Received: 9 September 2016 | Revised: 23 May 2017 | Accepted: 13 June 2017

DOI: 10.1002/jclp.22515

WILEY

RESEARCH ARTICLE

A systematic review of the impact of mindfulness on the well-being of healthcare professionals

Tim Lomas[1] | **Juan Carlos Medina**[2] | **Itai Ivtzan**[1] | **Silke Rupprecht**[3] | **Francisco José Eiroa-Orosa**[1]

[1]University of East London

[2]University of Barcelona

[3]Leuphana University

Correspondence
Tim Lomas, School of Psychology, University of East London, Arthur Edwards Building, Water Lane, London, E15 4LZ, United Kingdom.
Email: t.lomas@uel.ac.uk

Objective: Among efforts to improve the well-being of healthcare professionals are initiatives based around mindfulness meditation. To understand the value of such initiatives, we conducted a systematic review of empirical studies pertaining to mindfulness in healthcare professionals.

Method: Databases were reviewed from the start of records to January 2016. Eligibility criteria included empirical analyses of mindfulness and well-being outcomes acquired in relation to practice. 81 papers met the eligibility criteria, comprising a total of 3,805 participants. Studies were principally examined for outcomes such as burnout, distress, anxiety, depression, and stress.

Results: Mindfulness was generally associated with positive outcomes in relation to most measures (although results were more equivocal with respect to some outcomes, most notably burnout).

Conclusion: Overall, mindfulness does appear to improve the well-being of healthcare professionals. However, the quality of the studies was inconsistent, so further research is needed, particularly high-quality randomized controlled trials.

KEYWORDS
healthcare professionals, meditation, mindfulness, systematic review, well-being

1 | INTRODUCTION

Healthcare professionals (HCPs) can face particular challenges that can be detrimental to their physical and mental health. A wealth of research has accumulated indicating that HCPs are liable to experience a range of mental health issues, including anxiety (Gao et al., 2012), burnout (Khamisa, Oldenburg, Peltzer, & Ilic, 2015), depression (Givens & Tjia, 2002), and stress (Bidwal, Ip, Shah, & Serino, 2015). Moreover, these problems may be particularly acute among HCPs relative to people in other professions (Brooks, Gerada, & Chalder, 2011). A recent survey of over 3,700 public sector workers in the United Kingdom found that staff working for the National Health Service were the most stressed,

with 61% reporting feeling stress all or most of the time, and 59% stating that stress is worse this year than last year (Dudman, Isaac, & Johnson, 2015).

Analyses of these problems include attempts to understand why HCPs are especially vulnerable to mental health issues. Some scholars explain outcomes like burnout according to the model of effort-reward imbalance, finding that HCPs face a particularly disadvantageous imbalance because of the considerable effort required by their work, emotionally and physically (Rasmussen et al., 2015). Such efforts include factors such as emotional demands (Tyssen, Vaglum, Grønvold, & Ekeberg, 2000), exacerbated by often-limited resources, such as time allocation per patient (Mossialos, Wenzl, Osborn, & Anderson, 2015).

Another factor is adverse events in healthcare settings, which can mean that HCPs may be "second victims" (Draper, Kõlves, De Leo, & Snowdon, 2014). Particular HCP populations can be especially vulnerable, such as younger and/or less experienced workers; Bidwal et al. (2015) found that levels of stress among trainees in the healthcare professions were roughly twice as high as in the general adult population. Professionals may also fare worse than others owing to their specific occupational context, such as work demands in their particular national healthcare system. For instance, a survey of general practitioners in 11 developed countries found that workers in the United Kingdom reported the highest levels of stress, with 29% saying they intended to quit general practice within 5 years.

These issues represent a significant problem: obviously not only for the well-being of the HCPs themselves but also for patients (e.g., in terms of the ability of HCPs to treat them skilfully), and for the healthcare system, e.g., vis-à-vis the economic cost of staff burnout (Toppinen-Tanner, Ojajärvi, Väänaänen, Kalimo, & Jäppinen, 2005). As such, efforts are underway to protect against or ameliorate work-related mental health issues in HCPs. Among the most prominent of these types of initiatives are programs based around mindfulness meditation–mindfulness-based interventions (MBIs)–which are the focus of this review.

1.1 | Mindfulness

The past few decades have seen a burgeoning interest in mindfulness in the West. Originating in the context of Buddhism around the 5th century B.C.E. (Lomas, 2017), mindfulness came to prominence in the West through Kabat-Zinn (1982), who created a Mindfulness-Based Stress Reduction (MBSR) program for chronic pain. "Mindfulness" can refer to (a) a state/quality of mind and (b) a meditation practice that enables one to cultivate this. The most prominent operationalization of mindfulness as a mental state/quality is Kabat-Zinn's (2003) definition of it as "the awareness that arises through paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment" (p. 145). Expanding on this, Shapiro, Carlson, Astin, and Freedman (2006) deconstruct it into three components: intention (i.e., motivation for paying attention thus); attention (i.e., cognitive processes through which attention is enacted); and attitude (i.e., emotional qualities with which one imbues one's attention).

The term mindfulness is also deployed for meditation practices that facilitate this state. Meditation broadly refers to mental activities which share a common focus on training the self-regulation of attention and awareness, thereby enhancing control of mental processes and consequently increasing well-being (Walsh & Shapiro, 2006; Lomas, Ivtzan, & Fu, 2015). According to Lutz, Slagter, Dunne, and Davidson (2008), most practices feature either "focused attention" and/or "open-monitoring" processes. Focused attention can be operationalized in terms of the coordination of various attention modalities (Posner & Petersen, 1990), including sustained, executive, and selective attention. By contrast, open monitoring delineates a broader receptive capacity to detect events within an open "field" of awareness (Raffone & Srinivasan, 2010). Mindfulness–as a practice and a state of mind–is commonly presented as a case of open monitoring (Kabat-Zinn, 2003). However, in practice, mindfulness meditation usually involves both focused attention and open monitoring (e.g., beginning with a period of focused attention on the breath, to stabilize one's awareness, followed by the more receptive state of open monitoring; Chiesa, Calati, & Serretti, 2011).

According to Shapiro et al. (2006), the main significance of mindfulness–as a quality/state and a practice–is that it involves a meta-mechanism known as *reperceiving*. The three components of mindfulness combine to generate a "fundamental shift in perspective," in which "rather than being immersed in the personal drama or narrative of our life story,

we are able to stand back and witness it" (p. 377). This process, also known as "decentring," is defined as "the ability to observe one's thoughts and feelings as temporary, objective events in the mind, as opposed to reflections of the self that are necessarily true" (Fresco et al., 2007, p. 234). This ability is theorized as having a positive effect upon well-being. In MBIs, the aim is not to change participants' thoughts/feelings per se, as cognitive therapy might seek to, but to help people "become more aware of, and relate differently to" this content (Shapiro, Astin, Bishop, & Cordova, 2005, p. 165). For example, in Mindfulness-Based Cognitive Therapy (MBCT), designed to prevent depressive relapse, people are taught to decenter from their cognitions, thus helping prevent a "downward spiral" of negative thoughts and worsening negative affect, which could otherwise trigger relapse (Segal, Williams, & Teasdale, 2002).

Thus, MBCT, and MBIs generally, involve "retraining awareness" so that people have greater choice in how they relate and respond to their subjective experience, rather than habitually responding in maladaptive ways (Chambers, Gullone, & Allen, 2009, p. 659). For instance, the development of decentring can help people tolerate distressing qualia, which is important given that *in*ability to tolerate such qualia is a transdiagnostic factor underlying diverse psychopathologies (Aldao, Nolen-Hoeksema, & Schweizer, 2010).

Mindfulness interventions were initially limited to clinical settings, such as Kabat-Zinn's (1982) MBSR program and subsequent adaptations like MBCT (Segal et al., 2002). However, since the late 1990s, there has been increasing use of mindfulness in occupational contexts, for not only staff who might be suffering with stress and mental health issues but also workers "in general" (e.g., as a protective measure against future issues). To assess the state of this literature with regard to HCPs, we conducted a systematic review of relevant research.

Although a number of reviews have already been conducted in this area, these have tended to have fairly narrow remits in terms of population and/or outcome. These include reviews focused only on certain healthcare professions, such as general practitioners (Murray, Murray, & Donnelly, 2016), social workers (Trowbridge & Lawson, 2016), and nurses (Botha, Gwin, & Purpora, 2015), all of which featured small numbers of studies. Or, such reviews have concentrated on HCPs more generally but were concerned only with specific outcomes, such as stress, as in the case of Burton, Burgess, Dean, Koutsopoulou, and Hugh-Jones (2017), who included only nine studies, or empathy and emotional competencies, as in the case of Lamothe, Rondeau, Malboeuf-Hurtubise, Duval, and Sultan (2016), who focused just on MBSR and identified 14 such studies. By contrast, the current paper aims for greater inclusivity, reporting the results of a far broader systematic review, encompassing: (a) workers across all HCP contexts, (b) a wide range of well-being outcomes, and (c) the impact of mindfulness generally (not limited to any one intervention).

2 | METHOD

The literature search was conducted using the MEDLINE and Scopus electronic databases. The search was conducted as part of a broader ongoing systematic review into mindfulness in all occupations. The criteria for the broader review were as follows: mindfulness AND work OR occupation OR profession OR staff, in all fields in MEDLINE, and limited to article title, abstract, and keywords in Scopus. The dates selected were from the start of the database records to January 10, 2016.

For this current review into HCPs, in terms of participants, interventions, comparisons, outcomes, and study design, the key inclusion criteria were as follows: participants–currently employed in a healthcare context; outcomes–any pertaining to mindfulness, well-being, and job performance; and study design–any empirical study featuring data collection. Exclusion criteria were theoretical articles or commentaries without statistical or qualitative analyses.

Although we were principally interested in studies of MBIs in healthcare workplaces, as a secondary concern we were also interested in nonintervention studies, such as regression analyses of the association between trait mindfulness and well-being outcomes. Studies were required to be published, or in press, in English in a peer-reviewed academic journal. The review was conducted according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009). The review protocol for the broader systematic review was registered with the International Prospective Register of Systematic Reviews database on January 5, 2016 (registration number: CRD42016032899).

Papers were divided into intervention studies and nonintervention studies. For intervention studies, the following variables were extracted from each paper: type of design (e.g., randomized controlled trial [RCT] vs. convenience sample); occupation of participants; number of experimental participants; number of control participants (if applicable); type of MBI; length of MBI; nature of control; principal well-being and performance outcomes; and the significance level and effect size of principal outcomes. For nonintervention studies, the following variables were extracted: type of analysis; occupation of participants; number of experimental participants; principal well-being and performance outcomes; and the significance level of principal outcomes.

The primary summary measures were mindfulness and well-being outcomes. These were principally psychometric scales pertaining to mindfulness, mental health, and physical health. Secondary summary measures of interest were outcomes that *pertain* to well-being, such as compassion and empathy. Tertiary summary measures of interest were outcomes relating to job performance.

The Quality Assessment Tool for Quantitative Studies (QATQS; National Collaborating Centre for Methods and Tools, 2008) was used to assess the quality of the studies. QATQS assesses methodological rigor in six areas: (a) selection bias, (b) design, (c) confounders, (d) blinding, (e) data collection method, and (f) withdrawals and dropouts. Each area is assessed on a quality score of 1 to 3: 1 = strong; 2 = moderate; 3 = weak. Scores for each area were collated, and a global score assigned to each study. If there are no weak ratings, then the study overall is scored 1; one weak rating leads to a 2; and two or more weak ratings generates a 3. QATQS scoring was conducted by the third author, and checked independently by the first author. Any discrepancies were resolved by discussion with agreement reached in all cases.

3 | RESULTS

For the broader systematic review (i.e., mindfulness across all occupations), after removing duplicate citations, 721 potentially relevant papers were identified. In the current systematic review, focusing specifically on HCPs, from reviewing the abstract, 543 papers were excluded. From the full-text reviews of 178 papers, 97 further papers were excluded. Thus, a total of 81 papers were included in the systematic analysis: 66 intervention studies and 15 nonintervention studies. Two of these papers pertained to the same trial (Cohen-Katz, Wiley, Capuano, Baker, Kimmel, et al., 2005; Cohen-Katz, Wiley, Capuano, Baker, Deitrick, et al., 2005), and so the 81 papers included in the analysis represented results from 80 independent participant samples.

The studies comprised a total of 3,805 participants, discounting participants not included in analyses because of attrition. There were 2,645 participants in the intervention studies, as shown in Table 1, including 1,869 undertaking MBIs. There were 663 separate control participants, excluding Singh, Singh, Sabaawi, Myers, and Wahler (2006), in which participants acted their own controls, plus Grepmair, Mitterlehner, Loew, and Nickel (2007), in which participants were not HCPs per se but patients being treated by them. There were 1,160 participants in nonintervention studies, as detailed in Table 2. The studies covered a range of occupations, including physicians ($n = 9$), nurses ($n = 16$), disability professionals ($n = 4$), therapists, psychologists and counsellors ($n = 24$), mixed (nonspecific) mental health professionals ($n = 8$), and mixed (nonspecific) healthcare professionals ($n = 20$).

An overview of the findings is shown in Table 3 below. This shows whether outcomes were (a) increased in relation to an MBI, (b) did not change in relation to an MBI (or in exceptional cases, changed in a "negative" direction), or (c) were found in nonintervention studies to be associated with mindfulness. A more detailed breakdown of the results is included below in the discussion, featuring tables detailing all the studies that assessed a given outcome.

4 | DISCUSSION

MBIs generally had a positive effect upon all outcome measures. However, there were some areas in which findings were more equivocal, including burnout, health, resilience, and generic "well-being." This discussion will run through the main outcomes in turn, beginning with mindfulness and awareness itself.

TABLE 1 Overview of intervention studies

Authors	Occupation	Design	Expt. group	Control group	Intervention	Length	Control	Primary outcome(s)
(Aggs & Bambling, 2010)	Psychotherapists	Convenience sample	47	–	Mindful therapy	8 weeks	N/A	PI < stress & strain ($p < .01$). PI > mindfulness & awareness ($p < .01$).
(Barbosa et al., 2013)	Healthcare graduates	Convenience sample	13	15	MBSR	8 weeks	Nothing	PI < anxiety ($d = -.09$, $p < .001$), burnout (emotional exhaustion, $d = -.41$; depersonalisation, $d = -.26$; and personal accomplishment, $d = .29$; $p < .001$). PI > compassion & empathy (physician empathy, $d = .77$, $p < .01$).
(Bazarko, Cate, Azocar, & Kreitzer, 2013)	Nurses (corporate)	Convenience sample	36	–	MBSR adaptation (6 sessions by telephone)	8 weeks	N/A	PI < burnout (personal burnout, $d = -.97$; work-related burnout, $d = -.67$; and client-related burnout, $d = -.30$; $p < .001$), and stress & strain (perceived stress, $d = -1.21$, $p < .001$). PI > compassion & empathy (physician empathy, $d = .76$; and self-compassion, $d = 1.25$; $p < .001$), health (physical health, $d = -.38$, $p < .001$; and mental health, $d = 1.40$ $p < .05$), and well-being, satisfaction & flourishing (serenity, $d = 1.48$ $p < .001$).
(Beckman et al., 2012)	Primary care physicians	Convenience sample	20	–	Program in mindful communication (Krasner et al., 2009).	52 hours	N/A	Qualitative interviews ($n = 20$): PI > mindfulness & awareness, and relationships.
(Beddoe & Murphy, 2004)	Trainee nurses	Convenience sample	16 (23)[a]	–	MBSR	8 weeks	N/A	PI < stress & strain ($p < .05$). PI >< compassion & empathy.
(Bond et al., 2013)	Trainee doctors	Convenience sample	27	–	Mind–body course[b]	11 weeks	N/A	PI > compassion & empathy (self-compassion, $d = .17$, $p = .04$), emotional intelligence & regulation (self-regulation, $d = .01$, $p = .003$). PI >< compassion & empathy (physician empathy, $d = .09$), and stress & strain (perceived stress, $d = -.03$).
(Bonifas & Napoli, 2014)	Trainee social workers	Convenience sample	77	–	Mindfulness curriculum (specific to study)	16 weeks	N/A	PI > well-being, satisfaction & flourishing (quality of life, $d = .88$, $p < .001$). PI >< stress & strain (perceived stress, $d = .06$).

(Continues)

TABLE 1 (Continued)

Authors	Occupation	Design	Expt. group	Control group	Intervention	Length	Control	Primary outcome(s)
(Brady et al., 2012)	Psychiatric ward professionals	Convenience sample	16 (23)	–	MBSR adaptation	4 weeks	N/A	PI < stress & strain (stress, $d = -.70$, $p < .01$), burnout (emotional exhaustion, $d = -.50$; depersonalisation, $d = -.23$; and personal accomplishment, $d = .29$). PI > mindfulness & awareness (mindfulness, $d = .64$, $p < .01$; and intrapersonal presence, $d = .54$, $p = .02$).
(Brooker et al., 2013)	Disability professionals	Convenience sample	34 (36)	–	Occupational mindfulness training program	8 weeks	N/A	PI < well-being, satisfaction, & flourishing (extrinsic job satisfaction, $p < .05$). PI > mindfulness & awareness ($p < .05$), stress & strain ($p < .05$), and well-being, satisfaction & flourishing (positive affect, $p < .05$; and negative affect. $p < .05$). PI >< burnout, compassion & empathy, depression, well-being, satisfaction & flourishing.
(Brooker et al., 2014)	Disability professionals	Convenience sample	12	–	Occupational mindfulness training program	8 weeks	N/A	PI > job performance (restraint of patients, and seclusion of patients; $p < .05$).
(Burnett & Pettijohn, 2015)	Healthcare employees	RCT	20 active & 17 passive	18	MBST	5 weeks	Passive intervention: abstention from work activity. Control: nothing.	Passive intervention group: PI >< emotional intelligence & regulation, stress & strain (perceived stress, $d = -.09$). Control group: PI >< emotional intelligence & regulation, and stress & strain (perceived stress, $d = -.70$).
(Christopher, Christopher, Dunnagan, & Schure, 2006)	Trainee counsellors	Convenience sample	11	–	Mindfulness curriculum (specific to study)	1 term	N/A	Qualitative interviews: PI < burnout, and stress & strain.

(Continues)

TABLE 1 (Continued)

Authors	Occupation	Design	Expt. group	Control group	Intervention	Length	Control	Primary outcome(s)
(Cohen & Miller, 2009)	Trainee clinical psychologists	Convenience sample	21 (28)	–	Interpersonal mindfulness training	6 weeks	N/A	PI < anxiety ($d = -.46$, $p = .027$), and stress & strain (perceived stress, $d = -.53$, $p < .001$). PI > emotional intelligence & regulation (emotional intelligence, $d = .39$, $p = .02$), and relationships (social connectedness, $d = 57$, $p = .002$). PI >< depression ($d = -.11$), mindfulness & awareness (mindful attention awareness, $d = .48$), and well-being, satisfaction & flourishing (life satisfaction, $d = .43$, $p = .051$; searching of meaning in life, $d = -.35$; and presence of meaning in life, $d = .12$).
(Cohen-Katz, Wiley, Capuano, Baker, Kimmel, et al., 2005)	Nurses	RCT	12 (14)	13	MBSR	8 weeks	Waitlist	PI < burnout ($p = .050$). PI > mindfulness & awareness ($p = .001$). PI >< distress & anger.
(Cohen-Katz, Wiley, Capuano, Baker, Deitrick, et al., 2005)	Nurses	RCT	12 (14)	13	MBSR	8 weeks	Waitlist	Qualitative data analysis ($n = 12$): PI > emotional intelligence & regulation (self-acceptance), mindfulness & awareness (self-care, and self-awareness), relationships, and well-being, satisfaction & flourishing (relaxation).
(Dobie, Tucker, Ferrari, & Rogers, 2015)	Mental health professionals	Convenience sample	9	–	MBSR adaptation	8 weeks	N/A	PI < anxiety ($d = -.86$, $p = .02$), distress ($p = .002$), and stress & strain (stress, $d = -.96$, $p < .05$). PI > mindfulness & awareness (mindfulness, $d = .41$). PI >< depression ($d = -.44$, $p = .06$).
(De Vibe et al., 2013)	Trainee doctors	RCT	144	144	MBSR adaptation	6 weeks	Nothing	PI < distress & anger (distress, $d = -.77$, $p < .001$), and stress & strain (stress, $d = -.27$, $p = .021$). PI > well-being, satisfaction & flourishing (subjective well-being, $d = .43$, $p < .001$). PI >< burnout (burnout, $d = -.13$), and mindfulness & awareness (act aware, $d = -.04$; describe, $d = -.06$; observe, $d = .18$; nonjudging, $d = -.23$; and nonreacting, $d = .31$).

(Continues)

TABLE 1 (Continued)

Authors	Occupation	Design	Expt. group	Control group	Intervention	Length	Control	Primary outcome(s)
(de Zoysa, Ruths, Walsh, & Hutton, 2014)	Mental health professionals	Convenience sample	7	–	MBCT (in (Ruths et al., 2013)	8 weeks	N/A	Qualitative interviews: PI > emotional intelligence & regulation (self-regulation).
(Dorian & Killebrew, 2014)	Trainee psychotherapists	Convenience sample	21	–	Mindfulness curriculum (specific to study)	10 weeks	N/A	Qualitative interviews: PI < distress & anger. PI > compassion & empathy (compassion), emotional intelligence & regulation (acceptance), and mindfulness & awareness (awareness, and coping).
(Duchemin, B. A. Steinberg, D. R. Marks, K. Vanover, & M. Klatt, 2015)	Intensive care professionals	RCT	16	16	Mindfulness program (specific to study)	8 weeks	Waitlist	PI < stress & strain ($p = .04$). PI > well-being, satisfaction & flourishing (quality of life, $p = .031$). PI >< anxiety, burnout, depression, and mindfulness & awareness.
(Erogul, Singer, McIntyre, & Stefanov, 2014)	Trainee doctors	RCT	29	30	MBCT	8 weeks	Nothing	PI < stress & strain (perceived stress, $d = -.60$, $p = .03$). PI > compassion & empathy (self-compassion, $d = .88$, $p < .001$). PI >< resilience ($d = .27$, $p = .05$).
(Felton, Coates, & Christopher, 2015)	Trainee counsellors	Convenience sample			Mindfulness curriculum (specific to study)	15 weeks	N/A	Qualitative interviews: PI < stress & strain. PI > compassion & empathy (compassion), emotional intelligence & regulation (acceptance), and mindfulness & awareness (awareness).
(Fisher & Hemanth, 2015)	Clinical psychologists	Convenience sample	8	–	Mindfulness program (specific to study)	10 weeks	N/A	Qualitative interviews: PI > emotional intelligence & regulation (acceptance), and well-being, satisfaction & flourishing (relaxation).
(Fortney, Luchterhand, Zakletskaia, Zgierska, & Rakel, 2013)	Primary care clinicians	Convenience sample	28 (32)	–	MBSR adaptation	18 hours (over 5 sessions)	N/A	PI < anxiety ($d = -.47$, $p = .006$), burnout (emotional exhaustion, $d = -.31$, $p = .009$; depersonalisation, $d = -22$, $p = .005$; and personal accomplishment, $d = .50$, $p < .001$), depression (depression, $d = -.54$, $p < .001$), and stress & strain (perceived stress, $d = -.54$, $p = .002$; and stress, $d = -.31$, $p = .002$). PI >< compassion & empathy (compassion, $d = -.04$), resilience (resilience, $d = .17$).

(Continues)

TABLE 1 (Continued)

Authors	Occupation	Design	Expt. group	Control group	Intervention	Length	Control	Primary outcome(s)
(Foureur, Besley, Burton, Yu, & Crisp, 2013)	Nurses & midwives	Convenience sample	28 (40)	–	MBSR adaptation	1 day (& 8 weeks practice)	N/A	PI < distress & anger (distress, $d = -.59$, $p = .031$), and stress & strain (stress, $d = -.65$, $p = .004$). PI > well-being, satisfaction & flourishing (sense of coherence, $d = .73$, $p = .009$). PI >< anxiety ($d = -.28$, $p = .079$), and depression ($d = -.33$).
(Galantino, Baime, Maguire, Szapary, & Farrar, 2005)	Healthcare professionals	Convenience sample	84	–	Mindfulness program (specific to study)	8 weeks	N/A	PI < anxiety ($p = .001$), burnout ($p = .002$), depression ($p = .001$), and distress & anger ($p = .001$). PI >< compassion & empathy, and stress & strain.
(Gauthier et al., 2015)	Paediatric ICU nurses	Convenience sample	38 (45)	–	Mindfulness program (specific to study)	30 days	N/A	PI < stress & strain (stress, $d = -.40$, $p = .006$). PI >< burnout (emotional exhaustion, $d = -.18$; depersonalisation, $d = -.13$; and personal accomplishment, $d = .12$), compassion & empathy (self-compassion, $d = .23$), and mindfulness & awareness (mindful attention awareness, $d = .07$).
(Gockel et al., 2013)	Trainee social workers	Convenience sample	38	94	MBSR adaptation	10 weeks	N/A	PI > job performance (counselling self-efficacy, $d = .53$, $p = .005$), mindfulness & awareness (mindfulness, $d = .72$, $p = .034$).
(Goodman & Schorling, 2012)	Healthcare professionals	Convenience sample	93	–	Mindfulness for healthcare providers	8 weeks	N/A	PI >< burnout (emotional exhaustion, $d = -.29$; depersonalisation, $d = -.44$; and personal accomplishment, $d = .44$), and health (mental health, $d = .78$; physical health, $d = -.02$).
(Grepmair, Mitterlehner, Loew, & Nickel, 2007)	Trainee psychotherapists	Convenience sample	58	55	Mindfulness program (specific to study)	9 weeks	Pre-training	PI > job performance (patients' distress, $d = -.93$, $p < .01$).
(Hallman, O'Connor, Hasenau, & Brady, 2014)	Psychiatric service professionals	Convenience sample	12 (13)	–	MBSR	8 weeks	N/A	PI < stress & strain (perceived stress, $d = -.20$, $p < .05$). PI > mindfulness & awareness (mindfulness, $d = .68$, $p < .05$).
(Hemanth & Fisher, 2015)	Clinical psychology trainees	Convenience sample	10	–	Mindfulness program (specific to study)	10 weeks	N/A	Qualitative interviews: PI > compassion & empathy, job performance, relationships, and emotional intelligence & regulation.

(Continues)

TABLE 1 (Continued)

Authors	Occupation	Design	Expt. group	Control group	Intervention	Length	Control	Primary outcome(s)
(Hopkins & Proeve, 2013)	Trainee psychologists	Convenience sample	11	–	MBCT	8 weeks	N/A	PI > compassion & empathy (emotional concern, $d = -.40$; perspective taking, $d = -.37$; personal distress, $d = -.23$; and fantasy, $d = -.30$; $p < .01$), and mindfulness & awareness (act aware, $d = .11$; observe, $d = .43$; describe, $d = .18$; nonreacting, $d = .77$;and nonjudging, $d = 1.27$; $p < .05$). PI >< stress & strain, (perceived stress,xbrk $d = -.67$).
(Horner, Piercy, Eure, & Woodard, 2014)	Nurses	Convenience sample	31 (46)	12 (28)	Mindfulness program (specific to study)	10 weeks	Nothing	PI >< burnout, compassion & empathy, mindfulness & awareness, stress & strain, and well-being, satisfaction & flourishing (professional quality of life).
(Johnson et al., 2015)	Healthcare professionals	RCT	20	20	Resilience training	8 weeks	Waitlist	PI < anxiety (trait, $d = -1.41$, $p = .008$), depression (depression with the CESD-10, $d = -1.50$, $p = .002$; and depression with the PHQ-9, $d = -1.56$, $p < .001$), and stress & strain (perceived stress, $d = -1.30$, $p < .01$). PI > health (health responsibility, $d = .96$; interpersonal relations, $d = 1.40$; nutrition, $d = .34$; physical activity, $d = .81$; spiritual growth, $d = .99$; stress management, $d = 1.17$; abseentism, $d = -.50$; activity impairment, $d = -1.23$; presenteeism, $d = -1.28$; and work productivity loss, $d = -1.38$; $p < .05$). PI >< anxiety (state, $d = -1.02$).
(Kemper & Khirallah, 2015)	Health professionals	Convenience sample	112	–	Mindfulness in daily life	1 hour	N/A	PI > mindfulness & awareness (cognitive and affective mindfulness, $d = .24$, $p = .004$; and mindful attention awareness, $d = .20$, $p < .001$), and resilience (resilience, $d = .21$, $p < .001$).
(Klatt et al., 2015)	Intensive care IC staff	RCT	34	34	Mindfulness in motion	8 weeks	N/A	PI > resilience (engagement, $p = .012$; resilience, $p = .023$; and vigour, $p = .033$).

(Continues)

TABLE 1 (Continued)

Authors	Occupation	Design	Expt. group	Control group	Intervention	Length	Control	Primary outcome(s)
(Krasner et al., 2009)	Primary care physicians	Convenience sample	70	–	Mindfulness program (specific to study)	8 weeks	N/A	PI < burnout (emotional exhaustion, $d = -.37$, depersonalisation, $d = -.19$; and personal accomplishment, $d = .15$; $p < .001$), and distress & anger (distress, $d = -.47$, $p < .001$). PI > compassion & empathy (physician empathy, $d = .36$, $p < .001$), and mindfulness & awareness (mindfulness, $d = .86$, $p < .001$).
(Mackenzie et al., 2006)	Nurses	RCT	16	14	MBSR adaptation	4 weeks	Waitlist	PI < burnout (emotional exhaustion, $d = .32$, $p < .01$; depersonalisation, $d = -.04$, $p < .05$; and personal accomplishment, $d = 1.55$, $p < .05$). PI > well-being, satisfaction & flourishing (relaxation dispositions, $d = .24$, $p < .01$). PI >< well-being, satisfaction & flourishing (intrinsic job satisfaction, $d = .17$; satisfaction with life, $d = -.13$; and sense of coherence, $d = .16$).
(Manotas, Segura, Eraso, Oggins, & McGovern, 2014)	Healthcare professionals	RCT	40 (66)	43 (65)	MBSR adaptation	4 weeks	NR	PI < distress & anger (distress, $d = -.61$, $p = .006$), and stress & strain (perceived stress, $d = -.68$, $p < .001$). PI > mindfulness & awareness (act aware, $d = -.29$; observe, $d = .23$; describe, $d = -.28$; non judging, $d = .32$; non reacting, $d = .03$; and total mindfulness, $d = .07$; $p < .001$).
(Martín-Asuero & García-Banda, 2010)	Healthcare professionals	Convenience sample	29	–	MBSR adaptation	8 weeks	N/A	PI < depression (rumination, $d = -.19$, $p = .010$), and distress & anger (psychological distress, $d = -.59$, $p = .016$). PI > well-being, satisfaction & flourishing, (negative affect, $d = -.26$, $p = .002$). P >< stress & strain (daily stress, $d = -.39$).

(Continues)

TABLE 1 (Continued)

Authors	Occupation	Design	Expt. group	Control group	Intervention	Length	Control	Primary outcome(s)
(Martín-Asuero et al., 2014)	Healthcare professionals	RCT	43	25	MBSR adaptation	8 weeks	Waitlist	PI < anxiety ($p < .001$), burnout (emotional exhaustion, $d = -.59$; depersonalisation, $d = -.32$; and personal accomplishment, $d = .27$; $p < .01$), depression ($p < .05$), and distress & anger (distress, $d = -.83$, $p < .001$). PI > compassion & empathy (physician empathy, $d = .40$, $p < .05$), and mindfulness & awareness (act aware, $d = .84$; describe, $d = .44$; observe, $d = 1.27$; nonreacting, $d = 1.21$; and nonjudging, $d = .49$; $p < .05$).
(McConachie, McKenzie, Morris, & Walley, 2014)	Support staff	RCT	66	54	Acceptance and mindfulness workshop	1.5 days	Waitlist	PI < distress & anger (distress, $d = -.35$, $p < .001$). PI >< well-being, satisfaction & flourishing (mental well-being, $d = .17$).
(Mealer et al., 2014)	Intensive care nurses	RCT	13	14	Resilience training program [a]	12 weeks	Nothing	PI < depression ($p = .03$), and stress & strain (PTSD, $p = .01$). PI > resilience ($p = .01$). PI >< anxiety & burnout.
(Moody et al., 2013)	Paediatric oncology staff	RCT	24	23	Mindfulness program (specific to study)	8 weeks	Nothing	PI >< burnout, depression, and stress & strain.
(Moore, 2008)	Trainee clinical psychologists	Convenience sample	16 (23)	–	Mindfulness program (specific to study)	4 weeks	N/A	PI > mindfulness & awareness ($p = .04$) PI >< compassion & empathy, and stress & strain.
(Newsome, Christopher, Dahlen, & Christopher, 2006)	Counsellors	Convenience sample	33	–	Mindfulness curriculum (specific to study)	15 weeks	N/A	Qualitative interviews: PI >< emotional intelligence & regulation (acceptance), mindfulness & awareness (awareness), health, relationships, and well-being, satisfaction & flourishing (spirituality).
(Newsome, Waldo, & Gruszka, 2012)	Trainee helping professionals	Convenience sample	31	–	Mindfulness program (specific to study)	6 weeks	N/A	PI < stress & strain (perceived stress, $d = -1.01$, $p < .0001$). PI > compassion & empathy (self-compassion, $d = 1.13$, $p < .0001$), and mindfulness & awareness (mindful attention awareness, $d = .91$, $p < .001$),

(Continues)

TABLE 1 (Continued)

Authors	Occupation	Design	Expt. group	Control group	Intervention	Length	Control	Primary outcome(s)
(Noone & Hastings, 2010)	Disability support workers	Convenience sample	34	–	Promotion of acceptance in carers and teachers	1.5 days	N/A	PI < distress & anger (distress, $d = -.54$, $p = .02$). PI >< stress & strain (stress, $d = -.13$).
(Pflugeisen, Drummond, Ebersole, Mundell, & Chen, 2015)	Physicians	Convenience sample	19 (23)	–	MBSR adaptation	8 weeks	N/A	PI < burnout (emotional exhaustion, $d = -.46$; depersonalisation, $d = -.32$; and personal accomplishment, $d = .56$; $p = <.03$), and stress & strain (perceived stress, $d = -.87$, $p = .005$). PI > mindfulness & awareness (mindfulness skills, $d = .84$, $p = .01$).
(Pipe et al., 2009)	Nurses	RCT	15	17	MBSR adaptation	4 weeks	Waitlist	PI < distress & anger (psychological distress, $d = -.39$, $p = .009$). PI >< depression ($d = -.54$), job performance (caring efficacy, $d = .48$), and relationships (interpersonal sensitivity, $d = .38$, $p = .29$).
(Poulin et al., 2008) [study 1]	Nurses	RCT	16	10	MBSR adaptation	4 weeks	Imagery & progressive muscle relaxation	PI > well-being, satisfaction & flourishing (relaxation, $d = -.63$, $p < .05$). PI >< burnout (emotional exhaustion, $d = -.07$; depersonalisation, $d = -.16$; and personal accomplishment, $d = .73$).
(Raab et al., 2015)	Mental health professionals	Convenience sample	22	–	MBSR	8 weeks	N/A	PI > compassion & empathy (self-compassion, $d = .48$, $p = .003$). PI >< burnout (depersonalisation, $d = -.11$; emotional exhaustion, $d = -.20$; and personal accomplishment, $d = .20$), and well-being, satisfaction & flourishing (quality of life, $d = .02$).
(Rimes & Wingrove, 2011)	Trainee clinical psychologists	Convenience sample	20	–	MBCT	8 weeks	N/A	PI < depression (rumination, $d = -.57$, $p < .0005$). PI > anxiety ($d = .26$, $p = <.05$), compassion & empathy (fantasy, $d = .52$; self-compassion, $d = .48$, empathic concern, $d = .00$; personal distress, $d = -.06$; and perspective taking, $d = -.03$; $p = <.05$), and mindfulness & awareness (act aware, $d = .10$; non nonreacting, $d = .59$; non judging, $d = .52$; describe, $d = .31$; and observe, $d = .38$; $p < .001$). PI >< stress & strain (perceived stress, $d = -.23$).

(Continues)

TABLE 1 (Continued)

Authors	Occupation	Design	Expt. group	Control group	Intervention	Length	Control	Primary outcome(s)
(Rocco, Dempsey, & Hartman, 2012)	Mental health professionals	Convenience sample	16	–	Calm abiding meditation	8 weeks	N/A	Qualitative interviews: PI > emotional intelligence & regulation (acceptance, and emotion regulation), mindfulness & awareness (awareness), and health (health behaviours).
(Ruths et al., 2013)	Mental health professionals	Convenience sample	27	–	MBCT	8 weeks	N/A	PI < distress & anger ($p = .003$). PI > mindfulness & awareness ($p = .008$). PI >< anxiety, and well-being, satisfaction & flourishing (satisfaction with life).
(Shapiro et al., 1998b)	Trainee doctors	RCT	37	36	Stress reduction and relaxation	7 weeks	Waitlist	PI < anxiety (state, $d = -.46$; and trait, $d = -.59$; $p < .05$), depression (depression, $d = -.46$, $p < .006$), and distress & anger (psychological distress, $d = -.69$, $p < .02$). PI > compassion & empathy (empathy, $d = .47$, $p < .05$), and well-being, satisfaction & flourishing (spirituality, $d = .32$, $p < .02$).
(Shapiro et al., 2005)	Healthcare professionals	RCT	18	20	MBSR	8 weeks	Waitlist	PI < stress & strain (perceived stress, $d = -.15$, $p = .04$). PI > compassion & empathy (self-compassion, $d = .02$, $p = .004$). PI >< burnout (emotional exhaustion, $d = -.18$; depersonalisation, $d = -.74$; and personal accomplishment, $d = .64$), distress & anger (distress, $d = -.07$), and well-being, satisfaction & flourishing (satisfaction with life, $d = .15$).
(Shapiro et al., 2007)	Trainee psychotherapists	Convenience sample	22	32	MBSR	8 weeks	Psychology course	PI < anxiety (state, $d = -.55$, $p = .0005$; and trait, $d = -.91$, $p = .0002$), depression (rumination, $d = -.41$, $p = .0006$), and stress & strain (perceived stress, $d = -.67$, $p < .0001$). PI > compassion & empathy (self-compassion, $d = .42$, $p < .0001$), mindfulness & awareness (mindful attention awareness, $d = .36$, $p = .006$), and well-being, satisfaction & flourishing (positive affect, $d = .57$, $p = .0002$; and negative affect, $d = -.46$, $p = .04$).

(Continues)

TABLE 1 (Continued)

Authors	Occupation	Design	Expt. group	Control group	Intervention	Length	Control	Primary outcome(s)
(Singh et al., 2015)	Disability professionals	Convenience sample	9	–	Mindfulness-based positive behavioural support	7 days	N/A	PI < stress & strain (perceived stress, $d = -3.89$ $p < .001$), PI > job performance (restraining patients, $p < .001$; staff injury, $p < .001$;, disciplining patients, $p < .001$).
(Singh et al., 2006)	Psychiatric staff	Convenience sample	18 (3 teams)	18 (same as expt group)	Mindfulness-based mentoring	11, 8, or 6 sessions	Control within & between teams	PI > job performance (team functioning, $p < .001$).
(Song & Lindquist, 2015)	Trainee nurses	RCT	21 (25)	23 (25)	MBSR	8 weeks	Waitlist	PI < anxiety ($d = -.50$, $p = .023$), depression ($d = -.70$, $p = .002$), and stress & strain (stress, $d = -.85$, $p < .001$). PI > mindfulness & awareness (mindful attention awareness, $d = .13$, $p = .01$).
(Stew, 2011)	Trainee occ therapists	Convenience sample	12	–	MBSR adaptation	4 weeks	N/A	Qualitative interviews ($n = 10$): PI > emotional intelligence & regulation (acceptance), and mindfulness & awareness.
(Tarrasch, 2014)	Trainee counsellors and support staff	Convenience sample	19	–	Mindfulness curriculum (specific to study)	2 terms	N/A	Qualitative interviews ($n = 19$) PI > emotional intelligence & regulation (acceptance), mindfulness & awareness (awareness, calmness, coping).
(Van der Riet, Rossiter, Kirby, Dluzewska, & Harmon, 2015)	Trainee nurses	Convenience sample	14	–	Mindfulness program (specific to study)	7 weeks	N/A	Qualitative analysis: PI < stress & strain. PI > mindfulness & awareness (awareness), emotional intelligence & regulation, and relationships.
(West et al., 2014)	Physicians	RCT	35 (37)	37	Small group curriculum [a]	10 weeks	Nothing	PI >< compassion & empathy (physician empathy, $d = -.05$), stress & strain (perceived stress, $d = .13$); and well-being, satisfaction & flourishing (job satisfaction, $d = -.14$).

Note. All statistically significant results are reported. Effect sizes were calculated when means and standard deviations were available; otherwise, just statistically significant differences are offered.

< = decreases in; > = increases in; >< = no change in; expt = experimental group; cnt = control group; PI = postintervention; NR = not reported; MBCT = mindfulness-based cognitive therapy; MBSR = mindfulness-based stress reduction; MBST = mindfulness-based stress reduction therapy; MM = mindfulness meditation; NCC = neural correlates of consciousness; N/A = not applicable; NA = not available; RCT = randomized controlled trial.

[a]Number in parenthesis is the initial sample size (if different from sample size featured in analysis).

[b]Mindfulness just one component of broader intervention.

TABLE 2 Overview of nonintervention studies

Authors	Workplace	Meditators	Nonmeditators	Analysis	Primary result
(Choi & Koh, 2015)	Nurses	–	330	Correlations	Mindfulness correlation: < stress & strain (job stress, $r = -.279$, $p < .001$). > job satisfaction ($r = .171$, $p = .002$).
(Christopher et al., 2011)	Counsellors & psychotherapists	13	3	Qualitative	Mindfulness > emotional intelligence & regulation (acceptance, and self-regulation), mindfulness & awareness (awareness), job performance, and relationships.
(Cigolla & Brown, 2011)	Psychotherapists	6	–	Qualitative	Mindfulness > emotional intelligence & regulation (acceptance), mindfulness & awareness (awareness), job performance, relationships, and well-being, satisfaction & flourishing (spirituality).
(Di Benedetto & Swadling, 2014)	Psychologists	–	167	Correlation	Mindfulness correlation: < burnout ($r = -.42$, $p < .0003$).
(Dauenhauer, 2006)	Professional caregivers	–	20	Qualitative	Mindfulness > emotional intelligence & regulation (acceptance, and sensitivity), mindfulness & awareness (awareness), and relationships.
(Gill, Waltz, Suhrbier, & Robert, 2015)	Psychotherapists	7	–	Qualitative	Mindfulness > emotional intelligence & regulation (acceptance), mindfulness & awareness (awareness), job performance, relationships, and well-being, satisfaction & flourishing (well-being).
(Keane, 2014)	Psychotherapists	–	40	Correlations	Mindfulness (FFMQ, all facets) correlation: > compassion & empathy (IRI Perspective taking; r range .44-.60, $p < .001$), mindfulness & awareness (FFMQ Observe, Nonjudging, Nonreactivity) correlation: > compassion & empathy (IRI Global empathy; r range .44-.60, $p < .001$).
(Kemper et al., 2015)	Health professionals	–	213	Correlations	Mindfulness correlation: stress & strain (perceived stress, $r = -.58$, $p < 0.001$). > health (health, $r = .37$, $p < .01$; sleep quality, $r = -.32$, $p < .01$; and global mental health, $r = .56$, $p < .001$), resilience ($r = .5$, $p < .01$), and compassion & empathy (self-compassion, $r = .63$, $p < .001$).
(McCollum & Gehart, 2010)	Psychotherapists	13	–	Qualitative	Mindfulness > emotional intelligence & regulation (acceptance), and job performance.
(McCracken & Yang, 2008)	Rehabilitation workers	–	98	Correlations	Mindfulness correlation: < burnout (exhaustion; $r = -.43$, $p < .05$), and stress & strain ($r = .23$, $p < .001$). > health ($r = .30$, $p < .01$; vitality, $r = .43$, $p < .01$; social Functioning, $r = .44$, $p < .001$; emotion functioning, $r = .40$, $p < .001$; and emotion role, $r = .33$, $p < .001$). >< well-being, satisfaction & flourishing (job satisfaction).

(Continues)

TABLE 2 (Continued)

Authors	Workplace	Meditators	Nonmeditators	Analysis	Primary result
(Razzaque, Okoro, & Wood, 2015)	Clinical psychologists	–	76	Correlations	Mindfulness correlation: > relationships (therapeutic alliance, $r = .356$, $p < .01$).
(Ryan, Safran, Doran, & Muran, 2012)	Psychotherapists	–	52 (26 dyads)	Correlations	Mindfulness correlation: > relationships (interpersonal functioning, $p < .05$; and therapeutic alliance, $p < .05$). PI >< job performance (patient distress).
(Simon, Ramsenthaler, Bausewein, Krischke, & Geiss, 2009)	Palliative care professionals	–	10	Qualitative	Mindfulness > emotional intelligence & regulation (acceptance), and job performance.
(Talisman, Harazduk, Rush, Graves, & Haramati, 2015)	Medical training facilitators	62	–	Correlations & qualitative	Mindfulness correlation: < emotional intelligence & regulation (self-affiliation, $r = .413$, $p < .05$). Qualitative interviews: > mindfulness & awareness, compassion & empathy, job performance, and relationships.
(Westphal et al., 2015)	Intensive care nurses	–	50	Correlations	Mindfulness correlation: < anxiety ($r = -.55$, $p < .001$), burnout (depersonalization; $r = -.37$, $p < .001$; emotional exhaustion; $r = -.52$, $p < .001$), and depression ($r = .49$, $p < .001$).

Note. < = negative correlation with; > = positive correlation with; >< = no correlation.

TABLE 3 Summary of common outcomes across all studies

Outcome	Number of studies assessing	Improvement related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Anxiety	16	9	7, + [a]1	1
Burnout	25	11	11	3
Compassion & empathy	28	16	9	3
Depression	18	10	7	1
Distress & anger	16	14	2	0
Emotional intelligence & regulation	21	12	2	7
Health	7	3	2	2
Job performance	13	6	1	6
Mindfulness & awareness	39	27	6	6
Relationships	13	5	2	6
Resilience	6	3	2	1
Stress & strain	40	25	12, + [a]1	3
Well-being, satisfaction, & flourishing	24	12	11, + [a]1	2, + [a]1

Note. [a]Studies showing *worsening* outcomes in relation to mindfulness. In instances where the total number of studies does not appear to be an accurate product of the other three columns (e.g., in the case of anxiety), this is because some studies used multiple measures with respect to a given outcome, and observed both a significant impact and no significant change.

4.1 | Mindfulness and awareness

MBIs certainly appear effective at engendering mindfulness, with a small-to-medium effect size ($d = .36$), as assessed by 33 intervention studies, shown in Table 4 below. The vast majority of these ($n = 27$) showed an increase in mindfulness in relation to an MBI, while six found no significant improvement. However, as positive as these headline figures are, further nuance is provided by digging a little deeper into the results, because a range of scales were used across the studies–scales that construct mindfulness in diverse ways–with some interesting variation. This diversity of scales is both a weakness and a strength. It is a weakness inasmuch as it is difficult to draw comparisons across studies. Indeed, inconsistency in the use of scales across studies was a common theme in this review. That said, the diversity of measures does allow us to discern nuances in the development of mindfulness. The most popular tool was Brown and Ryan's unidimensional (2003) Mindful Attention and Awareness Scale (MAAS), which assesses dispositional mindfulness according to a single core characteristic of mindfulness (i.e., open and receptive awareness), which essentially aligns with Kabat-Zinn's (2003) definition cited above.

By contrast, a number of studies deployed multidimensional scales, most notably Baer, Smith, Hopkins, Krietemeyer, and Toney's (2006) Five Facets of Mindfulness Questionnaire. While also focusing on dispositional mindfulness, it identifies *five* different skills/dimensions. Here it was difficult to discern a coherent pattern among the studies with respect to these five. For instance, consider Hopkins and Proeve (2013), Manotas et al. (2014), Martin-Asuero et al. (2014), and Rimes and Wingrove (2011). Their respective effect sizes for the five dimensions varied considerably, as follows: observing (.43, .23, 1.27, .38); describing (.18, –.28, .44, .31); nonjudging of inner experience (1.27, .32, .49, .52); nonreactivity to inner experience (.77, .03, 1.21, .59); and acting with awareness (.11, –.29, .84, .10). Thus, there was considerable variation between studies with respect to the different dimensions; for instance, "nonreactivity" ranged from .03 (Manotas et al., 2014) to 1.21 (Martin-Asuero et al., 2014).

Moreover, there was also strong variation within individual studies across the dimensions. For instance, whereas Manotas et al. found small effect sizes for observing (.23) and nonjudging (.32), they observed no change with respect to nonreactivity (.03) and actually saw *worsening* skills in describing (–.28) and acting with awareness (–.29). Such

TABLE 4 Mindfulness and awareness outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Five Facets of Mindfulness Questionnaire	(Brooker et al., 2013) (Hopkins & Proeve, 2013) **(Manotas et al., 2014) (Martín-Asuero et al., 2014)** (Rimes & Wingrove, 2011)	(De Vibe et al., 2013) **(Duchemin et al., 2015)**	(Keane, 2014)
Freiberg Mindfulness Inventory	(Gockel et al., 2013)		
Kentucky Inventory of Mindfulness Skills	(Dobie et al., 2015) (Moore, 2008) (Pflugeisen et al., 2015)		
Mindful Attention Awareness Scale	**(Cohen-Katz, Wiley, Capuano, Baker, Kimmel, et al., 2005)** (Kemper & Khirallah, 2015) (Newsome et al., 2012) (Ruths et al., 2013) (Shapiro et al., 2007) **(Song & Lindquist, 2015)**	(J. S. Cohen & Miller, 2009) (Gauthier et al., 2015) (Horner et al., 2014)	
Mindful Therapy Scale	(Aggs & Bambling, 2010)		
Qualitative interviews	(Beckman et al., 2012) **(Cohen-Katz, Wiley, Capuano, Baker, Deitrick, et al., 2005)** (Dorian & Killebrew, 2014) (Felton et al., 2015) (Rocco et al., 2012) (Stew, 2011) (Tarrasch, 2014) (Van der Riet et al., 2015)	(Newsome et al., 2006)	(Christopher et al., 2011) (Cigolla & Brown, 2011) (Dauenhauer, 2006) (Gill et al., 2015) (Talisman et al., 2015)
Toronto Mindfulness Scale	(Brady et al., 2012) (Hallman et al., 2014)		
Two Factor Mindfulness Scale	(Krasner et al., 2009)		

Note. Authors in bold denote RCT studies.

variation shows the value of drilling down into the fine-grained details of studies. Furthermore, it highlights the notion that–so far as multidimensional scales are concerned–mindfulness is not a monolithic construct, rather it comprises nuances, upon which there may be differential rates of change and development.

4.2 | Anxiety

Turning now to the various well-being outcomes, first, on balance, mindfulness appears to have a beneficial impact upon anxiety, as shown in Table 5 below, with a medium effect size ($d = -.51$). While nine studies reported an improvement in relation to an MBI, six observed no change, although one further study (Rimes & Wingrove, 2011) reported worsening levels of anxiety.

In addition, of the nonintervention studies, Westphal et al. (2015) reported an inverse correlation between anxiety and mindfulness. Given the high prevalence and burden of anxiety among healthcare professionals (e.g., a survey of Chinese nurses found the prevalence of clinically significant anxiety symptoms to be as high as 43.4%), the improvements in anxiety linked to MBIs are noteworthy, modest though they are. As with mindfulness, a range of scales were

TABLE 5 Anxiety outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Beck Anxiety Inventory	(J. S. Cohen & Miller, 2009)		
Burns Anxiety Inventory	(Barbosa et al., 2013)		
Depression Anxiety Stress Scale [Anxiety]	(Dobie et al., 2015) (Fortney et al., 2013) **(Song & Lindquist, 2015)**	**(Duchemin et al., 2015)** (Foureur et al., 2013)	
Hospital Anxiety & Depression Scale [Anxiety]		**(Mealer et al., 2014)** (Rimes & Wingrove, 2011)!	(Westphal et al., 2015)
Penn State Worry Questionnaire		(Ruths et al., 2013)	
Profile of Mood States [Anxiety]	(Galantino et al., 2005)	**(Martín-Asuero et al., 2014)**	
State Trait Anxiety Inventory	**(Johnson et al., 2015)** **(Shapiro, G. Schwartz, & G. Bonner**, 1998a**)** (Shapiro et al., 2007)	**(Johnson et al., 2015)** (Ruths et al., 2013)	

Note. Authors in bold denote RCT studies; **!** in third column = poorer outcome in relation to mindfulness.

deployed. The most prominent were Spielberger, Gorsuch, and Lushene's (1970) State-Trait Anxiety Inventory, and Lovibond and Lovibond's (1995) Depression Anxiety Stress Scale (DASS). The multidimensional DASS is particularly useful because it also covers depression and stress; therefore, it enables more ground to be covered with the one scale, thus reducing the empirical demands placed on participants.

4.3 | Burnout

Regarding burnout, the results were more equivocal, as shown in Table 6 below. Of the 22 intervention studies examining this, only 11 registered a significant improvement, while equally 11 reported no significant change. Nevertheless, the overall effect size in this outcome was small to medium ($d = -.33$).

In addition, three nonintervention studies observed an inverse correlation between burnout and mindfulness. One possible explanation for the relatively equivocal results with respect to the MBIs may lie in the relatively small sample sizes of many studies. Some intervention studies that did not find a significant improvement in burnout certainly observed trends in the predicted direction (e.g., Mealer et al., 2014; Poulin, Mackenzie, Soloway, & Karayolas, 2008; Raab, Sogge, Parker, & Flament, 2015; Shapiro et al., 2005), although De Vibe et al. (2013) found trends in the other direction. Larger sample sizes may allow any effect of MBIs on burnout to be clearer. Another possible explanation is the multifaceted nature of the construct. The dominant measure used was the Maslach Burnout Inventory (Maslach, Jackson, & Leiter, 1986), which has three dimensions: emotional exhaustion, cynicism/depersonalization, and professional efficacy/accomplishment. When considering the components separately, several studies found that MBIs tended to have a stronger positive effect, albeit still nonsignificant, on emotional exhaustion compared to the other two components (e.g., Barbosa et al., 2013; Duchemin, Steinberg, Marks, Vanover, & Klatt, 2015; Moody et al., 2013; Poulin et al., 2008).

4.4 | Depression

The results were generally favourable with respect to depression, as shown in Table 7 below, with an overall medium effect size ($d = -.53$). Of the 16 intervention studies examining this, while 10 registered a significant improvement, seven reported no significant change. Meanwhile, in terms of nonintervention studies, Westphal et al. (2015) reported

TABLE 6 Burnout outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Copenhagen Burnout Inventory	(Bazarko et al., 2013)	(Brooker et al., 2013)	(Di Benedetto & Swadling, 2014)
Maslach Burnout Inventory	(Barbosa et al., 2013) (Brady et al., 2012) **(Cohen-Katz, Wiley, Capuano, Baker, Kimmel, et al., 2005)** (Fortney et al., 2013) (Galantino et al., 2005) (Krasner et al., 2009) **(Mackenzie et al., 2006)** **(Martín-Asuero et al., 2014)** (Pflugeisen et al., 2015)	**(De Vibe et al., 2013)** **(Duchemin et al., 2015)** (Gauthier et al., 2015) (Goodman & Schorling, 2012) **(Mealer et al., 2014)** **(Moody et al., 2013)** **(Poulin et al., 2008)** (Raab et al., 2015) **(Shapiro et al., 2005)**	(Westphal et al., 2015)
Professional Quality of Life Scale [Burnout]		(Horner et al., 2014)	
Profile of Mood States [Fatigue]	**(Martín-Asuero et al.**, 2014)		
Profile of Mood States [Vigour]	(Galantino et al., 2005) (Krasner et al., 2009)		
Qualitative Interviews	(Christopher et al., 2006)		
SF-12-V2 Health Survey [Vitality]			(McCracken & Yang, 2008)

Note: Authors in bold denote RCT studies.

TABLE 7 Depression outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Beck Depression Inventory		**(Moody et al., 2013)**	
Centre For Epidemiological Studies – Depression	**(Johnson et al., 2015)**	(J. S. Cohen & Miller, 2009)	
Depression Anxiety Stress Scale [Depression]	(Fortney et al., 2013) **(Song & Lindquist, 2015)**	(Brooker et al., 2013) (Dobie et al., 2015) **(Duchemin et al., 2015)** (Foureur et al., 2013)	
Emotional Control Questionnaire	(Martín-Asuero & García-Banda, 2010)		
Hospital Anxiety & Depression Scale [Depression]	**(Mealer et al., 2014)**		(Westphal et al., 2015)
Patient Health Questionnaire	**(Johnson et al., 2015)**		
Profile of Mood States [Depression]	(Galantino et al., 2005) **(Martín-Asuero et al., 2014)**		
Reflection-Rumination Questionnaire	(Rimes & Wingrove, 2011) (Shapiro et al., 2007)		
Symptom Checklist-90-R [Depression]	**(Shapiro et al., 1998a)**	**(Pipe et al., 2009)**	

Note. Authors in bold denote RCT studies.

an inverse correlation between depression and mindfulness. The relatively favorable results for this outcome are welcome, given the relatively high incidence of depression in HCPs. For instance, a study by Caplan (1994) in the United Kingdom found high levels of depression, particularly among general practitioners, 27% of whom scored as borderline or likely to be depressed. These figures contrast with estimates that around 2.3% of the general U.K. adult population experience a depressive episode at any one time, with 9% experiencing mixed anxiety and depressive disorder (The Health and Social Care Information Centre, 2009).

There are many hypothesized reasons for greater liability to depression among HCPs, including personality traits like perfectionism, burdens of clinical responsibility, and reluctance to seek treatment (Bright & Krahn, 2011). Whatever the reasons, it is encouraging that, on balance, MBIs appear to help in this regard–although it bears repeating that over one third of intervention studies reported no significant change–reflecting the more established efficacy of MBIs such as MBCT with respect to depression (Segal et al., 2002).

4.5 | Stress and strain

More consistent results were found for stress, by far the outcome receiving the most attention, as shown in Table 8 below. Of the 37 intervention studies examining this, 25 registered a significant improvement in relation to an MBI, while 12 reported no significant change, although, in addition, Brooker et al. (2013) observed worsening levels. The global effect size for this outcome was small to medium ($d = -.42$).

Three nonintervention studies also observed an inverse correlation between stress and mindfulness. These generally positive results are again welcome: As with the other outcomes, stress is generally higher among HCPs than in the general population. Firth-Cozens (2003) reported that the proportion of HCPs being above threshold levels of stress is around 28% in surveys, compared with about 18% in the general working population. As with depression, a similar range of factors has been implicated in elevated stress levels among HCPs, from long working hours to the burden of clinical responsibility (Sochos, Bowers, & Kinman, 2012).

Unfortunately, as highlighted above, these burdens have only increased over recent years, due to factors such as curbs on healthcare spending, meaning that overwork has become even more acute. As noted above, in a survey of NHS staff, 61% reported feeling stress all or most of the time and 59% reported that the stress is worse this year than last year (Dudman et al., 2015). Thus, while it is encouraging that MBIs may help alleviate or prevent stress, it is of course vital that these underlying structural causes are also addressed.

4.6 | Other well-being outcomes

This general pattern of mindfulness being associated with well-being was followed across the other outcomes. For example, 15 studies examined the relationship between mindfulness and distress or anger, and generally found it to have a positive effect, as shown in Table 9, with a total medium-to-large effect size ($d = .60$): 13 registered an improvement, whereas only two reported no change. Mindfulness was also associated with various more "positive" well-being outcomes, although the results overall were equivocal, as shown in Table 10, with an overall small-to-medium effect size ($d = .36$). Of the 21 intervention studies examining outcomes in this area, while 12 registered an improvement, 11 reported no change. (The nonadditive nature of the numbers in that last sentence reflects the fact that two studies used multiple well-being measures, and reported both significant and nonsignificant outcomes in relation to these.)

In addition, two nonintervention studies observed a correlation with mindfulness, while McCracken and Yang (2008) actually observed an inverse correlation. Mindfulness also appeared conductive to health with a medium-to-large effect size ($d = .62$), although there were fewer studies focusing on such outcomes, as seen in Table 11 below. Of the 5 intervention studies examining this, three registered an improvement, while two reported no change; additionally, two nonintervention studies observed a correlation with mindfulness.

In addition to these primary well-being outcomes, mindfulness was also linked to various factors and qualities *associated* with well-being–including relationships, resilience, and emotional intelligence–which may provide an explanation for the generally positive outcomes adumbrated above. Regarding relationships, mindfulness practice seems to have a

TABLE 8 Stress and strain outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Depression Anxiety Stress Scale [Stress]	(Dobie et al., 2015) **(Duchemin et al., 2015)** (Fortney et al., 2013) (Foureur et al., 2013)	(Brooker et al., 2013)!	
Derogatis Stress Profile	(Beddoe & Murphy, 2004) **(Song & Lindquist, 2015)**		
Job Stress Questionnaire			(Choi & Koh, 2015)
Perceived Medical School Stress	**(De Vibe et al., 2013)**		
Perceived Stress Questionnaire		(Martín-Asuero & García-Banda, 2010)	
Posttraumatic Diagnostic Scale	**(Mealer et al., 2014)**		
Perceived Stress Scale	(Bazarko et al., 2013) (J. S. Cohen & Miller, 2009) **(Erogul et al., 2014)** (Fortney et al., 2013) (Hallman et al., 2014) **(Johnson et al., 2015)** **(Manotas et al., 2014)** (Newsome et al., 2012) (Pflugeisen et al., 2015) **(Shapiro et al., 2005)** (Shapiro et al., 2007) (Singh et al., 2015)	(Bond et al., 2013) (Bonifas & Napoli, 2014) (Brooker et al., 2013)! (Burnett & Pettijohn, 2015) (Hopkins & Proeve, 2013) **(Moody et al., 2013)** (Moore, 2008) (Rimes & Wingrove, 2011) **(West et al., 2014)**	(Kemper et al., 2015)
Mental Health Professionals Stress Scale	(Brady et al., 2012)		
Professional Quality of Life Scale [Stress]		(Horner et al., 2014)	
Nursing Stress Scale	(Gauthier et al., 2015)		
Qualitative Interviews	(Felton et al., 2015) (Van der Riet et al., 2015) (Christopher et al., 2006)	(Bond et al., 2013) **(Moody et al., 2013)**	
Salivary A-Amylase	**(Duchemin et al., 2015)**		
Salivary Cortisol		(Galantino et al., 2005)	
Staff Stressor Questionnaire		(Noone & Hastings, 2010)	
Stress (Survey Question)			(McCracken & Yang, 2008)
Stress & Tension Ratings	(Aggs & Bambling, 2010)		

Note. Authors in bold denote RCT studies; **!** in third column = poorer outcome in relation to mindfulness.

positive impact, as seen in Table 12, with a small-to-medium effect size ($d = .46$). Most of the 13 studies analyzing this outcome found either improvement or benign association with regard to mindfulness, while only two failed to provide significant results. Similarly, mindfulness was also linked to resilience, although the results were somewhat equivocal: As shown in Table 13, of the five intervention studies examining this, three observed an improvement and two reported no significant change. The overall effect size for this outcome was small ($d = .21$). Meanwhile, Kemper, Mo, & Khayat (2015) observed a correlation with mindfulness.

Mindfulness appeared to also affect emotional intelligence and regulation, as shown in Table 14. Of the 14 intervention studies examining this, 12 observed an improvement and only two reported no significant change. Nevertheless,

TABLE 9 Distress and anger outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Brief Symptom Inventory	**(Manotas et al., 2014)**	**(Cohen-Katz, Wiley, Capuano, Baker, Kimmel, et al., 2005) (Shapiro et al., 2005)**	
Depression Anxiety Stress Scale	(Foureur et al., 2013)		
General Health Questionnaire	**(De Vibe et al., 2013)** (Foureur et al., 2013) **(McConachie et al., 2014)** (Noone & Hastings, 2010) (Ruths et al., 2013)		
Profile of Mood States [Anger]	(Galantino et al., 2005) (Krasner et al., 2009) **(Martín-Asuero et al., 2014)**		
Qualitative Interviews	(Dorian & Killebrew, 2014)		
Symptom Checklist-90-R	(Martín-Asuero & García-Banda, 2010) **(Pipe et al., 2009) (Shapiro et al., 1998a)**		

Note. Authors in bold denote RCT studies.

this time no effect size was found ($d = .18$). In addition, seven nonintervention studies observed a correlation with mindfulness. The significance of this particular outcome is that, as outlined above, a key mechanism through which mindfulness is thought to exert its positive effects is reperceiving (Shapiro et al., 2006), also known as decentering (Fresco et al., 2007). This ability, which means that people are better able to detach themselves from distressing qualia that might otherwise precipitate feelings of stress etc., could be regarded as an aspect of a more general capacity of emotion regulation (Walsh & Shapiro, 2006).

The suggestion is that mindfulness might positively affect well-being in the following ways: (a) mindfulness involves introspective practices that facilitate the development of attention and awareness skills; (b) development of these skills leads to enhanced emotional regulation (including abilities such as reperceiving); and (c) emotional regulation is a meta-skill that subserves multiple well-being outcomes (while, conversely, poor regulation skills are a transdiagnostic factor underlying diverse psychopathologies; Aldao et al., 2010). Future work may help to elucidate these hypothesized causal chains further (e.g., through longitudinal studies deploying regression analyses).

Finally, the effect of mindfulness was not limited to the well-being of HCPs, but was also associated with enhanced job performance. The dominant outcome in this respect was compassion and/or empathy, as shown in Table 15. Of the 28 intervention studies examining this, 16 observed an improvement and 9 reported no significant change, showing an overall small-to-medium effect size ($d = 31$); meanwhile, three nonintervention studies observed a correlation with mindfulness. Mindfulness was also associated with a broad range of other aspects of job performance, as shown in Table 16. Of the seven intervention studies examining outcomes in this area, six observed an improvement and only one found no change, with a large global effect size ($d = .82$). Six nonintervention studies also observed a correlation with mindfulness.

4.7 | Summary and recommendations

Overall, MBIs had a positive impact upon most outcome measures, although some outcomes were rather equivocal, such as burnout. Moreover, a fairly large evidence base regarding the use of mindfulness in healthcare settings is gradually accumulating, with 81 papers included in the current review, comprising a total of 3,805 participants. Together,

TABLE 10 Well-being, satisfaction, and flourishing outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Brief Serenity Index	(Bazarko et al., 2013)		
Index of Core Spiritual Experiences	**(Shapiro et al., 1998a)**		
Job Satisfaction Scale		**(Mackenzie et al., 2006)**	
Job Satisfaction (Survey Question)			(McCracken & Yang, 2008)**!**
Meaning In Life Questionnaire		(J. S. Cohen & Miller, 2009)	
Minnesota Satisfaction Questionnaire		(Brooker et al., 2013)**!**	
Physician Job Satisfaction Scale		**(West et al., 2014)**	
Positive & Negative Affect Scale	(Brooker et al., 2013) (Martín-Asuero & García-Banda, 2010) (Shapiro et al., 2007)		
Professional Quality of Life Scale	**(Duchemin et al., 2015)**	(Brooker et al., 2013) (Horner et al., 2014)	
Quality of Life Index	(Bonifas & Napoli, 2014)		
Quality of Life Inventory		(Raab et al., 2015)	
Qualitative Interviews	(Fisher & Hemanth, 2015)	(Cohen-Katz, Wiley, Capuano, Baker, Deitrick, et al., 2005)	(Gill et al., 2015)
Qualitative Interviews (Spirituality)		(Newsome et al., 2006)	(Cigolla & Brown, 2011)
Satisfaction With Life Scale	**(Mackenzie et al., 2006)** **(Poulin et al., 2008)**	(Brooker et al., 2013) (J. S. Cohen & Miller, 2009) (Ruths et al., 2013) **(Shapiro et al., 2005)**	
Sense of Coherence	(Foureur et al., 2013)	**(Mackenzie et al., 2006)**	
Smith Relaxation Disposition Inventory	**(Mackenzie et al., 2006)** **(Poulin et al., 2008)**		
Subjective Well-Being Scale	**(De Vibe et al., 2013)**		
Warwick-Edinburgh Mental Well-Being Scale		**(McConachie et al., 2014)**	

Note. Authors in bold denote RCT studies; **!** in third column = poorer outcome in relation to mindfulness; **!** in fourth column = inverse correlation with mindfulness.

these studies suggest mindfulness can potentially reduce mental health issues, enhance well-being-related outcomes (e.g., job satisfaction), and improve aspects of job performance. These outcomes appear to be fairly evenly distributed across different healthcare professions.

For instance, one might speculate that occupations that potentially have greater familiarity with psychological interventions like mindfulness, such as those in the mental health arena, might be more amenable to its effects. However, that appears to not be the case. Of the 81 papers analysed here, 32 (39%) specifically involved people working in mental health. These percentages were roughly reflected in the patterns of findings with respect to the various outcomes. For instance, in terms of anxiety, mental health professionals were involved in three of the nine interventions that reported a significant improvement, and two of the seven that found no such improvement (including one that found a

TABLE 11 Health outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Health Promoting Lifestyle Profile	**(Johnson et al., 2015)**		
Patient Reported Outcomes Measurement Information System			(Kemper et al., 2015)
Qualitative interviews	(Rocco et al., 2012)	(Newsome et al., 2006)	
SF-12-v2 Health Survey [Physical Health]	(Bazarko et al., 2013)	(Goodman & Schorling, 2012)	(McCracken & Yang, 2008)
Workplace Productivity and Impairment General Health Questionnaire	**(Johnson et al., 2015)**		

Note. Authors in bold denote RCT studies.

TABLE 12 Resilience outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Brief Resilience Scale	(Kemper & Khirallah, 2015)		(Kemper et al., 2015)
Connor David Resiliency Scale	**(Klatt et al., 2015) (Mealer et al., 2014)**		
Resilience Scale		**(Erogul et al., 2014)** (Fortney et al., 2013)	
Utrecht Work Engagement Scale [Vigour]	**(Klatt et al., 2015)**		

Note. Authors in bold denote RCT studies.

worsening impact). Thus, it appears that mindfulness might be helpful to HCPs generally, regardless of their particular occupational role.

However, there are various issues with the research that limits the conclusions that can be drawn. In terms of the QATQS quality assessment, few studies scored highly in all respects, as shown in Appendix 1. For instance, of the 66 intervention studies, only 26 (39%) involved a control group, while just 20 (30%) conducted an RCT. Without a control group, it is harder to ascribe any positive changes observed to mindfulness per se. Then, even when controls are included, unless participants are randomized into groups, it is possible that differences in baseline characteristics between the groups generated interaction effects, thereby compromising the results. For example, in Barbosa et al. (2016), the 16 participants who entered the experimental group–reduced to 13 on attrition–did so after an invitation e-mail was sent to the entire student population of around 1,300; by contrast, the control group comprised individuals who were subsequently selected as matching the composition of the experimental group and were paid to take part. Thus, it is conceivable–and indeed likely–that the experimental participants already had an interest in mindfulness, although whether they did so was not reported by the study. Furthermore, there were baseline differences in anxiety, with moderate levels among the experimental group–which also perhaps accounts for their interest in participating–compared to mild levels in the control group. Such factors complicate the assessment of the efficacy of MBIs, which is why RCT designs are generally preferable.

A further issue is heterogeneity with respect to both the type of MBI and the outcome measures looked at, which makes it difficult to conduct comparative or meta-analytic assessments and hence draw robust conclusions about the

TABLE 13 Relationships outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Inventory of Interpersonal Problems-32			(Ryan et al., 2012)
Symptom Checklist-90-R [Interpersonal Sensitivity]		**(Pipe et al., 2009)**	
Qualitative interviews	(Beckman et al., 2012) **(Cohen-Katz, Wiley, Capuano, Baker, Deitrick, et al., 2005)** (Hemanth & Fisher, 2015) (Van der Riet et al., 2015)	(Newsome et al., 2006)	(Christopher et al., 2011) (Cigolla & Brown, 2011) (Dauenhauer, 2006) (Gill et al., 2015) (Talisman et al., 2015)
Social-Connectedness Scale	(J. S. Cohen & Miller, 2009)		

Note. Authors in bold denote RCT studies.

TABLE 14 Emotional intelligence and regulation outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Self-Report of Emotional Intelligence	(J. S. Cohen & Miller, 2009)		
Qualitative Interviews	**(Cohen-Katz, Wiley, Capuano, Baker, Deitrick, et al., 2005)** (de Zoysa et al., 2014) (Hemanth & Fisher, 2015) (Rocco et al., 2012) (Van der Riet et al., 2015)		(Christopher et al., 2011) (Talisman et al., 2015)
Qualitative Interviews (Acceptance)	**(Cohen-Katz, Wiley, Capuano, Baker, Deitrick, et al., 2005)** (Dorian & Killebrew, 2014) (Felton et al., 2015) (Fisher & Hemanth, 2015) (Rocco et al., 2012) (Stew, 2011) (Tarrasch, 2014)	(Newsome et al., 2006)	(Christopher et al., 2011) (Cigolla & Brown, 2011) (Dauenhauer, 2006) (Gill et al., 2015) (McCollum & Gehart, 2010) (Simon et al., 2009)
Schutte Self Report Emotional Intelligence Test		(Burnett & Pettijohn, 2015)	
Self-Regulation Questionnaire	(Bond et al., 2013)		

Note. Authors in bold denote RCT studies.

research as a whole. Finally, the research is currently biased toward psychiatric outcome measures, with little exploration of other outcomes relevant to the work arena, such as work engagement or creativity.

Based on these critiques, the following recommendations can be made vis-à-vis future work in this area. First, where possible, studies should implement an RCT design, ideally with large numbers of participants, determined by a priori power calculations drawing on estimated effect size. Second, in addition to a waitlist control protocol, it would be useful if trials included an "active" control group, such as an exercise program. This will better enable any positive effects to be ascribed to mindfulness per se rather than merely an absorbing group activity.

Third, it would be good to see a diversification of outcome measures, with studies looking beyond "negative" psychiatric issues, such as depression and anxiety, and also focusing on more "positive" (i.e., nonclinical outcomes, such as

TABLE 15 Compassion and empathy outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Empathy Construct Rating Scale	**(Shapiro et al., 1998a)**		
Interpersonal Reactivity Index	(Hopkins & Proeve, 2013)	(Beddoe & Murphy, 2004) (Galantino et al., 2005)	(Keane, 2014)
Jefferson Scale of Physician Empathy	(Barbosa et al., 2013) (Bazarko et al., 2013) (Krasner et al., 2009)	(Bond et al., 2013) **(West et al., 2014)**	
Jefferson Scale of Physician Empathy [Compassion]	**(Martín-Asuero et al., 2014)**		
Neff Compassion Scale		(Moore, 2008)	
Professional Quality of Life Scale [Compassion]		(Horner et al., 2014)	
Qualitative interviews	(Dorian & Killebrew, 2014) (Felton et al., 2015) (Hemanth & Fisher, 2015)		(Talisman et al., 2015)
Santa Clara Brief Compassion Scale		(Brooker et al., 2013) (Fortney et al., 2013)	
Self-Compassion Scale	(Bazarko et al., 2013) (Bond et al., 2013) **(Erogul et al., 2014)** (Newsome et al., 2012) (Raab et al., 2015) (Rimes & Wingrove, 2011) **(Shapiro et al., 2005)** (Shapiro et al., 2007)	(Brooker et al., 2013) (Gauthier et al., 2015)	(Kemper et al., 2015)

Note. Authors in bold denote RCT studies.

TABLE 16 Job performance outcomes across all studies

Measure	Improvement (positive change) related to mindfulness intervention	No change in relation to mindfulness intervention	Association (benign) with mindfulness
Caring Efficiency Scale		**(Pipe et al., 2009)**	
Counsellor Activity Self-Efficacy Scale	(Gockel et al., 2013)		
Patient Distress [SC-90-R]	(Grepmair et al., 2007)		
Qualitative Interviews	(Hemanth & Fisher, 2015)		(Christopher et al., 2011) (Cigolla & Brown, 2011) (Gill et al., 2015) (McCollum & Gehart, 2010) (Simon et al., 2009) (Talisman et al., 2015)
Restraint of Patients	(Brooker et al., 2014) (Singh et al., 2015)		
Seclusion of Patients	(Brooker et al., 2014)		
Treatment Team Functioning Checklist	(Singh et al., 2006)		
Verbal Redirection [Disciplining Patients]	(Singh et al., 2015)		

Note. Authors in bold denote RCT studies.

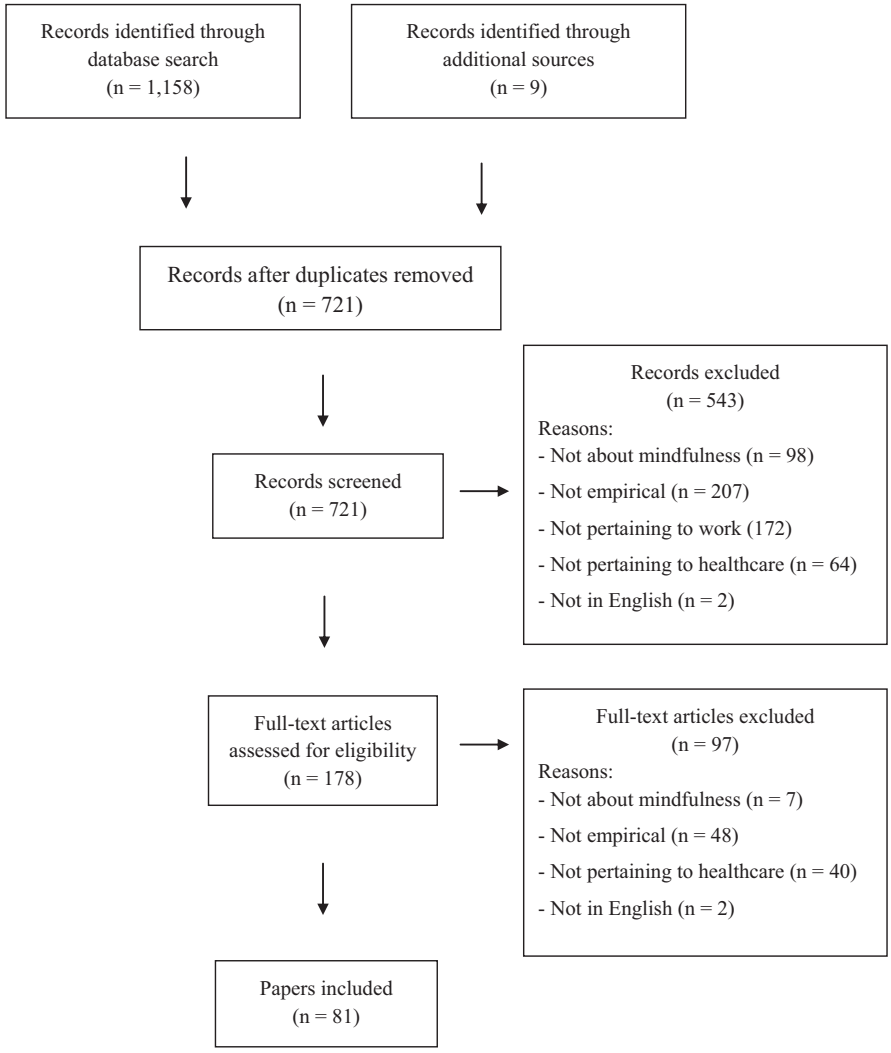

FIGURE 1 The preferred reporting items for systematic reviews and meta-analyses flow diagram

work engagement, social capital, and creativity). Finally, where possible, trials should involve established MBIs, rather than bespoke adaptations, to better enable comparison across studies. However, there is also a need to move beyond MBIs developed for clinical contexts (e.g., MBSR) and to explore MBIs created specifically for the workplace.

5 | CONCLUSION

Despite the issues with the current research base, the evidence of the value of mindfulness for HCPs is strong. Overall, mindfulness does appear to improve the wellbeing and job performance of HCPs on most metrics. Given the current pace of research into mindfulness, one might speculate that empirical support for the value of mindfulness in occupations such as healthcare will only strengthen over the years ahead.

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How to cite this article: Lomas T, Medina JC, Ivtzan I, Rupprecht S, Eiroa-Orosa F. 2018 A Systematic Review of the Impact of Mindfulness on the Well-Being of Healthcare Professionals. *J Clin Psychol*. 2018;74:319–355. https://doi.org/10.1002/jclp.22515

APPENDIX

QATQS Scoring Assessment of Intervention Studies

Authors	Selection bias	Design	Cofounders	blinding	Data collection	Attrition	Global
(Aggs & Bambling, 2010)	3	3	3	3	3	2	3
(Barbosa et al., 2013)	3	3	2	3	2	2	3
(Bazarko et al., 2013)	2	3	3	3	2	1	3
(Beckman et al., 2012)	Q	Q	Q	Q	Q	Q	Q
(Beddoe & Murphy, 2004)	3	3	3	3	2	2	3
(Bond et al., 2013)	3	3	3	3	2	2	3
(Bonifas & Napoli, 2014)	3	3	3	3	1	1	3
(Brady et al., 2012)	3	3	3	3	2	2	3
(Brooker et al., 2013)	3	3	3	3	1	2	3
(Brooker et al., 2014)	3	3	3	3	2	2	3
(Burnett & Pettijohn, 2015)	3	2	2	3	1	2	3
(Christopher et al., 2006)	Q	Q	Q	Q	Q	Q	Q
(J. S. Cohen & Miller, 2009)	3	3	3	3	1	2	3
(Cohen-Katz, Wiley, Capuano, Baker, Kimmel, et al., 2005)	2	2	2	3	1	1	2
(Cohen-Katz, Wiley, Capuano, Baker, Deitrick, et al., 2005)	Q	Q	Q	Q	Q	Q	Q
(Dobie et al., 2015)	3	3	3	3	1	1	3
(De Vibe et al., 2013)	2	1	1	1	1	1	1
(de Zoysa et al., 2014)	Q	Q	Q	Q	Q	Q	Q
(Dorian & Killebrew, 2014)	Q	Q	Q	Q	Q	Q	Q
(Duchemin et al., 2015)	1	1	1	1	1	1	1
(Erogul et al., 2014)	1	1	1	1	1	2	1
(Felton et al., 2015)	Q	Q	Q	Q	Q	Q	Q
(Fisher & Hemanth, 2015)	Q	Q	Q	Q	Q	Q	Q
(Fortney et al., 2013)	3	3	3	3	1	1	3
(Foureur et al., 2013)	3	3	3	3	1	2	3
(Galantino et al., 2005)	3	3	2	3	1	3	3
(Gauthier et al., 2015)	3	3	3	3	1	2	3
(Goodman & Schorling, 2012)	2	3	3	3	1	3	3
Grepmair et al., 2007)	2	2	1	2	1	1	2
(Hallman et al., 2014)	2	3	3	2	1	1	3
(Hemanth & Fisher, 2015)	Q	Q	Q	Q	Q	Q	Q
(Hopkins & Proeve, 2013)	3	3	3	3	1	2	3
(Horner et al., 2014)	3	3	3	3	1	3	3
(Johnson et al., 2015)	3	3	1	3	1	2	3
(Klatt et al., 2015)	3	3	3	3	1	2	3
(Kemper & Khirallah, 2015)	3	3	3	3	1	2	3
(Krasner et al., 2009)	2	3	3	3	1	2	3

(Continues)

Authors	Selection bias	Design	Cofounders	blinding	Data collection	Attrition	Global
(Kuoppala & Kekoni, 2013)	1	2	2	2	1	1	2
(Mackenzie et al., 2006)	3	2	2	3	1	2	3
(Manotas et al., 2014)	2	2	1	3	1	2	2
(Martín-Asuero & García-Banda, 2010)	2	3	3	3	1	1	3
(Martín-Asuero et al., 2014)	2	2	2	3	1	1	2
(McConachie et al., 2014)	2	1	1	3	1	2	2
(Mealer et al., 2014)	1	1	1	2	1	1	1
(Moody et al., 2013)	1	1	1	2	1	2	1
(Moore, 2008)	1	3	3	2	1	2	3
(Newsome et al., 2006)	1	3	3	3	3	3	3
(Newsome et al., 2012)	1	3	3	2	1	2	3
(Noone & Hastings, 2010)	1	3	3	1	1	3	3
(Pflugeisen et al., 2015)	1	3	3	2	2	1	3
(Pipe et al., 2009)	2	1	2	1	1	1	1
(Poulin et al., 2008)	1	2	1	1	1	3	2
(Raab et al., 2015)	1	3	3	2	1	2	3
(Rimes & Wingrove, 2011)	1	3	3	1	1	3	3
(Rocco et al., 2012)	Q	Q	Q	Q	Q	Q	Q
(Ruths et al., 2013)	2	3	3	1	1	1	3
(Shapiro et al., 1998b)	1	1	2	1	1	1	1
(Shapiro et al., 2005)	1	1	2	2	1	3	2
(Shapiro et al., 2007)	1	2	1	2	1	1	1
(Singh et al., 2015)	1	3	3	1	1	3	2
(Singh et al., 2006)	1	3	3	1	2	2	3
(Song & Lindquist, 2015)	1	1	2	1	1	1	1
(Stew, 2011)	Q	Q	Q	Q	Q	Q	Q
(Tarrasch, 2014)	Q	Q	Q	Q	Q	Q	Q
(Van der Riet et al., 2015)	Q	Q	Q	Q	Q	Q	Q
(West et al., 2014)	1	1	1	1	1	2	1

Note. Q = qualitative study.