, 2/15 multicomponent studies included ACT). Only four studies evaluated the effects of mindfulness-based self-help interventions, limiting the conclusions that can be drawn about this approach. Four studies evaluated multi-component interventions that included elements of mindfulness and/or acceptance with other therapeutic approaches. The effects of

mindfulness and acceptance-based self-help interventions remained statistically significant when multi-component studies were excluded in sub-group analyses.

Like most psychological therapies, both ACT and mindfulness-based interventions (e.g. MBCT, MBSR) themselves include multiple ‘ingredients’, both common factors and specific techniques, which were incorporated into the self-help materials used in these studies. In studies of these interventions it is unclear whether mindfulness or acceptance *per se* contributed importantly to their effects on symptom severity, or to what extent the active mindfulness and acceptance ingredients were associated with positive outcomes. Future research should include component analysis or dismantling approaches, which permit more robust conclusions about the specificity of component effects, and studies adequately powered to test the mediational role of mindfulness and acceptance in symptom change associated with these self-help interventions.

A ‘class-effect’ for self-help interventions that include mindfulness and/or acceptance components cannot be assumed. This review indicates positive outcomes for three different ACT self-help books. However, Jeffcoat and Hayes (2012) note that ‘dozens of additional ACT self-help books have subsequently appeared, and it would take a broad program of research to be certain that all of these are generally useful’ (p. 578). We would echo and extend this recommendation.

The measurement of mindfulness and acceptance constructs is not without its challenges (e.g. Baer, 2011). A range of measures of mindfulness and acceptance were utilised across the studies, such that measurement heterogeneity could potentially jeopardise the integrity of our findings. However, all measures of mindfulness and acceptance included had good provenance including sound psychometric properties published in peer-reviewed journals, and the use of

standardised mean difference in the calculation of effect sizes allows for different measures of the same construct to be synthesised in this kind of meta-analysis (Lipsey & Wilson, 2001). Whilst differing in content, the measures of each construct are related both theoretically and empirically. Three of the measures of mindfulness used (MAAS, FMI and KIMS) are significantly correlated with each other (Baer et al, 2006) and the FFMQ is derived from a factor analysis of items from these (and other) mindfulness questionnaires. Of the measures of acceptance used in these studies, the CPAQ was derived from items from the AAQ and the TAQ was derived from items from the AAQ and CPAQ. Scores from the AAQ-II and FFMQ are also significantly correlated (Veehof, ten Klooster, Taal, Westerhof & Bohlmeijer, 2011). Post-hoc tests found no differences between outcomes on measures of mindfulness and acceptance, indicating similar sensitivity to change in relation to these interventions.

Not all studies met the full Jadad quality criteria for RCTs, and studies did not consistently report clear and appropriate methods of randomisation and blinding. We know that RCTs that follow these criteria tend to have smaller effect sizes, therefore it is possible that our review overestimates the effects of self-help mindfulness based interventions. However, sensitivity analyses found no difference in outcomes between higher and lower quality studies and no relationship between study quality and effect size for any outcome measure.

All studies provided a clear account of participant flow through the study and most reported intent-to-treat analysis. Post-hoc analysis revealed no difference in effect sizes between studies reporting intent-to-treat and completer analysis for mindfulness/acceptance or depression outcomes. For anxiety, larger effects were found for studies reporting completer data, indicating potential bias.

Seven studies compared a self-help mindfulness or acceptance-based intervention with only a no-intervention or waiting list control condition which limits the conclusions we can draw about the specificity of intervention effects. Nine of the studies included an active control condition of some kind. Control conditions included self-help CBT (Hesser et al, 2012), applied relaxation self-help (Thorsell et al, 2011) and psychoeducation (Niles et al, 2012). It was welcome to see RCT designs in which change could be more readily attributed to the mindfulness intervention rather than to non-specific factors.

Clinical and Community Implications

This review has demonstrated the potential benefits of self-help interventions that include mindfulness and/or acceptance components across a range of populations including community samples and groups experiencing both mental and physical health difficulties. Our findings suggest that people are able to successfully develop mindfulness and acceptance skills through interventions that require little or no therapist resource. This challenges the widely held view that *face-to-face* teaching of such interventions is an essential ingredient to achieving successful outcomes for participants. This is not to say that the quality of the teaching of such interventions is not a key ingredient, nor that subtle inner qualities of the teacher facilitate change (cf. Crane, Kuyken, Hastings, Rothwell & Williams, 2010) but that these qualities may be successfully conveyed through self-help material (cf. Cavanagh & Millings, 2013b). Moreover, this suggests that self-help interventions that include mindfulness and/or acceptance components may complement and extend the available range of effective self-help materials which was to date been dominated by interventions based on the principles of CBT.

Whilst most studies demonstrated significant improvements on measures of wellbeing for participants, the studies targeting depression did not recruit from mental health services and so the potential benefits of self-help mindfulness and acceptance-based interventions within mental health services cannot be assumed. Further research is required to establish the generalizability, cost-effectiveness and optimization of self-help mindfulness and acceptance-based materials. Bearing these limitations in mind, the evidence to date is consistent with the efficacy of such tools in clinical and community samples, although the widespread implementation of self-help mindfulness and acceptance-based interventions at this point may be premature.

Future Research

Future research could helpfully include: (i) replication and extension of the above findings regarding both efficacy and process of both mindfulness and acceptance-based self-help interventions, using larger scale and more robust designs; (ii) health economic analysis; (iii) trials involving active control groups, component analysis and/or dismantling designs to determine active ingredients; (iv) participants recruited from mental health services, to examine efficacy and acceptability for this population; (v) an exploration of the mediators of change and whether these are consistent with the underpinning theory and evidence from the face-to-face literature; (vi) the development of a general metric for engagement with mindfulness and acceptance-based self-help interventions; (vii) an examination of whether engagement plays a mediating or moderating role in outcome; (viii) an exploration of the utility of including a greater relational element in these self-help approaches (cf. Richardson, Richards & Barkham, 2010; Barazzone, Cavanagh & Richards, 2012); and (viii) a

consideration of the factors that may promote uptake and engagement of mindfulness and acceptance-based self-help interventions.

Conclusions

Self-help materials designed to promote mindfulness and acceptance are widely available and research evaluating their potential benefits is a growing field. Our findings suggest that people are able to successfully develop mindfulness and acceptance skills through interventions that require little or no therapist resource. These interventions may also be helpful in symptom improvement in both non-clinical and clinical populations. Further research is required to establish the mechanisms of change, generalizability, cost-effectiveness and optimization of self-help mindfulness and acceptance-based materials. Self-help mindfulness and acceptance-based interventions might complement and extend the reach of evidence-based practices to enhance wellbeing and reduce distress. This direction of travel accords well with efforts to promote the dissemination of other evidence based psychological interventions and improve access to psychological therapies (e.g. Shafran et al., 2010).

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Table 1.
Selected characteristics for included studies

Authors	Participants	Self-help (SH) / comparison (C)	Mindfulness/ Acceptance intervention	Support	Intervention Duration	Outcome measure			Engagement metrics	Jadad rating (/5)
						Mindfulness/ Acceptance	Depression	Anxiety		
Buhrman et al (2013)	Chronic pain patients with functional impairment recruited from specialty pain clinic	SH: ACT self-help intervention (38) C: Moderated online discussion forum (38)	ACT internet program with downloadable MP3 files	Users submitted homework to their therapist weekly and received feedback within 24 hours (method unspecified). Plus 2 x 30 minute phone calls	7 weeks	CPAQ	HADS-D	HADS-A	Mean 4.2 (SD = 2.7) treatment sections completed 40% completed all 7 sections.	3
Carlbring et al. (2013)	Self-referred people meeting DSM criteria for Major Depressive Episode	SH: Behavioural activation with ACT self-help (40) C: Waiting list control group (40)	Behavioural activation with ACT self-help internet program with workbook and CD	15 minutes therapist support per week.	8 weeks	na	BDI	BAI	5.1 modules completed on average Mean 270 (range 21-1449) minutes spent logged on to site 28% completed all 7 modules of the intervention.	4
Fledderus et al (2012)	Participants in community experiencing mild-moderate symptoms of depression or anxiety	SH1: ACT self-help book with minimal support (N=125) SH2: ACT self-help book with extended support (N=125) C: Waiting list control group (N=126)	ACT self-help book including audio CD with mindfulness practices.	Set emails and responses to participant emails offering advice and instruction 1=3 minutes email contact 2=9 minutes email contact	9 weeks	FFMQ	CES-D	HADS-A	Mean 7.1 (range 4-8) weeks treatment completed Mean 7.4 (range 1-9) emails sent to therapist Participants spent on average 4 hours per week on the programme.	3

Glück & Maerker (2011)	Self-referred adults recruited by e-mail snowball	SH: Web-based mindfulness intervention (N=28) C: Waitlist control (N=21)	Web-based mindfulness course, including invitation to practice mindfulness modules for 20 minutes on 12/14 days.	Reminder emails.	2 weeks	FMI	na	PSS	64% completed 6 or more days of training.	3
Hesser et al (2012)	Participants were community residents with tinnitus distress	SH: Internet-delivered ACT (N=35) C1: Internet-delivered CBT (N=32) C2: Control group – monitored internet discussion forum (N=32)	Internet-delivered ACT self-help manual including mindfulness exercises	Individual emails offering support, advice and clarification Mean number of emails per participant = 10, mean number of minutes per email = 3	8 weeks	TAQ	HADS-D	HADS-A	91% ACT participants completed treatment phase.	4
Jeffcoat & Hayes, (2012)	Teachers	SH: ACT self-help book (N= 121) C: Waitlist control (N=115)	ACT self-help book with a chapter devoted to mindfulness practice (no CD)	6 online quizzes with standardised feedback	8 weeks.	KIMS	DASS-D	DASS-A	64% reported reading whole book and doing exercises.	3
Johnson et al (2010)	People experiencing chronic pain.	SH:ACT self-help book with minimal support (N=12) C: Control group with weekly phone support (N=12)	ACT self-help book including a chapter on mindfulness practice (no CD).	Weekly telephone support	6 weeks	CPAQ	CMDI	BAI	92% completed at least 3 weeks of treatment 50% completed 6 weeks of treatment.	2
Lappalainen et al (2013)	Community males with exhaustion,	SH: CBT and ACT self-help intervention (12)	CBT and ACT based internet intervention with	3 group support meetings (4+2+2 hours total)	3 months	AAQ-II	BDI	na	91% intervention users reported being 'active users' of at	2

	stress or sleeping problems recruited through adverts	C: Waiting list control group (12)	web-portal and 3 mobile phone apps (wellness, fitness and relaxation), heart rate monitor, heart rate belt and pedometer						least one treatment tool.	
Ljotsson et al (2010a)	IBS patients	SH: Internet delivered CBT IBS protocol including mindfulness practice (N=42) C: Online discussion forum (N=43)	CBT IBS protocol including mindfulness practice	Individual emails offering corrective psychoeducation, support and guidance. Mean support time=165 mins (range = 8-315 mins)	10 weeks	na	MADRS-S	na	69% reached the final step of the treatment and engaged in exposure exercises.	3
Meyer et al (2009)	Adults recruited from internet depression forum	SH: Integrative intervention (N=320) C: No Intervention control (N=76)	Web-based integrative intervention for depression (Depraxis) including mindfulness and acceptance module.	none	9 weeks	na	BDI-II	na	97% completed at least 1 session 36% completed 5 or more sessions	3
Morledge et al. (2013)	Community participants recruited through referral and advertising	SH1: Mindfulness-based self-help stress management program (N=183) SH2: Mindfulness-based self-help stress management program with message board (N=184)	Mindfulness-based internet-based self-management program for stress including videos and downloadable audio files in MP3 format	1. Fully automated 2. Message board with moderator to facilitate and lead discussion	8 weeks	MAAS	na	PSS	35% of participants in the ISM arms engaged for more than 5 weeks.	3

		C: No intervention control group (N=184)								
Muto et al (2011)	Japanese college students living in the US	SH: ACT self-help workbook (N=35) C: Waitlist control (N=35)	ACT self-help book with a chapter devoted to mindfulness practice (no CD)	6 online quizzes with standardised feedback. Study-site message board.	8 weeks.	AAQ-II	DASS-D	DASS-A	74% completed at least 1 quiz 83% quizzes completed on average.	2
Niles et al (2012)	Veterans with current diagnosis of combat-related PTSD	SH: Mindfulness Audio CD with support (N=17) C: Psychoeducation (N=16)	Audio CD and mindfulness workbook	Two face-to-face sessions at outset and 20 minute weekly phone calls.	6 weeks	na	na	CAPS	63% completed all readings, 89% completed at least 75% of the readings Mean of 137 (SD = 91) minutes per week mindfulness practice.	2
Thorsell et al (2011)	People with chronic pain recruited from specialty pain clinic	SH: ACT self-help intervention (N=61) C: Applied relaxation self-help intervention (N=54)	ACT self-help book including a chapter on mindfulness practice plus CD.	Initial and end of treatment meetings (90 minutes each), weekly phone support (30 mins each week) plus option to email therapist in between sessions.	7 weeks	CPAQ	HADS-D	HADS-A	63% of those who started ACT treatment completed it.	3
Warnecke et al (2011)	Medical students	SH: Mindfulness CD intervention (N=32) C: No intervention control (N=34)	Audio CD of guided mindfulness practice (30 mins) daily for 8 weeks.	None	8 weeks	na	DASS-D	DASS-A	64% completed record of mindfulness practice Mean 27 (range 0-52) days of mindfulness practice.	4

na = not measured in study

Measures: AAQ-II=Acceptance and Action Questionnaire; BAI=Beck Anxiety Inventory; BDI-II=Beck Depression Inventory – second edition; CAPS=Clinician Administered PTSD Scale; CES-D= Center for Epidemiologic Studies Depression Scale; CMDI= Chicago Multi-scale Depression Inventory; CPAQ= Chronic Pain Acceptance Questionnaire; DASS-A=Anxiety subscale from Depression Anxiety Stress Scales; DASS-D=Depression subscale from Depression Anxiety Stress Scales; FFMQ=Five Facet Mindfulness Questionnaire; FMI=Freiburg Mindfulness Inventory; HADS-A=Anxiety subscale from Hospital Anxiety and Depression Scale; HADS-D=Depression subscale from Hospital Anxiety and Depression Scale; KIMS=Kentucky Inventory of Mindfulness Skills; MAAS = Mindfulness Attention Awareness Scale; MADRS-S= Montgomery Åsberg Depression Rating Scale – Self Report; PSS=Perceived Stress Scale; TAQ=Tinnitus Acceptance; Questionnaire

Figure 1

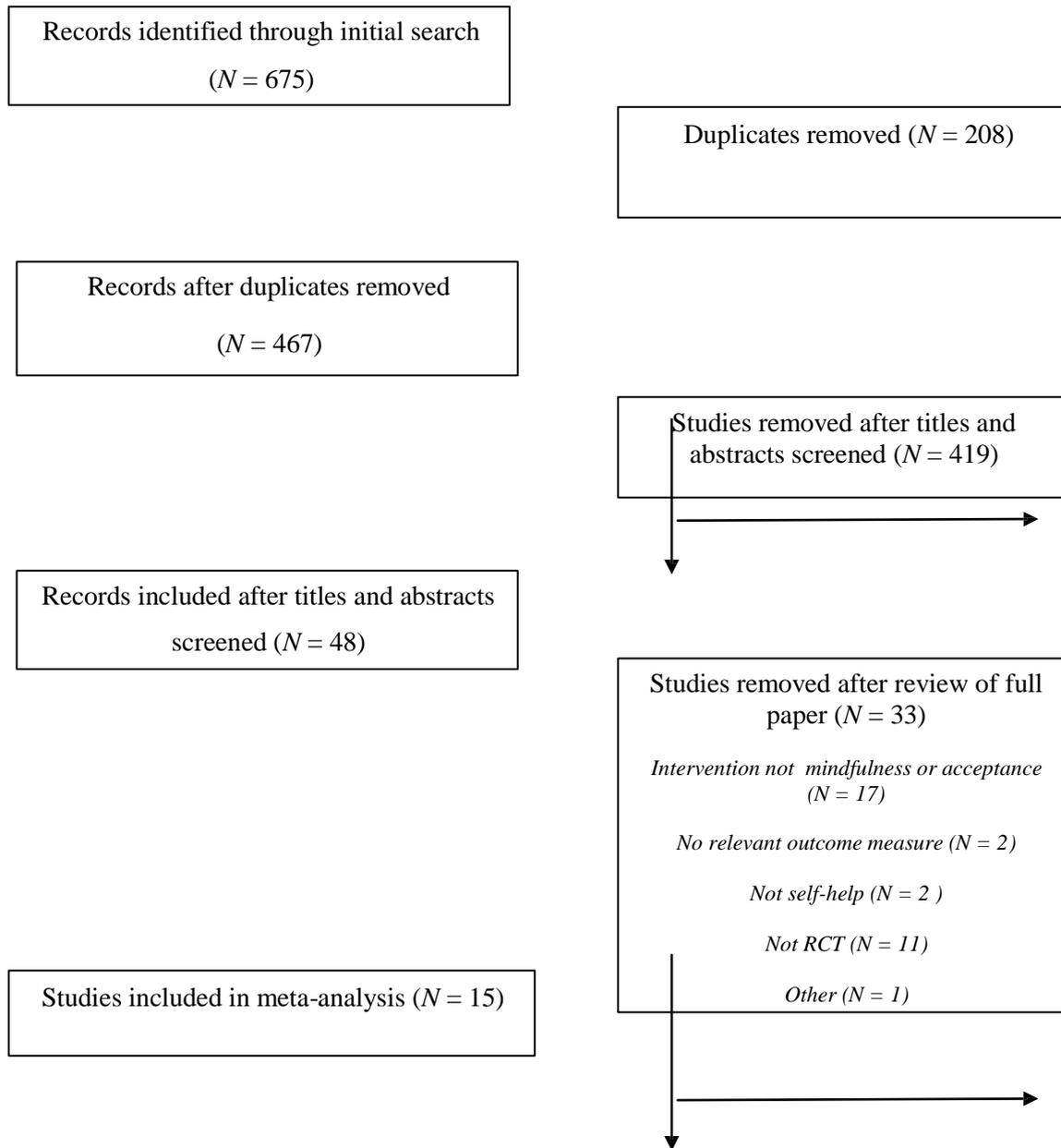


Figure 1. Flow of information from identification to inclusion of studies

NB. In this article, *N* refers to the number of studies; *n* to the number of participants.

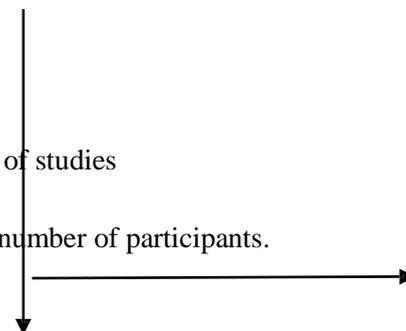
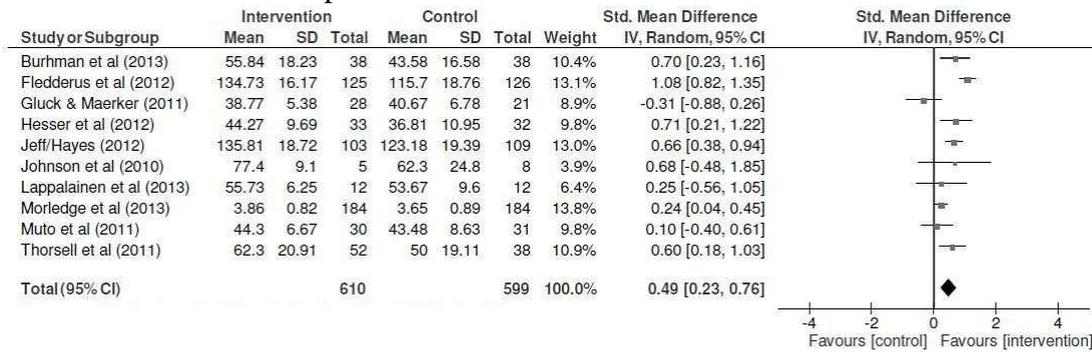
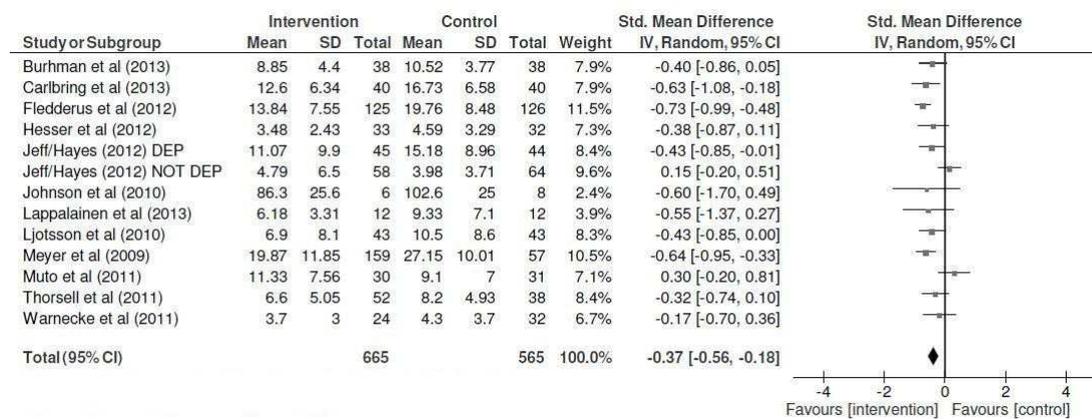


Figure 2. Forest plots of post-intervention between-group effect sizes

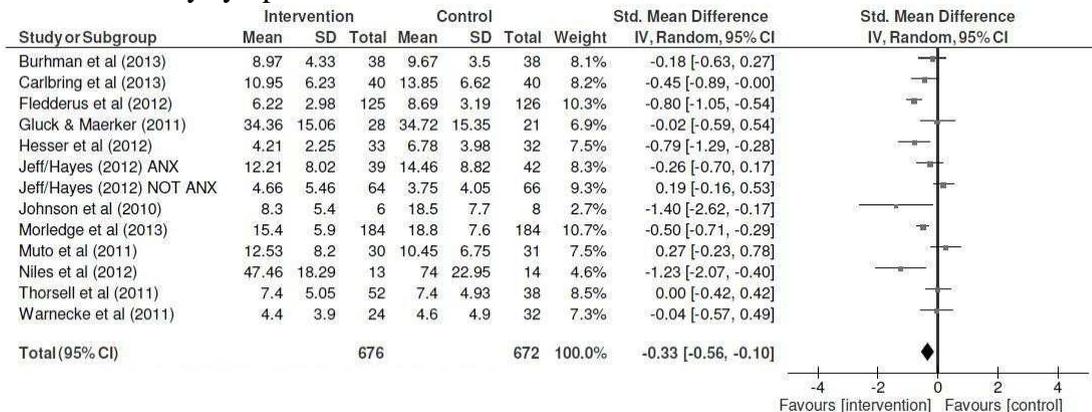
a. Mindfulness/acceptance outcomes



b. Depression symptom outcomes



c. Anxiety symptom outcomes



See Table 1 for details of each study

Figure 3

Funnel plots of post-intervention effect sizes by standard error

