The Effectiveness of Mindfulness-Based Stress Reduction on the Psychological Functioning of Healthcare Professionals: a Systematic Review

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Abstract

Objectives Burnout and occupational stress are frequently experienced by healthcare professionals (HCPs). Mindfulness-based stress reduction (MBSR) has been found to improve the psychological health outcomes of HCPs. To date, systematic reviews and meta-analyses have primarily focused upon empirical investigations into the reduction of stress amongst HCPs using MBSR and are limited to empirical studies published before December 2019. This systematic review aimed to update the current evidence base and broaden our understanding of the effectiveness of MBSR on improving the psychological functioning of HCPs.

Methods Three electronic databases (Medline, Psych Info and Web of Science) were searched without time frame restrictions. Quantitative studies included randomised controlled trials, clinical controlled trials, pre-post designs and studies with up to a 12-month follow-up period. All studies included in the review employed a MBSR programme, standardised measures of psychological functioning and qualified HCPs as participants.

Results Using PRISMA guidelines thirty studies were included in the review. The reviewed literature suggested that MBSR was effective in reducing HCPs experiences of anxiety, depression and stress. MBSR was also found to be effective in increasing HCP levels of mindfulness and self-compassion. However, MBSR did not appear as effective in reducing burnout or improving resilience amongst HCPs. Abbreviated MBSR programmes were found to be as effective as the traditional 8-week MBSR programmes.

Conclusions MBSR is an effective intervention which can help improve the psychological functioning of HCPs. Recommendations include improving the overall quality of the studies by employing more robust controlled designs with randomisation, increased sample sizes with heterogeneous samples, and making active comparisons between interventions used.

Keywords Mindfulness · Mindfulness-based stress reduction · Stress · Burnout · Resilience · Review

HCPs are exposed to emotionally challenging and stressful situations in the workplace, particularly in the current climate, with an increased demand for clinical productivity and other work-related pressures (Schinler et al. 2006). Occupational stress and burnout are common amongst different HCPs, including nurses, physicians and psychologists (Rupert and Morgan 2005; Shanafelt et al. 2003; Vahey et al. 2004).

In relation to burnout, there does not appear to be a universally agreed definition (Farber 1983). However, burnout can be viewed as a process rather than a fixed state (Schulz et al. 1995) and defined as emotional, mental and physical exhaustion caused by excessive and prolonged stress. In relation to employment, Maslach et al. (1996) developed a model of burnout which they described as a work-related...
syndrome with three components: (1) emotional exhaustion, (2) depersonalisation and (3) diminished feelings of personal accomplishment. Emotional exhaustion refers to employees having a reduced ability to experience emotions relating to their work. Depersonalisation is a process which involves employees distancing themselves from their patients by disregarding the characteristics that make them unique. Personal accomplishment relates to employees’ feelings of achievement from working with patients (Maslach et al. 1996, 2001).

Occupational stress and burnout amongst HCPs have been associated with physical and mental health problems, including anxiety, depression, diabetes, fatigue, heart disease, hypertension, insomnia and obesity (Byrant et al. 2000; Miller et al. 1988; Spickard et al. 2002; Weinberg and Creed 2000). Burnout amongst HCPs has also been associated with reduced job satisfaction (Dougherty et al. 2009) and negative patient outcomes, including reduced patient satisfaction and increased work errors (Fahrenkopf et al. 2008; Vahey et al. 2004; Williams et al. 2007).

There is a growing body of research evidence which has suggested that mindfulness-based interventions (MBIs) can help decrease stress and burnout experienced amongst HCPs, increase job satisfaction levels and improve patient outcomes (Escuriex and Labbe 2011; Irving et al. 2009; Shanafelt et al. 2009). Although there are varying definitions of mindfulness, it is commonly and operationally defined as the quality of awareness that occurs through intentionally focusing on present moment experiences in an accepting and non-judgemental manner (Kabat-Zinn 1994).

Mindfulness has become an increasingly popular psychological intervention worldwide; it has an extensive and well-established evidence base which has investigated the efficacy of MBIs to improve the psychological functioning and well-being in both clinical and non-clinical populations (Gu et al. 2015). There are numerous MBIs that are currently being employed with clinical and non-clinical populations; however, mindfulness-based stress reduction (MBSR; Kabat-Zinn 1982) is one of the most extensively used and evaluated MBIs. MBSR was originally designed for patients with chronic medical conditions to help reduce stress and improve their quality of life via focused attention, meditation, cognitive restructuring and adaptive learning techniques (Kabat-Zinn 1990). The standard MBSR program is an 8-week group intervention, where participants meet once weekly for 2 to 3 h and undertake a 6-h silent retreat. Participants are encouraged to complete 45 min of daily mindfulness practice to aid skill generalisation (Virgili 2013). Mindfulness practices are taught via formal practices (e.g. body scan, sitting meditation, mindful walking and hatha yoga) and informal practices whereby individuals are instructed to mindfully engage in typically mindless tasks (e.g. brushing teeth and washing dishes).

There are numerous theoretical models to explain the potential mechanisms of mindfulness and MBIs. A similarity of many of the models is that they postulate that mindfulness causes a positive shift in perspective and an ability to objectively view one’s life experiences, this is often referred to as “decentering” (Baer 2003; Brown et al. 2007; Shapiro et al. 2006). Shapiro et al. (2006) highlighted that mindfulness involves three interwoven mechanisms that form part of a single cyclical process: (1) intention (on purpose), (2) attention (paying attention) and (3) attitude (with openness and non-judgement). Furthermore, these three mechanisms of mindfulness are conceptualised as a single cyclical process and lead to the aforementioned shift in perspective, which Shapiro et al. (2006) referred to as ‘reperceiving’. Reperceiving facilitates an individual’s ability to observe their thoughts and feelings with greater clarity. Reperceiving is classified as a meta-mechanism that then leads to an additional four mechanisms: (1) self-regulation; (2) values clarification; (3) cognitive, emotional and behavioural flexibility; and (4) exposure to strong emotions with objectivity. These additional mechanisms result in changes which then produce positive outcomes (e.g. adaptive coping and reduction in stress).

Kabat-Zinn (2013) suggested that individuals can react to stress in a habitually unhealthy way. These feelings and behaviours are referred to as a ‘habitual or automatic stress reaction’ (Kabat-Zinn 2013). Kabat-Zinn (2013) further highlighted that mindfulness can help individuals employ a ‘mindfulness-mediated stress response’. This process enables individuals to engage in the process of reperceiving, this then reduces the power of the stress reaction, and consequently, individuals can employ more adaptive, effective coping strategies, which in turn reduces stress. With regard to HCPs, the practice of mindfulness encourages a person to ‘check-in’ with their own inner experiences and to better understand their personal strengths, difficulties and best contributions (Pipe et al. 2016). Bishop et al. (2004) proposed a two-component model of mindfulness: self-regulation of attention and acceptance of one’s own experiences (non-reactive awareness). Arguably, non-reactive awareness may help HCPs facilitate the process of ‘decentering’ and ‘reperceiving’ in the workplace. With the development of such skills, HCPs could better manage stress and thus reduce stress and burnout levels.

Over the past decade, research attention has increasingly focused upon the effectiveness and utility of MBSR programmes and several systematic reviews and meta-analyses have been completed. For example, two reviews conducted with a population of healthy adults concluded that, despite available studies being flawed with methodological limitations, MBSR was efficacious in reducing both anxiety and stress and increasing self-compassion (Chiesa and Serretti 2009; Sharma and Rush 2014). Similarly, a meta-analysis concluded that brief versions (e.g. 4–6 weeks) of MBSR were equally as effective in reducing psychological distress in
working adults compared with the MBSR originally designed for clinical populations (Virgili 2013).

Specific reviews have investigated the effectiveness of MBIs on the psychological functioning of HCPs and have concluded that MBIs were effective in increasing mindfulness and self-compassion and reducing anxiety, burnout, stress and rumination (Escuriex and Labbe 2011; Irving et al. 2009; Morgan et al. 2014; Smith 2014). However, the MBIs included in these reviews were not all based on MBSR (Escuriex and Labbe 2011). They were a mixture of qualitative and quantitative studies (Escuriex and Labbe 2011; Irving et al. 2009; Morgan et al. 2014; Smith 2014) and the samples included specific groups of HCPs (e.g. nurses). Furthermore, the variability of the studies included suggested that there was a need for future reviews to focus specifically on the effectiveness of MBSR on the psychological outcomes of different groups of HCPs. Consistent with this, Irving et al. (2009) undertook a review of ten empirical studies examining the potential benefits of MBSR in improving well-being and coping with stress amongst HCPs. From the ten quantitative studies reviewed, Irving et al. (2009) found that MBSR consistently reduced anxiety, emotional exhaustion and stress, whilst also increasing positive affect. However, the review only included published studies until 2007, and many of the studies were noted to have methodological shortcomings, such as small sample sizes and only one study included an additional treatment comparison.

A systematic review and meta-analysis by Burton et al. (2017) included of seven studies which focused on the benefits of MBIs reducing stress in HCPs. Findings from this review suggested that MBIs had the potential to significantly reduce stress experienced amongst HCPs. Although the authors argued that the quality of some studies proved high with regard to their clarity of aims, data collection and analysis, they also found that some studies continued to present with methodological shortcomings, including small sample sizes and limited use of theoretical frameworks. It was concluded that future research needed to investigate the sustaining effects of mindfulness training on stress experienced amongst HCPs. The review included studies published before August 2015.

More recently, Lomas et al. (2019) completed a systematic review and meta-analysis of thirty-eight RCTs which focused on the effect of mindfulness on both qualified and trainee HCPs. The review highlighted that mindfulness helped significantly reduce anxiety, depression, psychological distress and stress levels. Although the effect was smaller, significantly reduced burnout levels were also observed. The review highlighted the importance of assessing participant needs prior to selecting MBI type and that future studies should focus on measuring changes in mindfulness and include active controls. However, only RCTs published before August 2018 were included in this review.

More recent systematic reviews and meta-analyses have not quality assessed a number of existing studies in their reviews, due to their focus being on controlled studies and depending on the similarity of outcome measures so that meta-analytic procedures can be completed. Since the completion of the aforementioned reviews additional studies have been published in this area. Therefore, the systematic review aimed to examine controlled and uncontrolled quantitative studies that investigated the effectiveness of MBSR on the psychological functioning of HCPs more broadly. In addition, the systematic review also examined additional factors which may have influenced MBSR treatment outcomes, namely the nature of self-selected samples, level of mindfulness home practice, participant incentives and treatment dosage and duration. Robust theoretical frameworks and how they apply to the role of mindfulness to HCPs were also considered.

### Method

#### Search Strategy

The systematic review provided an update of Irving et al. (2009) original review. The search was completed in January 2020. Three electronic databases (Psych Info, Medline and Web of Science) were searched without any timeframe restrictions and studies up to December 2019 were included in the search. For the purpose of the review, studies published before 2008 were not included, as no other studies were identified from the
search pre-2008 that had not already been included in other reviews.

Search terms related to the intervention (mindfulness) and the participant group (healthcare professionals/healthcare workers/health care worker) were used for all three databases. The filter peer-reviewed studies were used where possible. Initially, duplicate studies from the three different databases searches were identified and removed accordingly. Titles and abstracts of eligible studies were identified and reviewed. Studies that did not meet the minimum inclusion criteria were eliminated. Remaining relevant citations were obtained in full text and assessed in relation to the inclusion/exclusion criteria, thus identifying a final list of studies for inclusion in the systematic review.

Other resources included in the search strategy were the Cochrane Library, the Mindfulness Journal and the American Mindfulness Research Association’s Mindfulness Research Monthly Newsletter. Figure 1 illustrates the PRISMA diagram (Moher et al. 2009) detailing the different stages of the search strategy for the review.

Fig. 1 PRISMA flow diagram of the different phases of the systemic review, reproduced from Moher et al. (2009) (p.3)

Inclusion and Exclusion Search Criteria

Types of Studies

Studies included in the review had a quantitative methodology or mixed methods (quantitative and qualitative) methodology. Studies were excluded if they solely had a qualitative methodology. Studies had a controlled or uncontrolled pre-post design and included the use of control groups, waiting-list controls or active treatment comparisons. Studies included were published in the English language and from peer reviewed publications.

Types of Participants

Studies included had samples of qualified HCPs working within an academic, clinical and voluntary capacity. Professional disciplines included counsellors, nurses, different specialisms of physicians, mental health workers, occupational therapists, psychologists, psychiatrists, social workers and support staff working within a healthcare setting. Students and in-training HCPs were excluded due to this population
arguably having differing stressors to qualified HCPs (e.g.,

exam conditions, deadlines for assignments and managing

academic and clinical demands). The aim of the review was
to build on previous reviews by broadly including HCPs;
therefore, it was deemed more helpful to keep the stressors
relatively similar. Studies were excluded if the sample were
carers for friends and/or family members.

Types of Interventions

Studies included used MBSR and any modified programmes
derived directly from MBSR (e.g. different programme dura-
tion). Studies were excluded if the content of the MBSR pro-
gramme included additional therapeutic concepts, such as ac-
ceptance and commitment therapy (ACT; Hayes and Wilson
1994), dialectical behaviour therapy (DBT, Linehan, 1993)
and mindfulness-based cognitive therapy (MBCT; Segal et al.
2002). Further, MBSR programmes that included addi-
tional psycho-educational components related to occupational
functioning were excluded (e.g. burnout and leadership).
Studies were also excluded if an audio CD of guided mind-
fulness practice was used solely as the mode of intervention.
Only including MBSR studies strengthened the review be-
cause it allowed for a more direct comparison with MBSR
abbreviated versions and it also allowed for more homogene-
ity, thus extrapolating findings to a likely effective component
of the intervention. No restrictions were applied for the dura-
tion of MBSR interventions or the use of adapted MBSR
interventions.

Types of Outcome Measures

Outcome measures were administered pre-treatment, post-
treatment and where relevant for some studies follow-up. At
least one standardised measure for an area of psychological
functioning was used. Psychological functioning was defined
as an individual’s ability to achieve their goals internal and
external to themselves, and included the individual’s mood,
emotions, mental health and behaviour (Preedy and Watson
2010). Thus, outcome measures included measures of anxiety,
depression, stress, resilience, burnout, self-compassion, men-
tal well-being, psychological distress and mindfulness.
Outcome measures and subscales were excluded if they mea-
sured empathy or compassion towards others, physical health,
ruminating or spirituality.

Quality Assessment Tool

In order to assess the quality of the identified papers, the
Quality Assessment Tool for Quantitative Studies (QATQS)
(National Collaborating Centre for Methods and Tools 2008)
was used. The QATQS was developed by the Effective Public
Health Practice Project (EPHPP 1998) and has been found to
have good content validity and test-retest reliability (Thomas
et al. 2004).

The QATQS measures the methodological rigour of stud-
ies with regard to six components: (1) selection bias, (2) study
design, (3) confounders, (4) blinding, (5) data collection
methods and (6) withdrawal and drop outs. Two final compo-
nents, intervention integrity and analysis, are also incorporat-
ed into the QATQS but a score is not provided for these
sections. Each area is assessed on a quality score of 1 to 3
(1 = strong; 2 = moderate; 3 = weak). Scores for each area are
collated and a global score assigned to each study. If there are
no weak ratings and four strong ratings the study scored
‘strong’; one weak rating and less than four strong ratings
the study scored ‘moderate’; and two or more weak ratings
then the study scored ‘weak’.

QATQS scoring was conducted primarily by the first au-
thor, following the guidelines outlined in the QATQS proto-
col. A dictionary specific to the QATQS is used to maintain
standardised results. Inter-rater reliability of the quality assess-
ment of all the studies was examined between the first and
third authors. Deviations in how aspects of QATQS were
interpreted were noted; however, following further discussion,
no deviations in interpretation were noted.

Results

In total, thirty studies were identified and included in the re-
view using the search method and inclusion and exclusion
criteria detailed above.

Study Quality

The QATQS was employed to review the quality and robust-
ness of the thirty research studies included in the review. The
‘global quality rating’ results indicated that six studies were
assessed as ‘moderate to strong’, five studies as ‘moderate’
and nineteen studies as ‘weak’. A summary of the thirty studi-
es is presented in Table 1. The studies have been ordered with
the most rigorous studies first based on the overall global
quality rating, along with the RCTs and studies with control
groups also ordered first.

Study Characteristics

Four studies employed an RCT design, nine studies employed a
clinical controlled trial (CCT), one study employed a quasi-
experimental design and the sixteen remaining studies
employed a pre-post design with no control or comparison
treatment groups. Three studies utilised a mixed methods de-
sign, including quantitative and qualitative data. Six studies
had a control group, six studies used a waitlist control group,
one study had a control group which offered an advanced
| Author/year               | Purpose                                                                 | Design/method                                | Sample and n | Interventions                                                                 | Measures                                                   | Salient findings and overall global quality rating |
|--------------------------|--------------------------------------------------------------------------|-----------------------------------------------|---------------|-------------------------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------|
| Amutio et al. (2015)     | Acceptability and effectiveness of a long-term educational intervention to reduce physicians’ stress-related conditions | Randomised controlled trial Waitlist control group | Physicians in both public and private practice | Two-phase MBSR programme 8-week initial treatment (8 weekly sessions of 2.5 h over 2 months plus one 8-h retreat) plus 10-month maintenance phase for the experimental group (one session of 2.5 h per month–25 h) 45 min of formal mindfulness practice | 1. Five Facet Mindfulness Scale 2. Maslach Burnout Inventory 3. Qualitative questionnaire 4. Blood pressure and heart rate measures of the intervention group* 5. Record sheet of mindfulness practice | Overall global quality rating: moderate–strong (score = 9). Findings: 1. Intervention group reported significant improvements in mindfulness post-intervention when compared to the control group 2. Intervention group reported significant reductions in burnout emotional exhaustion post intervention when compared to the control group. Limitations: 1. Small sample size 2. Participant characteristics may have affected observed outcomes 3. Two outliers with high levels of burnout (2 control, 1 intervention) were included in the analyses 4. Lack of control group in the second phase of the study |
| Duchemin et al. (2015)   | A small randomised pilot study of a workplace mindfulness-based intervention for surgical intensive care unit personnel: Effects on salivary amylase levels | Randomised controlled trial Waitlist control group | Personnel from a large academic medical centre. | Low-dose 8-week MBSR programme 7 sessions of 1 h and one session of 2 h 20 min of daily mindfulness practice | 1. Perceived Stress Scale (PSS) 2. Depression Anxiety Stress Scale (DASS) 3. Maslach Burnout Inventory 4. Professional Quality of Life Measure 5. Five Facet Mindfulness Questionnaire 6. Salivary amylase levels* | Overall global quality rating: moderate–strong (score = 9). Findings: 1. No significant changes in perceived stress levels pre and post-intervention on the PSS, however, stress levels on the DASS significantly reduced in the intervention group post-intervention and maintained when compared to waitlist controls 2. Scores for emotional exhaustion decreased, however, were not significant pre and post-intervention 3. No significant differences observed for personal accomplishment and depersonalisation 4. The observation facet score significantly increases post intervention and maintained when compared to waitlist controls. |
| Author/year | Purpose | Design/method | Sample and n | Interventions | Measures | Salient findings and overall global quality rating | Limitations |
|-------------|---------|---------------|--------------|---------------|----------|-----------------------------------------------|-------------|
| Martin-Asuero et al. (2014) | Effectiveness of a mindfulness education programme in primary health care professionals: A pragmatic controlled trial | Randomised controlled trial | Primary care professionals from a health institute including physicians, nurses, social workers and clinical psychologists | MBSR 8 sessions 2.5 h per week plus 1-day session of 8 h | 1. Maslach Burnout Inventory 2. Profile of Mood States 3. Jefferson Scale of Physician Empathy* 4. Five Facets Mindfulness Questionnaire 5. Questionnaire on changes in personal habits and mindfulness practice | Overall global quality rating: moderate–strong (score = 9). | 1. Self-administered questionnaires 2. Small sample size which was not gender representative due to participants being mostly women 3. No follow-up 4. Self-selection of participants 5. Lack of active control group. |
| Moody et al. (2013) | To investigate the effects of a mindfulness-based course on burnout of paediatric oncology staff | Randomised controlled trial | Nurses, social workers, physicians, nurse practitioners, psychologists and child-life specialists from two children's hospitals | 8-week MBSR programme 1 initial 6 h session; 6 weekly 1 h follow-up sessions and a final 3 h session Daily 10–20-min formal mindfulness practice | 1. Maslach Burnout Inventory 2. Perceived Stress Scale 3. Beck Depression Inventory 4. Daily logs of mindfulness practice 5. Daily journal of feelings at work | Overall global quality rating: moderate–strong | 1. No significant changes in burnout, stress and depression between group post intervention. |
| Author/year (year) | Purpose | Design/method | Sample and n | Interventions | Measures | Salient findings and overall global quality rating |
|--------------------|---------|---------------|--------------|---------------|----------|--------------------------------------------------|
| Pipe et al. (2009) | To investigate the effects of a mindfulness meditation programme for stress management on nurse leaders stress | Randomised controlled trial | Nurses in supervisor positions from a healthcare system | 4-week MBSR programme | 1. Symptom Checklist-90-Revised | 5. Previous mindfulness experience not noted. |
|                    |         | Control group: Advanced stress and leadership strategies course | Participants n = 33 Control n = 17 Intervention n = 16 Final n = 32 Control n = 17 Intervention n = 15 Gender: Male, 3% Female, 97% Mean age: Control, 49.4 Experimental, 50.2 Ethnicity information not documented. | 4 h sessions Daily 30-min practice Overall participation for all sessions: Intervention = 26.7% Control = 52.9% MBSR teacher. | 2. Caring Efficacy Scale* | Overall global quality rating: moderate–strong (score = 8). |
| Wang et al. (2017) | The effects of mindfulness-based stress reduction on hospital nursing staff | Controlled clinical trial | Hospital nursing staff | 8-weeks MBSR programme, 3 h per week and 1-day retreat | 1. Five Facet Mindfulness Questionnaire 2. Nurse Stress Checklist | 1. Intervention group reported significant more improvements in stress symptoms that controls 2. Intervention group reported significant more improvements in symptom distress and severity than controls 3. Intervention group reported nearly significant more improvements in symptom frequency than controls. | Overall global quality rating: moderate–strong (score = 9). |
|                    |         | Quasi-experimental design and 3- and 6-month follow-up Control group (Humanities class) Intervention group Non-intervention group | Participants n = 78 Control n = 35 MBSR group n = 31 Non-intervention group n = 12 Final n = 66 Control n = 29 MBSR group n = 26 Non-intervention group n = 11 Gender: Female, 100% Mean age, 22.7 Ethnicity information not documented. Self-selected sample. | Overall participation: not noted. Qualified MBSR teacher and a psychologist. | | Limitations: 1. Not an RCT 2. Small sample size 3. Longer follow-up |
| Author/year                  | Purpose                                                                 | Design/method                        | Sample and n | Interventions                                                                 | Measures                                                                 | Salient findings and overall global quality rating |
|-----------------------------|--------------------------------------------------------------------------|---------------------------------------|--------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------|
| Verweij et al. (2016)       | Mindfulness-based stress reduction for GPs                               | Controlled clinical trial Mixed methods design                        | GPs affiliated with training hospitals  
  Participants n = 50  
  Waitlist control group: 20  
  Intervention group: 30  
  Final n = 43  
  Waitlist control group: 20  
  Intervention group: 23  
  Gender:  
  Waitlist control group:  
  Male, 60%  
  Female, 40%  
  MBSR group:  
  Male, 70%  
  Female, 30%  
  Mean age:  
  Waitlist control group, 56.0  
  MBSR group, 54.5  
  Ethnicity information not documented.  
  Self-selected sample and  
  MBSR programme was offered as part of a regular CPD programme and accredited by the professional bodies. | 8 weekly MBSR programme, sessions lasting 2.5 h and 1 day silent retreat  
  30-45 min daily formal mindfulness practice  
  Overall participation: Not noted.  
  Two MBSR teachers, a GP/psychotherapist and psychologist/psychotherapist. | 1. Utrecht Burnout Scale  
  2. Utrecht Work Engagement Scale  
  3. Jefferson Scale of Empathy  
  4. Five Facet Mindfulness Questionnaire | 4. The effects of mindfulness on the therapist’s personal experiences can produce therapeutic effects.  
  Overall global quality rating: moderate (score = 10).  
  Findings:  
  1. Intervention group reported a greater decrease in depersonalisation than the waitlist control group post-intervention  
  2. Mindfulness skills increased significantly in the intervention group compared with the waitlist control group post-intervention.  
  Limitations:  
  1. Lack of randomisation  
  2. Important baseline differences between the GPs that participated in the MBSR programme during the first period than those in the second period  
  3. Self-selected sample  
  4. No follow-up period. |
| Manotas et al. (2014)        | To investigate the effects of brief mindfulness training on stress and distress in Columbian HCPs | Clinical controlled trial Control group | Healthcare professionals including medical doctors, nurses, support staff, scientists, physical therapists, mental health professionals, dentist, veterinarian and nutritionist  
  Participants n = 131  
  (65 control, 66 intervention)  
  Final n = 83  
  (43 Control, 40 Intervention)  
  Gender:  
  Male, 9.6%  
  Female, 90.4% | Adapted 4-week MBSR programme  
  2-h sessions  
  Daily 25-min mindfulness practice  
  Overall participation: Not noted.  
  Primary researcher was the MBSR teacher. | 1. Brief Symptom Inventory-18  
  2. Perceived Stress Scale  
  3. Five Facet Mindfulness Questionnaire-Lo-ng Form | Overall Global Quality Rating: Moderate (Score = 10).  
  Findings:  
  1. Intervention group reported significant increases in the mindfulness facets of observing, non-judging and overall mindfulness than control group  
  2. No significant effects for mindfulness facets of describing, acting with awareness and non-reacting  
  3. Intervention group reported significant reduction in anxiety,
| Author/year | Purpose | Design/method | Sample and n | Interventions | Measures | Salient findings and overall global quality rating |
|------------|---------|---------------|--------------|---------------|----------|-------------------------------------------------|
| Schroeder et al. (2016) | A brief mindfulness-based intervention for primary care physicians: A pilot randomised controlled trial | Controlled clinical trial and 3-month follow-up Waitlist control group. | Primary care physicians recruited from family medicine and internal medicine departments within a health organisation Participants n = 33 Waitlist control group n = 16 Intervention group n = 17 Final n = 26 Waitlist control group n = 13 Intervention group n = 13 Gender: Male, 27%; Female, 73%; Mean age, 42.76 Ethnicity information not documented. Randomisation of a self-selected sample. | Mindful Medicine Curriculum based on MBSR 13-h weekend training programme plus 2-h follow-up sessions Overall participation: not noted. Status of teacher not noted. | 1. Mindful Awareness Attention Scale 2. Brief Resilience Scale 3. Perceived Stress Scale 4. Santa Clara Brief Compassion Scale © 5. Maslach Burnout Inventory 6. Meditation Practice Questionnaire 7. Patient Self-Reported Satisfaction with Primary Care Physician © | Overall global quality rating: moderate (score = 10). Findings: 1. Intervention group reported significant improvements in stress, mindfulness, emotional exhaustion and depersonalisation post-intervention when compared to the control group 2. Improvements were maintained at 3-month follow-up 3. There was no significant improvement in resilience and personal achievement post-intervention. Limitations: 1. Small sample size 2. Sample size was too small to detect improvements on other outcome measures 3. Self-selected sample 4. Enhanced social support was not controlled for. |
| Ducar et al. (2019) | Mindfulness for healthcare providers fosters professional quality of life and mindful attention | Pre-post design, follow-up at 3 and 6 months No control group | Volunteer emergency medical service providers including medics, | 8-week adapted MBSR programme, 2.5-h sessions and an additional 7-h silent retreat Overall participation: not noted. | 1. Perceived Stress Scale | Overall global quality rating: moderate (score = 11). Findings: |
Table 1 (continued)

| Author/year | Purpose | Design/method | Sample and n | Interventions | Measures | Salient findings and overall global quality rating |
|-------------|---------|---------------|--------------|---------------|----------|-------------------------------------------------|
| Goodman and Schorling (2012) | To investigate the effects of a meditation course on decreasing burnout and improving mental well-being in different HCPs | Pre-post design, No control-group | Healthcare providers who practiced in community and university settings including physicians, nurses, psychologists and social workers. Participants: n = 93, Final n = 73. Gender: Male, 35%; Female, 65%; No age or ethnicity information documented. Self-selected sample and participants paid for the intervention. | 8-week MBSR programme. 2.5-h sessions. 7-h retreat. 45 min mindfulness practice 6 days per week. Overall participation: 97% attended at least 4 sessions. Experienced MBSR teachers. | 1. Maslach Burnout Inventory. 2. SF-12v2 Health Survey Questionnaire. | Overall global quality rating: moderate (score = 11). Findings: 1. Significant improvements for emotional exhaustion, depersonalisation and personal accomplishment post-intervention. 2. Significant improvements for mental well-being. Limitations: 1. No control group. 2. No follow-up data. 3. No measure of mindfulness which could provide valuable information regarding the mechanisms by which mindfulness is beneficial. |
| Crowder and Sears (2017) | Building resilience in social workers: An exploratory study on the impact of a mindfulness-based intervention | Clinical controlled trial and follow-up at 13-week follow-up, 26-week follow-up for the intervention. | Social workers. Participants: n = 14, Waitlist control n = 7, Intervention n = 7. Gender: | MBSR 2.5-h group session for 8 weeks. Overall participation: not noted. MBSR teacher was the primary investigators. | 1. Perceived Stress Scale. 2. Self-Compassion Scale. 3. Experiences Questionnaire*. | Overall global quality rating: weak (score = 11). Findings: 1. Intervention group reported significantly reduced stress levels post-intervention compared to the waitlist control group, however, |
Table 1 (continued)

| Author/year | Purpose | Design/method | Sample and n | Interventions | Measures | Salient findings and overall global quality rating |
|-------------|---------|---------------|--------------|---------------|----------|-------------------------------------------------|
| Duarte and Pinto-Gouveia (2016) | Effectiveness of a mindfulness-based intervention on oncology nurses’ burnout and compassion fatigue symptoms: a non-randomised study | Clinical controlled trials | Oncology nurses from two hospitals, n = 48 (45 intervention) | Mindfulness group based on MBSR 2-4 sessions of 2-4h, 6 weeks | 1. Professional Quality of Life Scale 2. Depression, Stress, Anxiety Scale 3. Acceptance and Action Questionnaire* 4. Ruminative Responses Scale-Short* 5. Five Facet Mindfulness Questionnaire 6) Self-Compassion Scale | Overall global quality rating: weak (score = 11). Findings: 1. Intervention group reported a significant reduction in burnout and stress post-intervention compared to waitlist control group 2. Intervention group reported significant increases in mindfulness and self-compassion post-intervention, and improvements regarding observing and non-judging maintained when compared to controls 3. Participants that practiced more mindfulness showed greater reductions in burnout and depression and greater increases in self-compassion compared with those that practiced less. Limitations: |
|Male: 3, Female: 16 | Male: 3, Female: 26 | Waitlist control | | Teacher of the intervention was also trained in MBSR. | | |
| Author/year          | Purpose                                                                 | Design/method                                   | Sample and n                                                                 | Interventions                                      | Measures                                      | Salient findings and overall global quality rating |
|----------------------|-------------------------------------------------------------------------|-----------------------------------------------|----------------------------------------------------------------------------|----------------------------------------------------|-----------------------------------------------|-------------------------------------------------|
| Geary and Rosenthal  | To investigate the effect of MBSR on academic healthcare employees stress, well-being and spiritual experiences | Controlled clinical trial and 1 year follow-up | Nurses and respiratory therapists in a university medical branch and neonatal services Participants \( n = 108 \) (49 control, 59 intervention) Final \( n = 91 \) (37 control, 54 intervention) Gender Control: Male, 4% Female, 96% Intervention: Male, 15% Female, 85% Mean age: Control, 42 Intervention, 48 Ethnicity: Control: 55% White, 14% Hispanic, 11% African American, 17% Asian Intervention: 75% White, 18% Hispanic, 2% African American, 5% Asian Self-selected sample. Nurses working in two hospitals | 8-week MBSR programme 3 h per week 8-h retreat Overall participation: Cumulative completion = 89% Certified MBSR teacher. | 1. Symptom Checklist Revised-90-Revised 2. Perceived Stress Scale 3. SF-36 Health Survey Questionnaire 4. Daily Spiritual Experiences Scale* | Overall global quality rating: weak (score = 11). Findings: 1. Significant improvements in stress, psychological distress and mental well-being post-intervention compared to controls 2. Improvements maintained at 1-year follow-up. Limitations: 1. Not randomised 2. No blinding 3. Significant difference between groups regarding percentage of patient care 4. Possible selection bias. |
| Norouzinia et al. (2017) | The effect of mindfulness-based stress reduction training on stress and burnout of nurses | Controlled clinical trial | Nurses working in two hospitals Participants \( n = 60 \) Control group \( n = 30 \) Intervention group \( n = 30 \) No attrition data. | MBSR programme - No further details documented. Overall participation: Not noted. Teacher status not noted. | 1. Nurse Stress Scale 2. Maslach Burnout Inventory | Overall global quality rating: weak (score = 11). Findings: 1. Significant reduction in job stress and three aspects of burnout post-intervention. |
| Author/year          | Purpose                                                                 | Design/method                                                                 | Sample and n                          | Interventions                                                                 | Measures                                                                                      | Salient findings and overall global quality rating |
|---------------------|-------------------------------------------------------------------------|--------------------------------------------------------------------------------|--------------------------------------|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|-----------------------------------------------|
| Bazarko et al. (2013) | To investigate the effects of an innovative MBSR programme on health and well-being of nurses | Pre-post design and 4-month follow-up | Nurses within a large healthcare organisation | Participants, n = 41 Final n = 36 Gender: Male, 0%; Female, 100%; Mean age, 52.2 Ethnicity information not documented. Self-selected sample. | Group telephonic MBSR (tMBSR) sessions Two 8-h person retreats 6 weekly 1.5-h group tele-conference calls, email contact between sessions Daily 25–30-min mindfulness practice Overall participation: Person retreat, 86.9%; Teleconference hours, 87.8% MBSR instructor. | 1. The Perceived Stress Scale 2. Copenhagen Burnout Inventory 3. SF-12v2 Health Survey Questionnaire 4. Brief Serenity Scale* 5. Jefferson Scale of Physician Empathy* 6. The Self-Compassion Scale 7. Log of amount and type of participation | Overall global quality rating: weak (score = 12). Findings: 1. Significant reduction in stress and burnout post-intervention and maintained at 4-month follow-up 2. Significant improvements in mental health and self-compassion post-intervention and maintained at 4 months follow-up 3. Participants who maintained mindfulness practice had lower stress and burnout and higher self-compassion. Limitations: 1. No control group 2. Small and self-selected sample 3. Unaware of previous MBSR and meditation experience 4. Homogenous sample as all female nurses 5. Incentives for participation could positively bias results. |
| Ceravolo and Raines (2019) | The impact of a mindfulness intervention on nurse managers | Pre-post design and 3 months follow-up | Nurse managers at an acute care hospital, including a perinatal centre and adult beds | Participants, n = 13 Final n = 12 No information regarding gender, age and ethnicity was recorded. Self-selected sample. | Weekly 60-min sessions for 8 weeks based on MBSR principles and exercises Overall participation: Not noted. Mindfulness expert was the teacher. | 1. Quality of Life Inventory* 2. Copenhagen Burnout Inventory 3. Perceived Wellness Scale | Overall global quality rating: weak (score = 12). Findings: 1. Significant improvements in burnout (personal and work-related) scores post intervention, however improvements were not maintained at 3-month follow-up 2. There were negligible changes in perceived wellness post-intervention. Limitations: |
| Author/year         | Purpose                                                                                                                             | Design/method             | Sample and n                                   | Interventions                                                                                           | Measures                                                                 | Salient findings and overall global quality rating |
|---------------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------------------|-----------------------------------------------|--------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------|
| Dobie et al. (2016) | Preliminary evaluation of a brief mindfulness-based stress reduction intervention for mental health professionals                | Pre-post design           | Mental health professionals working in a non-acute inpatient mental health unit (nursing, social work, occupational therapy and psychology) Participants n = 9 Final n = 9 Gender, age and ethnicity not documented. Self-selected sample. | 8 weeks of daily 15-min MBSR training with three 30-min education sessions during weeks 2, 4 and 6 Overall participation, 100% Status of teachers not noted. | 1. Depression Anxiety Stress Scale 2. Kentucky Inventory of Mindfulness Skills | 1. Small sample size and all participants employed by the same organisation 2. Self-selected sample 3. Lack of control group Overall global quality rating: weak (score = 12). Findings: 1. Significant reductions in anxiety and stress post-intervention 2. Observed reductions in depression post-intervention but were not significant 3. Reported increases in the mindfulness observe skill post-intervention but were not significant Limitations: 1. Only observations from a treatment group 2. No control group 3. Data was not collected on caseload acuity and complexity or workplace environment 4. No follow-up data. |
| Gaspar et al. (2018) | Exploring the benefits of a mindfulness programme for Portuguese public healthcare workers                                           | Pre-post design           | Public health workers at a blood and transfusion centre Participants n = 51 Final n = 26 Gender (Final): Male, 34.6% Female, 65.4% Mean age, 44.58 Ethnicity information not documented. Self-selected sample. | Mindfulness intervention following the structure of MBCT 45-min daily mindfulness sessions for 11 weeks Mean participation: 35.42 h Status of teacher not noted. | 1. Five Facet Mindfulness Questionnaire 2. Depression, Anxiety and Stress Scale 3. Positive and Negative Affect Schedule 4. Self-Compassion Scale 5. Compassion Scale* 6. Interpersonal Reactivity Index* | Overall global quality rating: weak (score = 12). Findings: 1. Significantly higher scores in acting with awareness and self-compassion scores post-intervention 2. Marginal significant results with regard to an increase in positive affect and describing and decrease in negative affect, stress. Limitations: 1. Small sample size 2. Self-selected and non-randomised 3. Self-report questionnaires 4. Average time practising mindfulness was too short 5. A large variation of attendance between participants thus |
| Author/year                      | Purpose                                                                 | Design/method                                   | Sample and n         | Interventions                                                                 | Measures                                                                                       | Salient findings and overall global quality rating |
|----------------------------------|-------------------------------------------------------------------------|--------------------------------------------------|----------------------|-------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------------------------------------------|
| Martin-Asuero and Garcia-Banda (2010) | To investigate the effects of MBSR on HCPs psychological distress | Pre-post design and 3-month follow-up Two intervention groups No control group | HCPs in hospitals and primary care centres Doctors, nurses, psychologists, educational professionals and service industry employees Participants n = 29 Final n = 27 Gender: Male, 17% Female, 83% Mean age, 41.1 No ethnicity information documented. Self-selected sample. | 8-week MBSR Programme 2.5-h per session plus one 8-h session Daily 45-min mindfulness practice Overall participation: 92% MBSR teacher was the first author of this study. | 1. Symptom Checklist-90-Revised 2. Survey of Recent Life Experience* 3. Perceived Stress Scale 4. Positive and Negative Affect Scale 5. Emotional Control Questionnaire* | Overall global quality rating: weak (score = 12). Findings: 1. A significant reduction in psychological distress post-intervention 2. A significant reduction in negative affect post-intervention 3. All improvements maintained at 3-month follow-up 4. Reduction in stress but not significant. Limitations: 1. Self-selected sample 2. No control group 3. Intervention effects on the group were not isolated. |
| Pflugeisen et al. (2016)          | Brief video-module administered mindfulness programme for physicians: a pilot study | Pre-post design and 2-month follow-up No control group | Physicians in a community hospital setting Participants n = 23 Final n = 19 Gender: Male, 60.9% Female, 39.1% Mean age, 46 Ethnicity information not documented. Self-selected sample. | 8-week MBSR training 3 90-min in person trainings Weekly online 5–7-min video module trainings Weekly 1-h teleconference coaching calls Overall participation: not noted. Programme delivery was one of the authors, and family medicine physician and certified professional coach. | 1. Perceived Stress Scale 2. Maslach Burnout Inventory 3. Kentucky Inventory of Mindfulness Skills 4. Participant use of mindfulness | Overall global quality rating: weak (score = 12). Findings: 1. Significant reductions in stress, personal accomplishment and emotional exhaustion was observed post-intervention and at 8-weeks follow up 2. Significant increases in mindfulness skills post-intervention, with increases in describing, acting with awareness and accepting without judgement maintaining 8-week follow up. Limitations: 1. Small sample size 2. Self-selected sample 3. Without a control population 4. Limited self-reported data. |
| Raab et al. (2015)                | Mindfulness-based stress reduction and self-compassion amongst mental healthcare professionals: a pilot study | Pre-post design No control group | Mental healthcare professionals working in a large mental healthcare centre Participants n = 22 | MBSR programme 8 weekly 2.5-h long classes with 1 day of silence Overall participation: Not noted. Certified MBSR teachers. | 1. Self-compassion scale 2. Maslach Burnout Inventory | Overall global quality rating: weak (score = 12). Findings: 1. Self-compassion significantly improved post intervention |
| Author/year | Purpose | Design/method | Sample and n | Interventions | Measures | Salient findings and overall global quality rating |
|-------------|---------|---------------|--------------|--------------|----------|--------------------------------------------------|
| Suyi et al. (2017) | Effectiveness of mindfulness intervention in reducing stress and burnout in mental health professionals in Singapore | Pre-post design and follow up at 3 months | Mental health professionals including nurses, occupational therapists, social workers, case managers, pharmacists, psychologists/counsellors and researchers | Mindfulness programme based on MBSR, 6 2-h sessions once per week for 6 weeks 30 min of formal meditation practice Overall participation: Attended all 6 sessions, 45% Certified MBSR teacher with 2 MBCT certified teachers as co-facilitators. | 3. Quality of Life Inventory* | 2. No statistically significant changes for burnout post-intervention. Limitations: 1. Open trial design 2. Self-selected sample 3. Not randomised 4. Lack of control group 5. Included an additional Loving Kindness meditation to the standard MBSR techniques thus this could have biased the findings. |
| Ando et al. (2011) | To investigate the effect of mindfulness-based meditation therapy on nurses’ sense of coherence and mental health | Controlled clinical trial | Nurses working on a ward with elderly patients | Adapted MBSR programme Two sessions within a 2 week period Mindfulness home practice Overall participation: Not noted. | 1. General Health Questionnaire | Overall global quality rating: weak (score = 13). Findings: 1. Significant deduction in anxiety and depression post-intervention. Limitations: 1. Small sample size |
| Author/year | Purpose | Design/method | Sample and n | Interventions | Measures | Salient findings and overall global quality rating |
|------------|---------|---------------|--------------|---------------|----------|--------------------------------------------------|
| Brady et al. (2012) | To investigate the effect of mindfulness meditation on managing work stress and improving patient outcomes | Pre-post design and 3-month follow-up | Acute psychiatric inpatient unit | 4-week MBSR group | 1. Mental Health Professionals Stress Scale 2. The Toronto Mindfulness Scale 3. Maslach Burnout Inventory | Overall global quality rating: weak (score = 13). Findings: 1. Significant reduction in stress post-intervention and at 3-month follow-up 2. Significant increase in mindfulness post-intervention and at 3-month follow-up 3. No significant reduction in emotional exhaustion and depersonalisation, there was an improvement in personal accomplishment but it was not significant. Limitations: 1. Small sample size 2. Not controlled nor randomised 3. Sampling bias 4. Did not take into account personality traits or cultural background 5. Response bias on measures 6. No comparison group |}

| Hallman et al. (2018) | To investigate the effects of MBSR on staff stress in a high-acuity psychiatric inpatient unit | Pre-post design and 2-month follow-up | Nurses, teachers social worker, activity therapist and physician from a high-acuity inpatient child/adolescent psychiatric unit | MBSR 4 45-min classes offered over 8 days Daily 15-min meditation practice as part of their shift Overall participation: 12 of the 15 participants attended all sessions Principal investigator was the MBSR teacher. | 1. Toronto Mindfulness Scale 2. Perceived Stress Scale | Overall global quality rating: weak (score = 13). Findings: 1. Significant reductions in stress post-intervention and maintained at 2 months follow-up 2. Significant increase in mindfulness post-intervention and maintained at 2-month follow-up. Limitations: 1. Small sample size 2. Self-selected participants 3. Response bias due to self-report measures |
| Author/year                  | Purpose                                                                 | Design/method                        | Sample and n                      | Interventions                                                                 | Measures                                                                 | Salient findings and overall global quality rating |
|-----------------------------|-------------------------------------------------------------------------|---------------------------------------|-----------------------------------|--------------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------|
| Fortney et al. (2013)       | To investigate the effects of an abbreviated mindfulness intervention on health and well-being of primary care clinicians | Pre-post design and 9-month follow-up Two intervention groups No control-group | Doctors, nurse practitioners and physician assistants in departments of family medicine, internal medicine and paediatrics Participants \( n = 30 \) Final \( n = 23 \) Gender Male, 40% Female, 60% Mean age, 40.5 Ethnicity: 97% White 3% Hispanic Self-selected sample. | Abbreviated version of the 8-week MBRS programme 14 h over a weekend 2 2-h follow up sessions Daily 10–20 min of mindfulness practice Overall participation: not noted. Mindfulness teachers. | 1. Maslach Burnout Inventory 2. Depression, Anxiety and Stress Scale 3. Perceived Stress Scale 4. Resilience Scale 5. Santa Clara Compassion Scale* | Overall global quality rating: weak (score = 13). Findings: 1. Significant improvements in emotional exhaustion, de-personalisation and personal accomplishment post-intervention and at 9 months 2. Significant reductions in anxiety, depression and stress post-intervention and at 9 months 3. No significant improvements in resilience. Limitations: 1. Uncontrolled pilot study 2. Lack of control group 3. Small sample size and self-selected participants 4. Group effects versus actual practice of mindfulness |
| Cucarella and Gianinni (2016) | Effectiveness of a pilot mindfulness programme in volunteers of a breast cancer association | Pre-post design No control group | Volunteers of a foundation that supports women with breast cancer Participants \( n = 7 \) No attrition data. Gender: Female, 100% Mean age, 46.7 Ethnicity information not documented. Self-selected sample and voluntary workers. | 8-week MBRS programme 2.5 hourly sessions Overall participation: not noted. Status of teacher not noted. | 1. Positive and Negative Affect Scale 2. Hospital Anxiety and Depression Scale 3. Professional Quality of Life Measure | Overall global quality rating: weak (score = 14). Findings: 1. Significant reductions in anxiety and depression post-intervention 2. No significant differences found in burnout nor positive and negative affect pre- and post-intervention. Limitations: 1. Small sample size 2. No control group 3. No follow-up. |
| Trowbridge et al. (2017)    | Preliminary investigation of workplace-provided mindfulness-based stress reduction with paediatric medical social workers | Pre-post design No control group | Social workers employed by a regional children’s healthcare system Participants \( n = 43 \) Final \( n = 21 \) | Compressed MBRS (cMBRS) programme Two days 20 min formal mindfulness practice Overall participation: not noted. | 1. Professional Quality of Life 2. Perceived Stress Scale-10 Item | Overall global quality rating: weak (score = 14). Findings: 1. Significant increase in mindfulness post-intervention |
| Author/year                     | Purpose                                                                 | Design/method                          | Sample and n | Interventions                                                                 | Measures                                                                 | Salient findings and overall global quality rating |
|---------------------------------|--------------------------------------------------------------------------|----------------------------------------|--------------|-------------------------------------------------------------------------------|--------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| van Wietmarschen et al. (2018)  | Effects of mindfulness training in perceived stress, self-compassion and self-reflection of primary care physicians: A mixed-methods approach | Pre- and post-design and 6 months follow-up Mixed methods design No control group | Primary care physicians Participants n = 54 Post-intervention n = 51 Follow-up n = 23 Gender: Male, 22% Female, 78% Mean age, 40 Ethnicity information not documented. Self-selected sample and participants paid $750 dollars for the programme and the training was accredited by the Royal Dutch Medical Association. | Adapted MBSR programme 8 weekly group sessions totalling 26 h Overall participation: Not noted. Two qualified MBSR teachers. | 1. Perceived Stress Scale 2. Self-Compassion Scale 3. Groningen Reflection Ability Scale* | Overall global quality rating: weak (score = 14). Findings: 1. Significant reductions in stress post-intervention 2. Significant increases in self-compassion post-intervention 3. Improvements were maintained at 6-month follow-up. Limitations: 1. Not a randomised design 2. Lacked an appropriate control group 3. Self-selected sample 4. Reduced response rates at 6-months follow-up |

*All measures in italics refer to measures that have not be included in the systemic review
stress and leadership strategies course and another study had a
course group which attended a humanities class. No studies
included a treatment comparison group. Thirteen studies col-
lected follow-up data, ranging from 2 months to 1 year.

Study Populations and Settings

Participant numbers ranged from a minimum of twelve to a
maximum of ninety-three and the total number of participants
(final n) across all thirty studies included in the review was
1053. Twenty-six studies included gender information of par-
icipants. With the exception of three studies (Ducar et al.
2019; Pflugeisen et al. 2016; Verweij et al. 2016), there was
an overrepresentation of females within all the study samples
compared with males. Twenty-three studies documented par-
ticipant age information, and the mean age ranges varied from
22.7 to 52.2 years.

Four studies detailed ethnicity information of participants,
and there was an overrepresentation of Caucasian participants
in three studies (Crowder and Sears 2017; Fortney et al. 2013;
Geary and Rosenthal 2011) and an overrepresentation of
Chinese participants in another study (Suyi et al. 2017). Sixteen
of the studies were carried out in America, three in
Spain, two in Portugal, two in the Netherlands, two in Canada,
one in Australia, one in Japan, one in Singapore, one in
Taiwan and one in Iran.

With regard to the HCP disciplines, seven studies focused
on nursing staff, five studies focused on physicians, two stud-
ies focused on social workers, one study on public health
workers and two studies on voluntary workers, namely emer-
gency medical staff and workers supporting women with
breast cancer. The remaining twenty-three studies focused on
a variety of HCPs including all the aforementioned disci-
plines. Additional HCPs included physical therapists, respira-
tory therapists, activity therapists, occupational therapists,
support staff, pharmacists, researchers, a dentist and a nutri-
tionist. All participants were self-selected, and within four
studies (Amutio et al. 2015; Goodman and Schorling 2012;
van Wietmarschen et al. 2018; Verweij et al. 2016), partici-
pants voluntarily took part in the MBSR courses as part of a
group for the purpose of continual professional development
(CPD).

MBSR Programme Characteristics

All MBSR programmes were facilitated face to face and in
group format, with the exception of two studies. One study
(Bazarko et al. 2013) used a group telephonic (tMBSR) for-
mat, which involved two 8-h retreats and six 90-min group
teleconference calls, with email contact in-between sessions. An-
other study (Pflugeisen et al. 2016) facilitated an 8-week
MBSR programme with three 90 min in person training ses-
sions, with five weekly online 7-min video training modules,
along with 1-h weekly teleconference coaching calls. The re-
maining studies included standard MBSR programmes, ab-
breviated or modified MBSR programmes. With regard to
programme duration, programmes varied from 2 days to
11 weeks and one programme had a 10-month maintenance
phase.

Outcome Measures

Stress

Eighteen studies reported significant reductions in stress and
four studies reported non-significant findings (Duchemin et al.
2015; Martin-A suero and Garcia-Banda 2010; Moody et al.
2013; Trowbridge et al. 2017). Of note, one study reported a
reduction in stress on the Depression Anxiety Stress Scale
(Lovibond and Lovibond 1995), but a non-significant finding
on the Perceived Stress Scale (Cohen et al. 1983; Duchemin
et al. 2015). Significant reductions in stress were also main-
tained ranging from 2 months (Hallman et al. 2017) to 1-year
(Geary and Rosenthal 2011) follow-up. However, significant
reductions in stress were not maintained at 3-month follow-up
(Ducar et al. 2019; Suyi et al. 2017) and 6-month follow-up
(Ducar et al. 2019).

Burnout

With regard to burnout, thirteen studies reported significant
reductions in burnout. However, nine studies found non-
significant findings for burnout. Significant reductions in
burnout were maintained ranging from 3-month (Ducar et al.
2019; Schroeder et al. 2016) to 9-month (Fortney et al. 2013)
follow-up. One study found that reductions in burnout were
not sustained at 3-month follow-up (Ceravolo and Raines
2019). Of note, Crowder and Sears (2017) reported a non-
significant finding for burnout at 13-week follow-up; howev-
er, a significant reduction in burnout was later reported at 26-
week follow-up.

Mood

In relation to mood disturbance, one study reported a signifi-
cant improvement in mood disturbance, five studies reported
significant reductions in anxiety, four studies found signifi-
cant reductions in depression, one study reported significant
improvements in positive affect and two studies reported sig-
nificant reductions in negative affect. However, two studies
reported non-significant findings in anxiety (Duarte and
Pinto-Gouveia 2016; Duchemin et al. 2015), four studies
found non-significant findings in depression (Dobie et al.
2016; Duarte and Pinto-Gouveia 2016; Duchemin et al.
2015; Moody et al. 2013), and a further study reported non-
significant changes in positive and negative affect (Cucarella
and Gianinni 2016). Significant reductions in anxiety, depression and stress were maintained at 9-month follow-up (Fortney et al. 2013).

Psychological Distress

For measures of psychological distress and mental wellbeing, seven studies reported significant improvements in psychological distress, mental wellbeing, and mental health and one study reported a non-significant finding for improvements in wellness (Ceravolo and Raines 2019). Significant improvements in psychological distress were maintained at 3-month (Martin-Asuero and Garcia-Banda 2010) and 1-year follow-up (Geary and Rosenthal 2011; compared to controls), and significant improvements of mental wellbeing were also reported at one-year follow-up compared to controls (Geary and Rosenthal 2011). Significant improvements in mental health were also maintained at 4-month follow-up (Bazarko et al. 2013).

Self-Compassion and Resilience

With regard to measures of self-compassion, eight studies reported significant increases in self-compassion. Significant improvements in self-compassion were also maintained and ranged from 3-months (Suyi et al. 2017) to 26-week follow-up (Crowder and Sears 2017). For measures of resilience, only two studies measured resilience and both reported non-significant findings (Fortney et al. 2013; Schroeder et al. 2016).

Mindfulness

In relation to measures of mindfulness, fifteen studies reported significant improvements in overall mindfulness and in all facets of mindfulness (observe, describe, acting with awareness and non-judging) with the exception of non-reacting. However, non-significant findings were also reported for the facet observe (Dobie et al. 2016), describe (Manotas et al. 2014; Martin-Asuero et al. 2014), acting with awareness and non-reactiveness (Manotas et al. 2014). In terms of follow-up, significant improvements in mindfulness were observed ranging from 2 months (Hallman et al. 2017) to 3 months (Brady et al. 2012; Ducar et al. 2019; Schroeder et al. 2016; Suyi et al. 2017). However, in several studies significant improvements in mindfulness were not maintained at 3 (Wang et al. 2017) or 6 months (Ducar et al. 2019; Wang et al. 2017) follow-up.

Discussion

The systematic review findings provided further evidence that MBSR programmes were effective in improving particular aspects of psychological functioning in different types of HCPs, including reducing anxiety, depression, and stress and increasing self-compassion. These findings supported theories that mindfulness can generate a positive shift in perspective and an ability to view one’s life experiences more objectively. This supported Shapiro et al.’s (2006) theory that mindfulness has three mechanisms (intention, attention and attitude) and Bishop et al.’s (2004) two-component model of mindfulness. Shapiro et al. (2006) and Bishop et al. (2004) postulated that improvements in self-regulation and nonreactive awareness could lead to changes in perspective. This process of decentering (Baer 2003; Brown et al. 2007) or reperceiving (Shapiro et al. 2006) leads individuals to employ a ‘mindfulness-mediated stress response’ (Kabat-Zinn 2013) and thus be less affected by the power of the stress response. With the development of such skills, HCPs would be expected to display improved stress management and reduced levels of stress and burnout.

However, the systematic review also highlighted that MBSR were less effective in reducing burnout and increasing resilience, compared with other aspects of psychological functioning. The inconsistent findings could be explained by research that has previously suggested that burnout is a distinct construct, which is connected to mental health difficulties such as anxiety, depression and stress (Awa et al. 2010; Maslach et al. 2001), but is not the same. Levels of burnout may take longer to decrease compared with mental health difficulties, and it is only following the implementation of healthier coping strategies, such as decentering and reperceiving, that levels of burnout may reduce. This interpretation seems to be supported by Crowder and Sears (2017), who reported non-significant findings for burnout at 13-week follow-up for an MBSR programme for social workers, but later found significant reductions at 26-week follow-up. Arguably, resilience is a trait that develops over time and may be less amenable to change following an MBSR intervention compared to other emotional states such as anxiety, depression and stress. Further research is therefore required into the underlying relationships between burnout, resilience and mindfulness, which in turn may provide greater insight into how HCPs burnout and resilience can be targeted using effective MBIs.

Findings from the systematic review also suggested that MBSR programmes were effective in increasing HCPs overall levels of mindfulness. However, when specific facets of mindfulness were investigated, MBSR appeared not to have consistent positive effects. The varied findings could be attributed to the HCPs developing some aspects of mindfulness skills associated with anxiety and stress during the completion of the MBSR programme. Alternatively, like resilience some facets of mindfulness may take longer to develop, such as acting with awareness and non-reactiveness. Furthermore, fourteen studies in the review did not measure mindfulness as an
outcome measure pre- and post-intervention, thus making it difficult to ascertain whether effective treatment outcomes were a consequence of increased mindfulness skills (Spinelli et al. 2019) or other factors such as social support of group cohesion. Further research is required to explore whether the facets of mindfulness improve with training and to identify how MBSR programmes can be adapted to target all of the facets of mindfulness. Future research into the underlying mechanisms of mindfulness and how these may play a role in producing the positive treatment outcomes that have been observed in MBSR effectiveness studies is also recommended.

The robustness of the available research included in the systematic review indicated that the overall quality proved weak to moderate and that methodological limitations were common (e.g. variability in methodology, outcome measures, small sample sizes, self-selected samples and over-representation of Caucasian women). Many of the studies lacked randomisation, blinding procedures and control groups, and none of the four RCTs included an alternative treatment comparison. All studies obtained a weak rating for selection bias, as all samples were self-selected. Selection bias may have influenced the results of non-randomised studies, as randomly assigning participants to either control or experimental group is critical in reducing selection bias. Due to the samples being self-selected, only motivated participants would have arguably completed the MBIs and thus would be more likely to report positive treatment outcomes (Klein et al. 2019). This was particularly relevant to four research studies whereby participants completed MBSR courses on a voluntary basis as part of their CPD and within two studies participants paid for the intervention (Goodman and Schorling 2012; van Wietmarschen et al. 2018).

In addition, the participant samples were noted to be over-representative of women compared to men in the studies, thus reducing the generalisation of study findings. Twenty-six of the studies did not report ethnicity participant information. Within four studies that detailed ethnicity information, there was an over-representation of Caucasian and Chinese participants, again limiting the generalisability of findings. With regard to confounding variables, the studies that had a control group or waitlist control generally did explore preexisting differences between groups regarding demographic characteristics and pre-intervention measure scores. If significant differences were found between groups, statistical analyses were generally used to control such differences. Future studies are encouraged to employ robust controlled designs with ‘active’ control groups (Lomas et al. 2019), obtain larger sample sizes and more heterogeneous samples to increase the generalisability of research findings.

Unfortunately, some studies did not assess for previous experience of mindfulness practice which may have influenced the outcome of the research findings. With regard to measuring mindfulness home practice, research suggested that participants, who completed mindfulness home practice along with completing an MBSR programme, were more likely to observe greater improvements than participants who did not (Carmony and Baer 2009). Thus, exploring the frequency and intensity of mindfulness practice external to MBSR programmes proved very important, along with assessing its influence upon treatment outcomes (Spinelli et al. 2019). Fourteen studies encouraged participants to engage in daily formal mindfulness, which ranged from 15 to 45 min, throughout the duration of the MBSR programmes. Sixteen studies did not include information about formal daily mindfulness practice and six studies monitored participants mindfulness practice.

Moody et al. (2013) found that participants practiced at least one mindfulness technique eight to ten times per week. Interestingly, MBSR did not result in any consistent or significant improvements in burnout, stress or depression. Moody et al. (2013) argued that their sample of paediatric and oncology staff had significantly higher levels of burnout and stress compared with other studies where MBSR had demonstrated a positive effect with HCPs (Cohen-Katz et al. 2005; Shapiro et al. 2005). In contrast, Bazarko et al. (2013) found that nurses, that maintained the mindfulness practice compared to those that did not, reported significantly lower stress and burnout scores. Whilst Duarte and Pinto-Gouveia (2016) reported that oncology nurses that practiced more mindfulness showed greater reductions in burnout and depression, and greater increases in self-compassion compared to those that practiced less. Ruiz-Fernandez et al. (2019) postulated that when daily mindfulness practice was encouraged, stress levels reduced and mindfulness increased.

Overall, the findings from the systematic review suggested that mindfulness home practice may lead to observed improvements in some aspects of psychological functioning amongst HCPs. Therefore, the design of future MBIs should incorporate daily meditation practice to maximise the effectiveness of the intervention. Briefer mindfulness practices may help increase the level of mindfulness home practice. Further research into the quality and quantity of formal and informal mindfulness home practice may help achieve psychological health outcomes (Irving et al. 2009).

Some studies employed the traditional 8-week MBSR programme and other studies utilised abbreviated MBSR programmes. With regard to the duration of the reviewed MBSR programmes, eighteen programmes were 8 weeks in duration. Eight of which followed the traditional MBSR model, namely eight 2.5-h weekly sessions along with a day retreat. One of these MBSR programmes also had a 10-month maintenance phase that involved one session of 2.5 h per month. Two MBSR programmes were 6 weeks in duration and yielded significant improvements in stress, burnout, mindfulness and self-compassion (Duarte and Pinto-Gouveia...
Furthermore, shorter MBSR programmes cost significantly less to deliver, which is an important factor in the current climate where healthcare organisations are under constant pressure to make financial savings. Further research to identify the optimal adapted MBSR programme design and how this may affect treatment outcomes for HCPs is warranted.

With regard to overall participant attendance, eighteen studies did not report data for overall participant attendance. In relation to the remaining twelve studies, participant attendance rates were reported in varying ways, thus making it difficult to reliably compare the data. Although some studies reported high overall attendance, it is important to note that these numbers may not include busy and stressed HCPs from participating. With regard to participant attendance, all studies in the systematic review included attrition data with the exception of three studies (Ando et al. 2011; Cucarella and Gianinni 2016; Norouzinia et al. 2017). Six studies had no dropouts or withdrawals, and in the remaining twenty-one studies, the attrition rates varied from 3 to 57%. Although no incentives were noted in twenty-one of the studies, three studies paid participants directly for their involvement and the remaining six studies gave participants a monetary incentive, education credits and/or a coupon following each completion of questionnaires or study visit. Two MBSR programmes were part of a regular CPD programme accredited by professional bodies and in another study, participants were paid a portion of their work time. Arguably studies that included incentives for participation may have positively biased their results with regard to attrition rates or possibly outcomes (Bazarko et al. 2013). Further research is recommended to explore how the provision of incentives for participation in MBSR programmes effects attrition rates and treatment outcomes.

Three studies carried out MBSR programmes in psychiatric inpatient units. In the first study, HCPs were allocated 15-min meditation time within their working day (Hallman et al. 2017). In Brady et al.’s (2012) study, HCPs were paid for attending MBSR classes, and in Dobie et al.’s (2016) research, mindfulness sessions were facilitated in the morning at the beginning of shifts. However, Hallman et al. (2017) found that only a few HCPs used the allocated meditation time and Brady et al. (2012) reported a 30% attrition rate due to the varying work schedule demands of the unit. Bryon et al. (2015) identified several barriers to the implementation of mindfulness training for HCPs working within psychiatric inpatient units, which included limited time for staff to attend training sessions, insufficient cover to allow staff to participate in the sessions without using personal time and inadequate preparation for the new initiative on some units. Due to the practical difficulties and time restrictions often faced by HCPs, shorter MBSR programmes incorporated into the regular working schedules of staff have been recommended to reduce attrition rates (Shapiro et al. 2007). Hallman et al. (2017) further argued that the shorter duration of the MBSR...
intervention (e.g. 8 days versus 8 weeks) in their study may have accounted for the retention of participants at 2-month follow-up. Overall, the findings suggested that shorter, well-organised MBSR programmes embedded into the working schedules of HCPs could reduce attrition rates and increase engagement in MBIs.

Despite some research studies employing robust outcome measures, great variability was found between studies that investigated different aspects of psychological functioning (e.g. anxiety, depression, stress, burnout and mindfulness). Such variability could lead to ambiguity and difficulty comparing findings between studies that investigate the same psychological construct. Future research would benefit from employing consistent assessments to measure outcomes of psychological functioning (Escuriex and Labbe 2011; Smith 2014), so that findings between studies can be compared reliably and allow defensible conclusions to be made.

In relation to programme integrity, Irving et al. (2009) argued that further investigation into the integrity of MBSR programmes was pertinent. Of the thirty studies included in the systematic review, twenty-four studies employed certified MBSR instructors and mindfulness teachers and six studies failed to include any information about the MBSR facilitators. Of note, four of the studies MBSR facilitators were also part of the research team, thus potentially reinforcing selection bias due to social desirability effects.

**Future Research**

The systematic review highlighted that MBSR was effective in reducing HCPs experiences of anxiety, depression and stress. MBSR was also found to be effective in increasing HCP levels of mindfulness and self-compassion. However, MBSR did not appear as effective in reducing burnout or improving resilience amongst HCPs. Arguably burnout and resilience may be conceptualised as different constructs to depression, anxiety and stress. Burnout and resilience may be viewed as traits rather than states, thus potentially taking longer to improve, requiring the longer-term implementation of healthier coping strategies which then facilitate improvements in burnout and resilience. The review also provided further support for existing mindfulness theories that have highlighted the importance of decentering and reperceiving as essential mechanisms in reducing HCPs vulnerability to the impact of the stress response. Further research exploring the underlying mechanisms that maximise the effectiveness of MBSR interventions on different psychological constructs would be of great benefit to the current evidence base.

Furthermore, the review highlighted that abbreviated MBSR programmes were as effective as traditional 8-week MBSR programmes and that briefer, well-organised programmes embedded into HCP working days proved more successful. The review also highlighted the importance of future MBSR programmes encouraging and monitoring daily mindfulness practice to maximise treatment outcome. Existing studies were generally found to be of poor quality with shortcomings related to self-selected samples, lack of controlled studies and randomisation, lack of blinding and overrepresentation of Caucasian women within samples. Future studies need to incorporate robust study designs (e.g. RCTs), consistent outcome measures, larger sample sizes, heterogeneous samples and compare MBSR programmes with other active controls or psychological interventions designed to improve psychological functioning amongst HCPs. Future studies would benefit from longer-term follow-up to facilitate exploration of the continuing effects of mindfulness on different psychological constructs. Such research could help facilitate the development of a relevant psychological model for the underlying mechanisms of mindfulness and its relationship with other psychological outcomes, such as stress, burnout and resilience.

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**Compliance with Ethical Standards**

**Conflict of Interest** The authors declare they have no conflict of interest.

**Ethical Approval** This article does not contain any studies with human participants performed by any of the authors.

**References**

* Indicates studies included in the systematic review

Amuto, A., Martinez-Taboada, C., Delgado, L.C., Hermosilla, D., & Mozaz, M.J. (2015). Acceptability and effectiveness of a long-term educational intervention to reduce physicians stress-related conditions. *Journal of Continuing Education in the Health Professions*, 35 (4), 255–260. https://doi.org/10.1097/ceh.0000000000000002.

Ando, M., Natsume, T., Kukihara, H., Shibata, H., & Ito, S. (2011). Efficacy of mindfulness-based meditation therapy on the sense of coherence and mental health of nurses. *Health*, 3 (2), 108–122. https://doi.org/10.4236/health.2011.32022.

Awa, W. L., Plaumann, M., & Walter, U. (2010). Burnout prevention: A review of intervention programs. *Patient Education and Counselling*, 79(2), 184–190. https://doi.org/10.1016/j.pec.2009.04.008.

Bac, R. A. (2003). Mindfulness training as a clinical intervention: A conceptual and empirical review. *Clinical Psychology: Science and Practice*, 10(2), 125–143. https://doi.org/10.1093/clipsy.bpg015.

Bazarko, D., Cate, R.A., Azocar, F., & Kreitzer, M.J. (2013). The impact of innovative mindfulness-based stress reduction program on the health and well-being of nurses employed in a corporate setting.
Crowder, R. & Sears, A. (2017). Building resilience in social workers.

Duarte, J. & Pinto-Gouveia, J. (2016). Effectiveness of a mindfulness-based intervention on oncology nurses’ burnout and compassion fatigue symptoms: A non-randomized study. International Journal of Nursing Studies, 64, 98–107. https://doi.org/10.1016/j.ijnurstu.2016.10.002.

Ducar, D.M., Penberthy, J.M., Schorling, J.B., Leavell, V.A., & Calland, J.F. (2019). Mindfulness for healthcare providers fosters professional quality of life and mindful attention among emergency medical technician. Explore, 16 (1), 61–68. https://doi.org/10.1016/j.explore.2019.07.015.

Duchemin, A.M., Steinberg, B.A., Marks, D.R., Vanover, K., & Klatt, M. (2015). A small randomized pilot study of a workplace mindfulness-based intervention for surgical intensive care unit personnel: Effects on salivary amylase levels. Journal of Occupational and Environmental Medicine, 57(4), 393–399. https://doi.org/10.1097/jom.0000000000000371.

Effective Public Health Practice Project (EPHPP). (1998). Quality assessment tool for quantitative studies. Hamilton, ON: Effective Public Health Practice Project. Retrieved from: http://www.ephpp.ca/index.html. Accessed 01.12.2014.

Escuriex, B. F., & Labbe, E. E. (2011). Healthcare providers’ mindfulness and treatment outcomes: A critical review of the research literature. Mindfulness, 2, 242–253. https://doi.org/10.1007/s12671-011-0068-z.

Fahrenkopf, A. M., Sectish, T. C., Barger, L. K., Sharek, P. J., Lewin, D., Chiang, V. W., et al. (2008). Rates of medication errors among depressed and burnt out residents: A prospective cohort study. British Medical Journal, 336, 488–491. https://doi.org/10.1136/bmj.39469.763218.be.

Farber, B. A. (1983). Introduction: A critical perspective on burnout. In B. A. Farber (Ed.), Stress and burnout in the human services professions (pp. 1–20). New York, NY: Pergamon.

Fortney, L., Luchterhand, C., Zakletskaia, L., Zgierska, A., & Rakel, D. (2013). Abbreviated mindfulness intervention for job satisfaction, quality of life, and compassion in primary care clinicians: A pilot study. Annals of Family Medicine, 11(5), 412–420. https://doi.org/10.1370/afm.1511.

Gaspar, I., Martinho, A., & Lima, M. (2018). Exploring the benefits of a mindfulness program for Portuguese public healthcare workers. Current Psychology. https://doi.org/10.1007/s12144-018-9987-3.

Geary, C. & Rosenthal, S. (2011). Sustained impact of MBSR on stress, well-being, and daily spiritual experiences for one year in academic healthcare employees. The Journal of Alternative and Complementary Medicine, 17(10), 939–944. https://doi.org/10.1089/acm.2010.0335.

Goodman, M. J. & Schorling, J.B. (2012). A mindfulness course decreases burnout and improves well-being among healthcare providers. International Journal of Psychiatry in Medicine, 43(2), 119–128. https://doi.org/10.2190/pm.43.2.b.

Gu, J., Strauss, C., Bond, R., & Cavanagh, K. (2015). How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and well-being? A systematic review and meta-analysis of mediation studies. Clinical Psychology Review, 37, 1–12. https://doi.org/10.1016/j.cpr.2016.09.011.

Hallman, I.S., O’Connor, N., Hasenau, S., & Brady, S. (2017). Improving the culture of safety on a high-acuity inpatient child/adolescent psychiatric unit by mindfulness-based stress reduction training of staff. Journal of Child and Adolescent Psychiatric Nursing, 30, 175–180. https://doi.org/10.1111/jcpp.12191.

Hayes, S. C., & Wilson, K. G. (1994). Acceptance and commitment therapy: Altering the verbal support for experiential avoidance. The Behaviour Analyst, 17, 289–303. https://doi.org/10.1007/bf03392677.

Irving, J. A., Dobkin, P. L., & Park, J. (2009). Cultivating mindfulness in healthcare professionals: A review of empirical studies of mindfulness-based stress reduction (MBSR). Complementary Therapies in Clinical Practice, 15, 61–66. https://doi.org/10.1016/j.ctcp.2009.01.002.
Kabat-Zinn, J. (1982). An outpatient program in behavioral medicine for chronic pain patients based on the practice of mindfulness meditation: Theoretical considerations and preliminary results. *General Hospital Psychiatry, 4*(1), 33–47. https://doi.org/10.1016/0163-8343(82)90026-3

Kabat-Zinn, J. (1994). *Wherever you go, there you are: Mindfulness in everyday life*. New York, NY: Hyperion Books.

Kabat-Zinn, J. (2013). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York, NY: Delta.

Klein, A., Taieb, O., Xavier, S., Baubet, T., & Reyre, A. (2019). The benefits of mindfulness-based interventions on burnout among health professionals: A systematic review. *Explore, 16*(1), 35–43. https://doi.org/10.1016/j.explore.2019.09.002.

Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal and coping*. New York, NY: Springer.

Lomas, T., Medina, J. C., Ivtrzn, I., Rupprecht, S., & Eiroa-Orosa, F. S. (2019). A systematic review and meta-analysis of the impact of mindfulness-based interventions on the well-being of healthcare professionals. *Mindfulness, 10*, 1193–1216. https://doi.org/10.1007/s12671-018-1002-5.

Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the depression anxiety stress scales* (2nd ed.). Sydney, Australia: Psychology Foundation.

MacKenzie, C. S., Poulin, P. A., & Seidman-Carlson, R. A. (2006). Association of brief mindfulness training with reductions in perceived stress and distress in Colombian healthcare professionals. *International Journal of Stress Management, 13*(2), 207–225. https://doi.org/10.1007/a0035150.

Martin-Asuero, A., & Garcia-Banda, B. (2010). The mindfulness-based stress reduction program (MBSR) reduces stress-related psychological distress in healthcare professionals. *The Spanish Journal of Psychology, 13*(2), 897–905. https://doi.org/10.1017/s113874600002547.

Martin-Asuero, A., Queralt, J.M., Pujol-Ribera, E., Berenguera, A., Rodriguez-Blanco, T., & Epstein, R.M. (2014). Effectiveness of a mindfulness education program in primary health care professionals: A pragmatic controlled trial. *Journal of Continuing Education in the Health Professions, 34*(1), 4–12. https://doi.org/10.1002/chp.21211.

Maslach, C., Jackson, S. E., & Leiter, M. P. (1996). *Maslach burnout inventory manual* (3rd ed.). Palo Alto: Consulting Psychologists Press, Inc.

Maslach, C., Schaufeli, W. B., & Leiter, M. P. (2001). Job burnout. *Annual Review of Psychology, 52*, 397–422. https://doi.org/10.1146/annurev.psych.52.1.397.

Miller, K. I., Stiff, J. B., & Ellis, B. H. (1988). Communication and empathy as precursors to burnout among human service workers. *Communication Monographs, 55*, 250–265. https://doi.org/10.1080/03637758809376171.

Moher, D., Liberati, A., Tetzlaff, J., & Altman, D. G. (2009). Preferred reporting terms for systematic reviews and meta-analyses: The PRISMA statement. *PloS Medicine, 6*(7), 1–6. https://doi.org/10.1371/journal.pmed.1000097.

Moody, K., Kramer, D., Santizo, R.O., Magro, L., Wyshogrod, D., Ambrosio, J., Castillo, C., Lieberman, R., & Stein, J. (2013). Helping the helpers: Mindfulness training for burnout in paediatric oncology - a pilot program. *Journal of Paediatric Oncology Nursing, 30*(5), 275–284. https://doi.org/10.1177/1043454213504497.

Morgan, P., Simpson, J., & Smith, A. (2014). Healthcare workers’ experiences of mindfulness training: A qualitative review. *Mindfulness, 6*, 744–758. https://doi.org/10.1007/s12671-014-0313-3.

National Collaborating Centre for Methods and Tools. (2008). *Quality assessment tool for quantitative studies*. Hamilton, ON: McMaster University. http://www.nccmt.ca/registry/view/eng/14.html Accessed 01.12.2014.

Norouzimia, R., Rameznai, Z., Khalili, A., Dehghani, M., & Sharifi, A. (2017). The effect of mindfulness-based stress reduction training on stress and burnout of nurses. *Indo American Journal of Pharmaceutical Sciences, 4*(5), 1296–1302. http://www.iaps.com/pdf/may2017/34.IAJPS4052017.pdf. Accessed 10.04.2020.

Pflugeisen, B.M., Drummond, D., Ebersole, D., Mundell, K., & Chen, D. (2016). Brief video-module administered mindfulness program for physicians: A pilot study. *Explore, 12*(1), 50–54. https://doi.org/10.1016/j.explore.2015.10.005.

Pipe, T. B., Bortz, J.J., & Duek, A. (2009). Nurse leader mindfulness meditation program for stress management: A randomized controlled trial. *The Journal of Nursing Administration, 39*(3), 130–137. https://doi.org/10.1097/mana.0b013e3181989440.

Pipe, T., Fitzpatrick, K., Doucette, J. N., Cotten, A., & Arnow, D. (2016). The mindful nurse leader: Improving processes and outcomes; restoring joy to nursing. *Nursing Management, 47*(9), 44–48. https://doi.org/10.1011/numa.0000491135.83601.3e.

Preedy, V. R., & Watson, R. R. (2010). *Handbook of disease burdens and quality of life measures*. New York, NY: Springer-Verlag.

Raab, K., Sogge, K., Parker, N., & Flament, M.F. (2015). Mindfulness-based stress reduction and self-compassion among mental healthcare professionals: A pilot study. *Mental Health, Religion, and Culture, 18*(6), 503–512. https://doi.org/10.1080/13674676.2015.1081588.

Ruiz-Fernandez, M. D., Artiz-Arzo, R., Ortega-Galan, A. M., Ibanez-Masero, O., Rodriguez-Salvador, M. D., & Ramos-Pichardo, J. D. (2019). Mindfulness therapies on health professionals. *International Journal of Mental Health Nursing, 29*(2), 127–140. https://doi.org/10.1111/inm.12652.

Rupert, P. A., & Morgan, D. J. (2005). Work setting and burnout among professional psychologists. *Professional Psychology: Research and Practice, 36*, 544–550. https://doi.org/10.1037/0735-7028.36.5.544.

Schnier, B. A., Novack, D. H., Cohen, D. G., Yager, J., Wang, D., Saheen, N. J., et al. (2006). The impact of the changing care environment on the health and well-being of faculty at four medical schools. *Academic Medicine, 81*, 27–34. https://doi.org/10.1097/01.am.0000188520.20601000-00008.

Schroeder, D.A., Stephens, E., Colgan, D., Hunsinger, M., Rubin, D., & Christopher, M.S. (2016). A brief mindfulness-based intervention for primary care physicians: A pilot randomized controlled trial. *American Journal of Lifestyle Medicine, 12*(1), 83–91. https://doi.org/10.1177/15598276166292121.

Schulz, R., Greenley, J. R., & Brown, R. (1995). Organisation, management, and client effects on staff burnout. *Journal of Health and Social Behaviour, 36*(4), 333–345. https://doi.org/10.2307/2137323.

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

Shanafelt, T. D., Sloan, J. A., & Habermann, T. M. (2003). The well-being of physicians. *American Journal of Medicine, 114*, 513–519. https://doi.org/10.1016/s0002-9343(03)00117-7.

Shanafelt, T. D., Balch, C. M., Bechamps, G. J., Russell, T., Dyrbye, L., Satele, D., et al. (2009). Burnout and career satisfaction among American surgeons. *Annals of Surgery, 250*, 463–471. https://doi.org/10.1097/sla.0b013e3181ac4fdid.

Shapiro, S. L., Astin, J. A., Bishop, S. R., & Cordova, M. (2005). Mindfulness-based stress reduction for health care professionals: A pilot study. *Journal of General Internal Medicine, 20*(1), 83–91. https://doi.org/10.1007/s11606-004-2322-4.
Results from a randomized controlled trial. *International Journal of Stress Management, 12,* 164–176. https://doi.org/10.1037/1072-5245.12.2.164.

Shapiro, S. L., Carlson, L. E., Astin, J. A., & Freedman, B. (2006). Mechanisms of mindfulness. *Journal of Clinical Psychology, 62*(3), 373–286. https://doi.org/10.1002/jclp.20237.

Shapiro, S. L., Brown, K., & Biegel, G. (2007). Self-care for health professionals: Effects of MBSR on the mental health of therapists in training. *Training and Education in Professional Psychology, 1*(2), 105–115. https://doi.org/10.1037/1931-3918.1.2.105.

Sharma, M., & Rush, S. E. (2014). Mindfulness-based stress reduction as a stress management intervention for healthy individuals: A systematic review. *Journal of Evidenced-Based Complementary and Alternative Medicine, 19*(4), 29–38. https://doi.org/10.1177/2156587214543143.

Smith, S. A. (2014). Mindfulness-based stress reduction: An intervention to enhance effectiveness of nurses’ coping with work-related stress. *International Journal of Nursing Knowledge, 25*(2), 119–130. https://doi.org/10.1111/2047-3095.12025.

Spickard, A., Gabbe, S. G., & Christensen, J. F. (2002). Mid-career burnout in generalist and specialist physicians. *Journal of the American Medical Association, 288,* 1447–1450. https://doi.org/10.1001/jama.288.12.1447.

Spinelli, C., Wisener, M., & Khouary, B. (2019). Mindfulness training for healthcare professionals and trainees: A meta-analysis of randomized controlled trials. *Journal of Psychosomatic Research, 120,* 29–38. https://doi.org/10.1016/j.jpsychores.2019.03.003.

*Suyi, Y., Meredith, P., & Khan, A. (2017). Effectiveness of mindfulness intervention in reducing stress and burnout for mental health professionals in Singapore. *Explore, 13*(5), 319–326. https://doi.org/10.1016/j.explore.2017.06.001.

Thomas, B. H., Ciliska, D., Dobbins, M., & Micucci, S. (2004). A process for systematically reviewing the literature: Providing the research evidence for public health nursing interventions. *Worldviews on Evidence Based Nursing, 1*(3), 176–184. https://doi.org/10.1111/j.1524-475x.2004.004006.x.

*Trowbridge, K., Lawson, L.M., Andrews, S., Pecora, J., & Boyd, S. (2017). Preliminary investigation of workplace-provided compressed mindfulness-based stress reduction with paediatric social workers. *Health and Social Work, 42*(4), 207–214. https://doi.org/10.1093/hsw/hbx038.

Vahey, D. C., Aiken, L. H., Sloane, D. M., Clarke, S. P., & Vargas, D. (2004). Nurse burnout and patient satisfaction. *Medical Care, 42,* 57–66. https://doi.org/10.1097/01.mlr.0000109126.50398.5a.

*Van Wietmarschen, H., Tjaden, B., van Vilet, M., Battjes-Fries, M., & Jong, M. (2018). Effects of mindfulness training on perceived stress, self-compassion and self-reflection of primary care physicians: A mixed-methods study. *BJGP Open, 2*(4): 1–11. https://doi.org/10.3399/bjgpopen18x101621.

*Verweij, H., Wyaams, R.C., Smeijers, D., Lucassen, P.L.B.J., Donders, A.R.T., van der Horst, H.E., & Speckens, A.E.M. (2016). Mindfulness-based stress reduction in GPs: Results of a controlled mixed methods pilot study in Dutch primary care. *British Journal of General Practice Research, 66,* 99–105. https://doi.org/10.3399/bjgp16x683497.

Virgili, M. (2013). Mindfulness-based interventions reduce psychological distress in working adults: A meta-analysis of intervention studies. *Mindfulness, 6,* 326–337. https://doi.org/10.1007/s12671-013-0264-0.

*Wang, S.C., Wang, L.Y., Shih, S.M., Chang, S.C., & Fan, S.Y. (2017). The effects of mindfulness-based stress reduction on hospital nursing staff. *Applied Nursing Research, 38,* 124–128. https://doi.org/10.1016/j.apnr.2017.09.014.

Weinberg, A., & Creed, F. (2000). Stress and psychiatric disorder in healthcare professionals and hospital staff. *Lancet, 355,* 533–537. https://doi.org/10.1016/s0140-6736(99)07366-3.

Williams, E. S., Manwell, L. B., Konrad, T. R., & Linzwer, M. (2007). The relationship of organisational culture, stress, satisfaction, and burnout and physician-reported error and suboptimal patient care: Results from the MEMO study. *Health Care Management Review, 32,* 203–212. https://doi.org/10.1097/01.hmr.0000281626.28363.59.

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