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Review Article

The Benefits of Loving Kindness Meditation for Helping Professionals: A Systematic Review

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Helping professionals are at risk of experiencing adverse health and psychological problems when working in roles where they are continually exposed to the emotional distress of others. The term compassion fatigue was coined to describe symptoms of emotional and physical fatigue experienced by workers in these environments. However, empirical research contends that compassion does not cause fatigue, rather compassion is said to foster well-being and is neurologically rejuvenating. The objective of this review was to examine the scientific literature which investigated the compassion-enhancing practice of loving kindness meditation (LKM). This review suggests that LKM can be seen as an alternate strategy to reduce stress, ease empathic distress, and increase positive affect.

1. Introduction

Work-related stress conditions are a well-documented problem for helping professionals [1, 2]. Stress is defined as a harmful psychological or physical response to workplace pressures and demands, which can result in poor mental and physical health [3]. Beginning in the brain, stress responses activate the sympathetic nervous system, elevating levels of adrenaline and bringing about physiological changes, such as increased heart rate, blood pressure, and respiration [4, 5]. Prolonged chronic stress may result in physical and mental exhaustion, contributing to long-term problems, such as hypertension, depression, and anxiety [4].

While it is important that helping professionals practice with compassion and empathy, this work is thought to come with a significant personal cost. Historically, the terms burnout and compassion fatigue have received considerable attention in the helping profession literature to explain work-related stress conditions [1, 6–8]. Often used synonymously, these terms broadly describe the evolution of workers' experiences of emotional fatigue and exhaustion. According to Figley and Figley [9], (p. 387), compassion fatigue "is the fatigue from dispensing compassion, day after day, year after year," implying that compassion is finite, depleting, and fatiguing. Continuous, direct exposure to others' emotional distress is the first pathway to compassion stress and, over time, compassion fatigue [9]. Workers who develop compassion fatigue and burnout may experience feelings of sadness, grief, and anxiety, leading to reduced functioning, suboptimal work performance, and difficulties with personal and professional relationships [10]. Burnout and compassion fatigue are established constructs, with high rates reported in studies among helping professionals; for example, rates of compassion fatigue and burnout amongst physicians are said to be between 40% and 80% [11]. Mathieu [10], (p. 34), says, "depending on the studies, between 40% and 85% of helping professionals were found to have compassion fatigue and/or high rates of traumatic symptoms." A health survey from the Australian Medical Association found 69% of junior doctors had burnout symptoms and 54% had compassion fatigue [12]. These and similar studies suggest that compassion fatigue and burnout have undesirable consequences, negatively affecting workers' health and functioning. In considering the work-related financial cost of burnout, prepandemic, the World Economic Forum estimated the global economic price to be US $322 billion [13].

2. Background

Burnout was popularised by Freudenberger after the publication of his *Staff Burn-Out* article in 1974 [14]. At the time, Freudenberger was employed as a psychiatrist at the free drug addiction clinic in New York [15]. Staffed mainly by volunteers, he used the term burnout to describe chronic work-related stress, resulting in emotional exhaustion and loss of motivation. Deriving from the illicit drug scene, burnout was used colloquially to describe the harmful effects of chronic drug abuse [15]. Considering burnout to be a serious occupational hazard, Freudenberger [16] explains, "The dictionary defines the verb "burn-out" as "to fail, wear out, or become exhausted by making excessive demands on energy, strength, or resources." And that is exactly what happens..." (pp. 159-160).

In 1976, Maslach et al. adopted the term after coming across it whilst interviewing human service workers. This saw a shift in focus from Freudenberger's awareness-raising and prevention work to research that sought to understand the phenomena and concept of burnout, including the development of burnout assessment tools [17]. According to Maslach [18], (p. 2), burnout is "a syndrome of emotional exhaustion. . ., that can occur among individuals who do "people-work" of some kind. It is a response to the chronic emotional strain of dealing extensively with other human beings". Citing Lief and Fox's technique of "detached concern," or empathic listening and observation without emotional involvement, Maslach [19] thought that the lack of training in such techniques was an influencing factor in the development of burnout. Physical symptoms of burnout are characterised by exhaustion, psychosomatic complaints, fatigue, headaches, gastrointestinal disorders, and sleeplessness. Emotional signs may include a lack of patience, irritation, anger, and depression [20], whereas burnout may affect people in any profession and is more likely in stressful work environments [21], compassion fatigue is considered specific to helping professionals, particularly those who repeatedly witness the emotional distress of others [22].

2.1. Compassion Fatigue and Empathy. Compassion fatigue was introduced into the nursing literature to describe a unique form of burnout seen in the profession, resulting in feelings of anger, depression, and ineffective practice [22]. Joinson [22] says, "unlike burnout, compassion fatigue is linked directly to particular people: nurses, ministers, counsellors, and others in the caregiving professions" (p. 116). Joinson borrowed the term after Edward Poliandro of the Mount Sinai Medical School presented the concept at a social work conference in 1989 [23]. Pugh [23] says "doctors, social workers, and therapists are giving a new name to a syndrome they say is draining their ranks: compassion fatigue."

Figley considers compassion fatigue a more user-friendly and less stigmatising term than secondary traumatic stress [24], establishing the concept in the helping profession literature. Figley [25] says, "the very act of being compassionate and empathic extracts a cost under most circumstances. In our effort to view the world from the perspective of the suffering we suffer" (p. 1434). Considering empathy to be essential to psychotherapeutic practice, Figley [25] links empathy to compassion fatigue, describing empathy as a process where the worker projects themselves "into the perspective of the client. In doing so, the psychotherapist might experience the hurt, fear, anger, or other emotions experienced by the client" (p. 1437). Thinking that workers may automatically absorb clients' emotional suffering, Figley [26] says, "those who have an enormous capacity for feeling and expressing empathy tend to be more at risk of compassion stress" (p. 1). When developing his etiological model for compassion fatigue, Figley paradoxically proposed that empathy lies at the root of compassion stress, which eventually leads to compassion fatigue [27, 28].

Carl Rogers is widely considered to be an eminent figure in the field of psychotherapy, with his dissemination of ideas around "therapeutic empathy" into the helping profession literature resulting in empathy being regarded as an essential therapeutic skill [29], also see [30]. Although empathy is defined in many different ways, there is agreement that it is made up of distinct cognitive and affective components, which allow us to comprehend others' internal states, whilst maintaining a self-other distinction [31, 32]. Cognitive empathy—sometimes referred to as mentalising or perspective taking—is where one intentionally adopts another person's perspective in an attempt to cognitively understand how they are thinking or feeling [33], whereas affective empathy is said to occur via a vicarious sharing of another's emotions [33]. While empathy is considered to support positive therapeutic relationships and motivate altruistic behaviour, empirical evidence from social psychology and the neurosciences suggests that the reliance on affective empathy may be maladaptive and may contribute to empathic distress [11, 34].

The concept of compassion fatigue has brought awareness of the extent and nature of work-related stress conditions; however, it has recently come under scrutiny. In nursing [28, 35] and medicine [36], it has been suggested that compassion fatigue is a poorly defined term, which "rests on a most fragile foundation" [35], (p. 2046), that "has largely been unchallenged and remains poorly understood" [28], (p. 20). Researchers propose that compassion fatigue is a misleading term, as compassion is said to foster emotional well-being and empathic distress is the primary source of workers' problems, arguing that "compassion fatigue should be replaced by the term "empathic distress fatigue" [11], (p. 368). Empirical studies using functional magnetic resonance (*f*MRI) show that the neural substrates for compassion and empathy are distinct [37–39], whereas compassion activates the dopaminergic and oxytocin regions, associated with affiliation and reward, affective empathy activates the pain matrix and the amygdala [32, 37, 38]. Compassion, therefore, is said to be neurologically rejuvenating, buffers against negative affect, and potentially prevents burnout [40–43].

Compassion is commonly defined as a sensitivity to the suffering of others and a desire to alleviate that suffering and is characterised by feelings of concern, warmth, and care [33, 42]. Compassion has several components: awareness,

concern, intention, and motivation to help others [44]. The number of studies on contemplative practices that seek to understand the components associated with compassion has been growing over the last decade, yet this has not come without some criticism [45]. Tang et al. [45] point out that findings for many studies require replication, there is a risk of bias as some researchers are also meditation enthusiasts, and sample sizes are often small. According to Fox et al. [46], although more work is required to build on findings, the increasing number of high-quality studies assures that "different practices show relatively distinct patterns of brain activity and that the magnitude of associated effects on brain function may have some practical significance" (p. 225).

2.2. Research Aims. There is accumulating scientific evidence which suggests that certain forms of compassion practice, such as loving kindness meditation (LKM), offer effective ways of reducing stress and increasing positive affect, making workers less vulnerable to maladaptive stress responses, such as empathic distress [11, 40, 47, 48]. The key difference between compassion and LKM is that LKM is specifically directed toward suffering [40]. Rooted in the Theravada Buddhist traditions, LKM aims to cultivate compassion, warmth, connectedness, and kindness towards ourselves and others [49]. The process of LKM traditionally begins with the development of feelings of kindness, love, and compassion towards oneself and then is extended to friends, family, and loved ones and eventually to neutral people, enemies, and all living beings [40]. In recent times, LKM practice has been adapted to meet specific research interests and is beginning to be thought of as a viable strategy which may counter negative health concerns, such as stress, as seen in health-related settings [40].

Given the serious negative consequences attributed to burnout and compassion fatigue, we argue that prevention interventions are essential. While compassion fatigue continues to be of considerable interest and a promising area of research within the helping profession literature, compassion is a neglected topic. Our intent is not to provide an in-depth scientific discussion, rather our objective is to provide an overview of the research literature that has a specific focus on LKM as a practice supporting the development and maintenance of compassion. Hence, in this systematic review, we aim to investigate the effectiveness of interventions involving LKM. These new insights aim to provide a basis for further discussion on compassion and compassion-based interventions that may mitigate, or prevent, negative health consequences for those working in the helping professions.

2.3. Methodology. The seminal *f*MRI study by Singer et al. [50], which investigated and demonstrated the neural activations involved in empathic responses to pain, attracted immense scientific interest and was considered the seed article that sparked social neuroscientific interest in social emotions [51]. Following this, Singer and colleagues published two other highly influential studies on compassion: *Differential Pattern of Functional Brain Plasticity after Compassion and Empathy Training* (paper 1) [52] and *Functional Neural Plasticity and Associated Changes in Positive Affect after Compassion Training* (paper 2) [53]. Inspiration for our research paper came from these two studies. Following the key guidelines for systematic reviews as provided by the Centre for Reviews and Dissemination [54], a citation search was used to locate relevant articles that cited Klimecki et al. [52] and Klimecki et al.'s [53] studies. In May 2021, a SCOPUS search located 223 articles for paper 1 and 273 for paper 2. After removing duplications, 418 articles remained. A follow-up manual search of reference lists from meta-analysis papers found in the original citation search, such as Fox et al. [46] and Kim et al.'s [55] studies, was carried out to locate additional studies investigating LKM, revealing another 7 articles to include. To identify any other articles that may have been missed in the original search, the ProQuest, Scopus, and Web of Science databases were searched using a date range from July 2013 to May 2021. The search string consisted of terms considered to be within the scope of this review. The keywords were loving kindness AND *f*MRI OR MRI; compassion training AND *f*MRI OR MRI; compassion meditation; compassion OR loving kindness AND emotion regulation; positive affect AND *f*MRI OR MRI; mental training; and amygdala AND compassion. No additional articles were found. The 425 articles were screened by title and abstract, and 283 were removed for not meeting the inclusion criteria, which were as follows: (a) published in a peer-reviewed journal, (b) original research, (c) written in the English language, (d) samples comprised of either novices or expert meditators, (e) included healthy adult participants only, and (f) the study included an intervention primarily made up of LKM, or more than 50% of the exercises were LKM. Where this was not evident in the abstract, the full text was retrieved ($n = 142$), and the study was excluded if it did not meet the inclusion criteria ($n = 127$). Seventeen articles, including the two seed articles, were included in this review (Figure 1). All authors assessed the quality of each article using the checklist for assessing the quality of quantitative studies (QualSyst) [56], and any differences were resolved until 100% agreement was reached. Comprising of 14 items, each study was rated against the items on the checklist and scored on the extent to which they met the specific criteria (yes = 2, partial = 1, no = 0). N/A was permitted for 5 items, if not applicable to the study design. The overall score for each study was converted to a percentage (0–100), scores ranged from 68% to 92%, with a median of 80.5%.

3. Results

Of the 17 included studies, all clearly described their study designs in sufficient detail to allow for replication. Several distinct designs were employed, such as solely *f*MRI (1), *f*MRI with another measure (6), solely MRI (1), MRI with another measure (1), questionnaire (1), solely self-report (3), self-report with another measure (1), spectral frequency (1), blood samples (1), and a video task (1). The included articles also investigated the effectiveness of a range of compassion-related interventions based on LKM, such as brief compassion training of novices [52, 57, 58], others only included

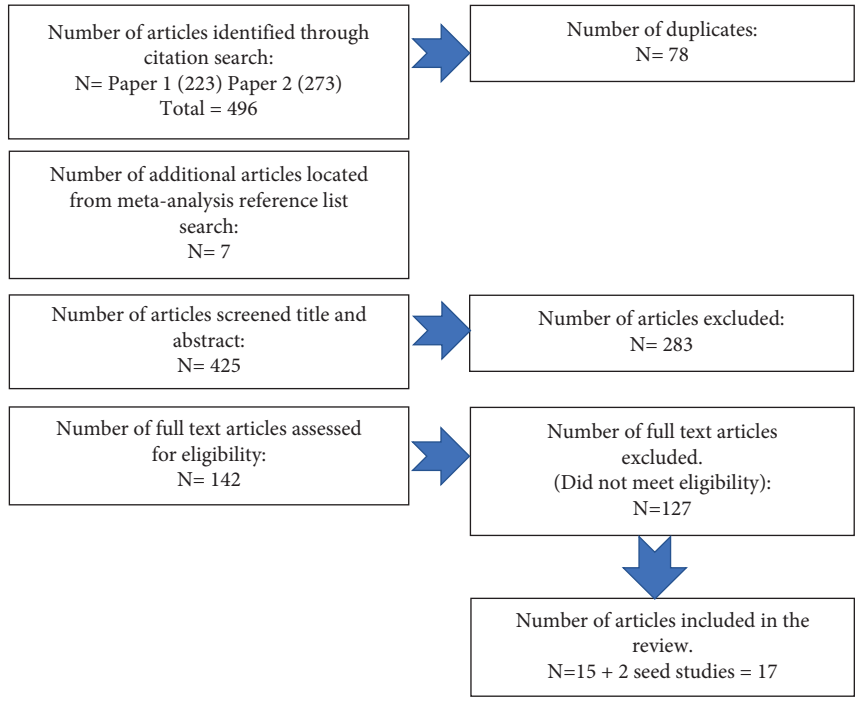

Figure 1: Flowchart for selected articles.

long-term meditators [59, 60], and some compared compassion training with other interventions, such as reappraisal, sitting quietly, empathy, or mindfulness [52, 59, 61]. A close reading of the included articles found that the operational process of LKM was broadly consistent across the studies, except for [62]. Lutz et al.'s. [62] research was based on LKM; however, the expert meditators had trained in Tibetan traditions which were not entirely rooted in Theravada. Also, the novices' instructions for LKM differed slightly from traditional LKM practice. The objectives for each study were also clearly described and diverse. Fredrickson et al. [63], for example, tested the effects of LKM on the participant's positive emotions, personal resources, and overall life satisfaction, whereas Leung et al. [64] sought to examine grey matter differences between novice and expert mediators, and Le Nguyen et al. [61] examined the impact of LKM on telomere length.

All of the studies passed QualSyst screening; however, there were some areas of weakness. As neuroimaging is resource-intensive, sample sizes are often low, and a sample of at least 40 is considered satisfactory [65]. Of the 7 included *f*MRI articles, three exceeded 40 participants, and four had under 30. Of the two MRI studies, one had 25 [64] participants and the other had 332 [66] participants. Due to the paucity of published studies related to our topic, we decided that no article would be excluded based on sample size. Although there were no common weaknesses across the remaining articles, for some, the recruitment method meant that participants had an interest in or were open to learning meditation, such as in Fredrickson et al. [63] and Kok et al.'s studies [67]. Furthermore, most of the articles restricted recruitment to particular populations, such as university students, or staff [58, 67, 68], or meditation experts [59, 62, 64]. Therefore, results may not be generalisable to other populations, such as in healthcare settings. Studies with small samples would require replication in larger samples to confirm findings.

Blinding of participants in studies such as these is not always possible as they may know which intervention they will be receiving. As a control, Klimecki et al. [53] did not make the participants aware of the intervention until they had entered the training phase. Seppala et al. [68] used a cover story and random selection for either intervention. Polizzi et al. [58] named their studies, experiences 1, and reflections, whereas Fredrickson et al. [63] and Kok et al. [67] did not describe LKM or provide any other information that may have led to the demand effect. Le Nguyen et al. [61], Weng et al. [69], and Fredrickson et al. [70] randomly assigned to the experimental condition (LKM, memory, etc.). Blinding of expert meditators was not possible as they were purposely selected for their expertise, and so findings should be interpreted with caution.

Taken together, the included studies show promise that LKM may be an effective and practical tool that enhances positive affect and overall well-being. LKM also shows promise as an emotional regulation strategy (see Table 1 for a summary of key findings). The main findings are summarised and discussed in the following sections.

3.1. Summary of Findings. The results of this systematic review suggest that training in the compassion of LKM fosters beneficial changes through changes in brain structures, neural plasticity, and physiological responses. To determine how LKM may cultivate such change was approached in several ways in the included studies. One was

Table 1: Summary of included articles.

Study authors and years	Objectives	Measures	Participants	Intervention	Control	Key findings
Klimecki et al. [52]	To investigate if compassion training produced functional neural plasticity	*F*MRI/report	58 female volunteers	One day training in LKM held by a teacher with 10 years' experience	Memory	Compared to memory training, compassion training increased positive affect, as did plasticity in the neural networks associated with love, affiliation, and positive valuation
Klimecki et al. [53]	To determine if empathy and compassion training have distinct effects on neural functions, and if compassion training could overcome distress	*F*MRI/self-report	53 female volunteers	One day training course in empathy and compassion, both of which held by teacher's with >10 years' experience in their particular field	Memory	In response to witnessing other's distress, compassion training reduced negative affect, whilst increasing positive affect. Also, compassion training augmented neural activity in areas related to reward, affiliation, and positive affect, whereas the empathic response and negative affect increased after empathy training, also corresponding activity was seen in neural networks related to negative affect and self-experienced pain
Polizzi et al. [58]	(1) To evaluate whether a single session of mindfulness meditation would elicit gains in psychological functioning (2) Whether 2 sessions of LKM would produce greater positive outcomes than sitting quietly	Questionnaires scales/ index	91 university undergraduate volunteers, 77% female	(1) 15-minute meditation training followed by two weeks at home practice. (2) 2 sessions LKM program	Sitting quietly	Brief mindfulness meditation enhanced positive affect compared to sitting quietly. LKM increased compassion for other compared to sitting quietly. Both studies reflected improved psychological outcomes
Fredrickson et al. [63]	To test whether LKM generated positive emotions and built consequential personal resources	Survey/self-report	139 volunteer IT company employees, 66% female. Males lost to attrition and/or disqualification	6x 60-minute LKM group sessions led by a stress management expert	Waitlist	LKM practice generated positive emotions whilst decreasing negative emotions. Also, the personal resources of self-acceptance, mindful attention, and positive reactions to others increased, as did physical health

Table 1: Continued.

Study authors and years	Objectives	Measures	Participants	Intervention	Control	Key findings
Leung et al. [64]	To examine the difference in grey matter between novices and LKM experts	MRI	26 Chinese men, 10 LKM experts, 15 novices	Novices completed 7 hrs of LKM under the instruction of an expert meditator	NA	LKM experts had considerably more grey matter in the posterior parahippocampal gyrus and right angular gyrus (regions associated with empathic responding emotion regulation). Posited that LKM may affect neural regions associated with emotion regulation
Le Nguyen et al. [61]	To investigate if training in mindfulness meditation and LKM impact on telomere length (cellular aging), compared to a control	Blood samples/self-report	176 novice volunteers	6x 1-hour meditation workshops, plus 5×20 min. At home recorded guided meditation. Developed by meditation experts	Mindfulness meditation	Telomeres significantly shortened in the mindfulness and waitlist control groups. On average the LKM group, had no significant shortening and LKM appeared to buffer against attrition
Kok et al. [67]	To investigate if cardiac vagal tone improved through the self-generation of positive emotions	To assess vagal tone, analysis of spectral frequency heart rate (HR) data was carried out to find high-frequency (HR) variability. Self-analysis scale	65 novice faculty university staff. 66% female, 34% male	6x 1-hour LKM workshops with trained medication teacher and at home practice	Waitlist	LKM increased self-perceived social connections, positive emotions, and cardiac vagal tone, compared to the control
Engen et al. [60]	To assess the effects of long-term training on structural brain networks	fMRI/MRI	17 long-term Tibetan LKM & compassion meditators	Previous participation in a 3 month to 3-year meditation retreat	No meditation experience	Long-term meditators (LTM) had increased thickness ranging from the prefrontal regions to the anterior insula cortex relative to the control. Hypothesised that LKM may generate positive emotional states, foster resilience, and buffer against negative stressors

Table 1: Continued.

Study authors and years	Objectives	Measures	Participants	Intervention	Control	Key findings
Engen and Singer [59]	To investigate the effects of compassion-meditation techniques, compared to the emotion regulation strategy of reappraisal, on neural affective and experiential responses whilst observing the distress of others	fMRI/subjective rating	18 long-term LKM Tibetan meditators	Previous participation of at least 3 years at a full-time meditation retreat	NA	Positive affect increased during compassion, whereas reappraisal decreased negative affect. Compared to reappraisal compassion increased activation in neural regions associated with positive affect, reward processing, and affiliation
Leung et al. [71]	To examine the amygdala's functional connectivity in meditation experts during affective processing	fMRI/self-report	24 Chinese men 10 experts, 14 novices	Novices completed 7 hours of at-home meditation practice	No meditation experience	There was greater connectivity between the left amygdala and the emotion processing regulation system (dACC) in the experts compared to the novices. The experts showed lower levels of negative emotions than the novices whilst processing negative emotions
Valk et al. [66]	To investigate whether targeted cognitive training modules induced changes in the brain morphology	MRI/video task	332 novice volunteers	3-day intensive retreat followed by 8x 2-hr weekly group sessions and at-home practice, in either presence, affect (LKM), or perspective training (resource project)	NA	Performance in the theory of mind task increased for those trained in the perspective module. LKM increased compassion ratings after watching neutral or distressing videos, and increased regions associated with empathy and emotion regulation. All training resulted in structural brain plasticity
Weng et al. [69]	To investigate if visual attention to suffering would increase or decrease amygdala activation, after training in either compassion or reappraisal	fMRI/eye tracking	56 novices	Compassion or reappraisal training via guided audio instructions, 30-min per day for 2 weeks	NA	Compassion training decreased activation in the amygdala and regions associated with negative processing and arousing stimuli (right AI/OFC), whilst visually engaging in the suffering of others. This finding was not seen after reappraisal training

Table 1: Continued.

Study authors and years	Objectives	Measures	Participants	Intervention	Control	Key findings
Hildebrandt et al. [72]	To understand which specific training modules facilitated emotional regulation	Self-report	332 novice volunteers	13-week presence, affect (LKM) or perspective training modules (resource project)	NA	No emotion regulation was self-reported after the presence training module. Perspective training increased cognitive reappraising and acceptance. LKM increased acceptance and positive reappraisal whilst decreasing avoidance
Trautwein et al. [73]	To investigate whether different mental training modules have specific or the same effects on cognitive functioning	EmpaTOM video task	332 novice volunteers	13-week presence, affect (LKM), or perspective training modules (resource project)	NA	The presence module neither increased compassion, nor theory of mind. The affect module increased compassion fostered positive affect, and enhanced attention. The perspective module enhanced theory of mind performance
Lutz et al. [62]	To examine the neural circuitry whilst novices and expert meditators engaged in LKM	fMRI	16 long-term Buddhist meditation experts	Previously completed 10–50,000 hrs of meditative practice	No previous meditation training	The neural circuitry-related empathic processing was modulated via the generation of, and expertise in LKM
Frederickson [70]	To uncover the emotional and dose-response profiles, between and within individuals after meditation training	Self-report	339 novice volunteers	6x, 1 hr LKM or MM group sessions and at-home practice	NA	Both LKM and MM increased participants' day-today experience of positive emotions over time. Regardless of meditation type increased practice resulted in feeling more positive emotions
Seppala et al. [68]	(1) To determine if 10 minutes of compassion training changed affective responding to others (2) How does LKM compare to other affective interventions	Self-report	134 paid undergraduate university students	LKM instructions over headphones	Positive affect induction and neutral visualisation	LKM improved well-being and feelings of connection over and above the controls, while decreasing participants self-focus in less than 10 minutes

to compare the neural responses of expert mediators to those of novices and/or a control, and another was to investigate experts only. A third alternative was to train people who were novices and then examine the effects.

The approach of comparing expert meditators' neural responses to those of novices, who had undergone one week of LKM training, was first employed by Lutz et al. [62]. Results revealed that the experts showed greater activation in regions associated with empathy during meditation than the novices whilst listening to emotional sounds. However, neural brain regions previously associated with affective empathic responding to another's pain, such as the limbic system and middle insular, were modulated whilst the experts were in a voluntary compassionate state. Also, the experts had greater activation in brain circuitries previously linked to theory of mind than the novices [62], suggesting that compassion may enhance cognitive processing. The findings of this study demonstrate that the state of LKM is linked with activity in neural brain regions associated with both empathic arousal and cognitive control. Thus, LKM may be effective in emotion regulation through a combination of affective empathic responses being downregulated and greater recruitment of cognitive processing.

In Klimecki et al's. [52] research, *f*MRI data were analysed to determine if compassion training (compared to a memory control group) produced functional neural plasticity. *f*MRI data was obtained whilst both groups were exposed to high empathy (HE) videos. Posttraining results demonstrated that only those in the compassion group (1) experienced an increase in positive affect, and (2) there was strengthened activation in neural regions associated with the care and social connections systems. By comparison, pre-compassion training exposure to the HE videos produced a negative affect and activation in neural regions formerly related to the empathy for pain response. Findings suggest that training in compassion may counter negative emotional effects related to the activation of the empathy for pain networks, such as anger, sadness, fear, and distress. In other words, compassion training may be protective for workers who practice in conditions that elicit a high affective-empathic stress response. Also, this study was the first to demonstrate that short-term compassion training changes neural functioning and neural changes are specific to regions that have previously been implicated in affiliation and caregiving. This is important as these regions are associated with the release of neuropeptides such as oxytocin and dopamine. Growing evidence suggests that these neuropeptides have beneficial effects on health through their ability to downregulate the threat and stress response [57, 74]. Also, as compassion fosters affiliation, practices of this type may cultivate a feeling of connectedness and closeness between oneself and others. Connectedness and closeness have been associated with prosocial behaviours, meaning we are motivated to cooperate and help others when they are in need [34].

Furthermore, Klimecki et al. [53] trained novices in either compassion or empathy or memory control. Findings demonstrated that empathy training elicited more negative affect, whereas compassion training increased positive affect. Notably, the neural pathways associated with empathy for pain increased in activation after empathy training. After compassion training, there was increased activation in neural regions associated with social connection and reward. This demonstrates that neural functional plasticity is non-overlapping and distinct between empathy and compassion training. The implication here is that compassion offers a route to positive affect, whereas empathy tended towards the opposite. In other words, compassion may help ameliorate distress and burnout associated with emotionally distressing work contexts.

The subjective findings by Fredrickson et al. [63] strengthen former studies on the benefits of loving kindness training on well-being. Fredrickson et al. [63] reported an association between LKM practice and self-reported increases in positive emotions, which steadily rose over the 6-week training period. Their results suggest that there is a dose-response correlation between the practice of LKM and positive emotions, tripling over the time of the study. Furthermore, findings indicated that (1) positive emotions are generated during LKM sessions, (2) even after the sessions have ended, they persist, and (3) repeated LKM practice, over time, resulted in a cumulative increase in positive emotions. These shifts in positive emotions were connected to increases in various personal resources, such as positive relationships with others, better physical health, and increased attention. Fredrickson et al. [70] found that both mindfulness meditation and LKM were equally connected to increases in participants' everyday experiences of positive emotions, suggesting that these meditation practices may improve people's physical and mental health. Seppala et al. [68] support this view, saying that a single 10-minute session of LKM is a cost-effective tool that can potentially be applied by most people to increase feelings of well-being as well as compassion towards others. Conversely, Polizzi et al. [58] reported that although LKM resulted in greater compassion for others compared to the control group, a 15-minute single session of LKM practice was not sufficient enough to elicit gains in psychological functioning. This implies that training duration matters and it seems logical that having more experience in LKM practice will have some benefit in terms of skill and expertise. Currently, however, there is not enough research specific to the effects of training length to draw upon, especially as the included studies for this paper did not explicitly address a correlation between the lengths of training time and longer-term benefits. Therefore, further research is required. Despite this need, the implication is that LKM is a promising technique that can be deployed to ameliorate the negative affective responses associated with empathic distress.

Similarly, Valk et al. [66] argue that the *type* of training matters. In their longitudinal MRI brain imaging study of novices, results provided evidence that structural brain plasticity and correlated individual improvements in attention differed between three different training modules: presence, affect, or perspective. The goal of the presence module was to teach participants to be present in the moment, by calming their minds (attention) and raising their

awareness of their bodily states (interoception). These were trained through a breathing meditation and body scan exercises. The two core exercises for the affect module were LKM and a contemplative dialogue exercise, in which paired participants sat facing each other, whilst one asked a question, the other listened but did not respond. This activity focused on the experience rather than any thoughts, such as accepting difficult emotions. For the perspective module, the focus was on developing cognitive abilities, where the two exercises were an observing-thoughts meditation and a perspective-taking task.

In the presence module, participants reported improved attention with MRI data showing increased thickness in brain regions associated with learning. The affect module group reported enhanced compassion and structural thickening was observed in the emotional regulation, self-perception, and introspection regions. The perspective module group had increased thickness in areas associated with theory of mind (TOM) and self-perspective inhibition. Valk et al. [66] concluded that gray matter selectively increases in areas that support various cognitive functions. Leung et al. [64] also noted brain gray matter differences between their sample of novices who had completed 7 hours of home-based training compared to experts. Although results need to be interpreted cautiously because of the small sample size, MRI analysis revealed that, compared to the novices, the experts had notably more gray matter volume in regions associated with TOM, emotional regulation, self-control, and motivational behaviour. Importantly, increases seen in the right posterior parahippocampal gyrus (RPPG) in the experts were considered noteworthy, as the RPPG is part of the limbic system and neocortical regions which work together to regulate emotional and empathic responses. Overall findings indicate that LKM may increase gray matter in regions associated with emotion regulation, suggesting that LKM may play a role in counteracting negative affect associated with empathic burnout.

The idea that LKM may be employed as an effective emotion regulation strategy was proposed by Engen and Singer [59], who suggested that compassion may moderate negative empathic responses to others' suffering. Data from their *f*MRI study of expert meditation practitioners found that compassion activated regions associated with positive affect, suggesting that it may be effective in generating positive emotions. Engen and Singer [59] proposed that compassion could increase resilience in the helping professions when employed as an emotion regulation strategy. A later *f*MRI study by Engen et al. [60] of experts and a novice control supports the idea that LKM may foster resilience by generating positive emotional states. Engen et al. [60] demonstrated that the experts had significantly increased thicknesses in brain structures ranging from the anterior insular cortex to the ventrolateral prefrontal regions when compared to the control. This suggests that these regions are fundamental in the generation of LKM, and LKM functionally and structurally affects these regions. The anterior insular is associated with interception, attentional processing, and general awareness. The ventrolateral prefrontal region is often recruited during reappraisal in which interpretation of a negative stimulus minimises emotional impact, indicating that activation of the ventrolateral region may be key to the generation of positive emotional states during LKM. Likewise, in Leung et al's. [71] *f*MRI study of experts and novices, evidence indicated that meditation experts could maintain the duration of positive feelings compared to that of novices. Similar to Engen and Singer [59], Leung et al. [71] also found downregulation in the amygdala. The experts experienced lower levels of negative emotions in comparison to the novices, suggesting that long-term meditation may be connected to the extinction of negative emotions and the cultivation of positive emotions. As such, compassion could be viewed as an emotion-regulation strategy.

The findings of this review offer evidence in support of compassion training as a method for supporting professionals in roles that elicit high emotional valence. Compassion as an emotional regulation strategy was first proposed by Engen and Singer [59] and later tested by Weng et al. [69] and Hildebrandt et al. [72]. Although Weng et al's. [69] results need to be interpreted with caution due to the small sample size, *f*MRI data obtained from novices trained in either reappraisal or LKM demonstrated that compassion, but not reappraisal, significantly regulated emotional responses to suffering by mediating psychological arousal through decreased activation in the amygdala. While decreased psychological arousal may mitigate empathic distress, compassion also facilitates prosocial engagement [69].

The purpose of Hildebrandt et al's. [72] study was to determine which contemplative cognitive training practices facilitated specific emotional regulation strategies. Training in either a presence (meditation and body scan), affect (LKM), or perspective (perspective-taking, or TOM) modules resulted in participants self-reporting the benefits of their assigned training strategy. Findings showed that (1) relevant self-rated emotional regulation strategies were not induced in the presence module, (2) the strongest effect on cognitive reappraising and acceptance was seen in the perspective module, and (3) the affect module increased acceptance and positive ratings while decreasing avoidance of difficult emotions.

Supporting Hildebrandt et al.'s [72] work, Trautwein et al. [73] also tested the effects of training in either presence, affect, or perspective taking. In their study, data were obtained through the novel video-based task, EmpaToM. EmpaToM influences empathic affect sharing and TOM by presenting videos of an individual recounting an autobiographical episode that differs emotionally. To assess affect, after each video, the novice participants rated the amount of compassion they felt for the person, and for TOM, they were presented with three multiple choice questions which required inference of the person's mental state, only one question was correct. Results revealed that the different training practices had specific effects on cognitive and social functioning. In the presence module, driven by improvements in executive control, general attentional performance increased. Compared to presence and perspective training, LKM training had the strongest effect on compassion, increased positive affect, and improved attention.

The perspective module was the only module to have a meaningful effect on TOM performance, supporting the view that, working differently from other strategies, compassion-based practice can be regarded as an alternate route to successful emotion regulation.

As contemplative neuroscience grows as a discipline that seeks to identify the brain's neural pathways for compassion, parallel scientific investigations of physiological states generated through compassion have started to become of interest. Kok et al. [67] analysed vagal tone measures of the novice participants against a control, pre- and post-LKM training, as well as self-reported data. Vagal tone is a fundamental part of the autonomic nervous system, meaning it is not under conscious control. A high, or "healthy" vagal tone, is associated with improved cardiovascular health and emotion regulation [75]. Kok et al. [67] found that LKM produced increased self-perceived social connections and positive emotions relative to the control. Furthermore, the increase in positive emotions encouraged participants to connect socially, and in turn, positive social connections increased vagal tone, thus potentially creating a resource that is beneficial to good health. Kok et al's. [67] study has gone some way in demonstrating the association between the effects of LKM practice and improved vagal tone, which over time may be self-sustaining.

Taking a different approach Le Nguyen et al. [61] sought to determine if LKM and mindfulness meditation (MM) differ in their effects relative to a control on telomere length. DNA was extracted from the novice participants' blood samples pre and posttraining. Telomeres allow chromosomes to replicate properly during cell division, each time a cell divides, and as we age, telomeres shorten. Of note, oxidative stressors such as diet, smoking, and stress are significant factors that result in shortening during replication [76]. Results showed that telomeres shortened across all experimental conditions, but more so in the MM and control groups. In the LKM group, daily practice of LKM seemed to buffer against attrition, with less shortening over time, appreciably less than the control group.

4. Discussion

We began our paper with the observation that workers in the healthcare professions have been long perceived as at risk of developing burnout and compassion fatigue. We also observed that empathy and compassion are often used interchangeably, but they have been demonstrated to have distinct components. To recap, empathy has been understood as having two major components: affective and cognitive [37]. Compassion is underpinned by the cognitive empathy process involved in perspective-taking and caring motivation in noticing the suffering of others [33]. This review was sparked by interest in what would support the development and maintenance of compassion in the helping professions. While recognising the importance of contextual and individual differences, we offer four main discussion points: (1) the type of training matters; (2) LKM can offer workers a method for supporting compassion towards others; (3) regular LKM practice may assist in reducing stress and enhancing the well-being of helping professionals; and (4) education about the theory of compassion and empathy should take into account new evidence and offer students and workers effective compassion-enhancing meditative techniques, of which LKM is one.

It has been increasingly appreciated that contemplative practices are effective in increasing resilience and well-being [59]. Recently, researchers have turned their attention to the question of whether LKM can be taught, whether it is beneficial, and how it differs from other practices. As demonstrated in the included studies, LKM can be taught, but more importantly, the type of training matters, as compassion appears to be markedly different from reappraisal and theory of mind, for example [66, 72]. Compassion has the potential to increase overall well-being and positive affect and regulate emotions, whereas, for the other training methods, this is not necessarily so [69, 72]. This has important implications for those working in the helping professions such as healthcare settings because burnout and compassion fatigue have been identified as significant issues that can negatively impact patient care and staff retention [13]. Identifying effective training techniques is essential, as they can be employed to promote resilience and buffer against stress [40, 41], and such outcomes are important, particularly for those employed in environments where they are repeatedly exposed to the suffering of others.

As a whole, there is encouraging evidence from the included articles that training in LKM, or courses including LKM, cultivates the ability to experience compassion towards others [52]. Novice participants in the included studies reported a range of benefits from engaging in the training such as strengthened feelings of care towards themselves and others, increased positive emotions which persisted over time, improved relationships, and greater compassion towards others [69, 73]. Of note, we found in some studies that participants were able to manage distressing situations as training strengthened positive affect [52, 63]. Consequently, the generation of compassion is not only beneficial to oneself by providing a potentially effective coping strategy but also helps others. Although LKM studies including a sample of healthcare professionals are yet to be published, we suggest that it is plausible that similar effects would be seen in such a sample.

Although LKM primarily uses emotional and visual strategies to cultivate compassion, compassion is also supported through affective and cognitive neural pathways [37]. As such, compassion training shows promise as an effective emotion regulation strategy, fostering positive affect for workers who are exposed to the distress of others. Regularly cultivating compassion in the form of LKM may offer increased protective factors against the risks of stress, whilst enhancing overall well-being. When responding to a client's distress with compassion, rather than becoming emotionally roused, the worker acknowledges the distress, and thus they are more able to regulate their own emotional response. By contrast, if a worker responds with an affective empathic response, they are at risk of identifying with the suffering of their client, potentially leading to emotional distress and, over time, a negative health outcome. Evidence suggests that

compassion training may help workers who practice in conditions that elicit a high affective empathic stress response [59, 64, 66].

It would be helpful to introduce LKM-based interventions into training courses and work-based settings. We encourage educators and helping professionals to revise their thinking about compassion in favour of the term empathic distress. Compassion serves as a buffer against adverse health and psychological problems, therefore benefiting the person who experiences it. Our research underscores the importance of training helping professionals in practices, such as LKM, as a potent strategy for improving workers understanding of the effects of affective empathy, causing fatigue and stress on their minds and bodies. By educating workers, we can create supportive environments that enhance their ability to provide sustainable, compassionate care to others.

5. Conclusion

This review examined Figure 1 scientific literature which investigated the compassion-enhancing practice of LKM. Based on the findings found in this paper, we suggest that LKM can be seen as an alternate strategy to reduce stress, ease empathic distress, and increase positive affect. Saying that, since none of the samples in the included articles were specific to healthcare professionals, findings from our review can only be tentatively generalised to this population. Despite this limitation, it is reasonable to posit the idea that findings could be generalised; however, research employing a sample of healthcare professionals would be beneficial. Also, whilst acknowledging that available studies are sparse, evidence from compassion-based research is suggestive of LKM training shaping outcomes through a range of compassion-related pathways, such as the capacity and motivation to respond to the needs of others, whilst also being physiologically and emotionally beneficial. We suggest that additional research aimed at how to best train educators and individuals in compassion skills is needed to support the sustained development of compassionate care. For example, compassion practices derived from Buddhist traditions equip individuals with the tools to cultivate and sustain a more resilient, compassionate, and emotionally regulated self. Finally, we suggest that the cultivation of compassion is potentially protective, and at this stage, it would be more helpful for compassion fatigue to be thought of as empathic distress fatigue.

Data Availability

The scientific research papers used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that there are no conflicts of interest.

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