

# The Impact of Psychological Interventions with Elements of Mindfulness on Burnout and Well-Being in Healthcare Professionals: A Systematic Review

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**Background:** Healthcare professionals are highly likely to experience various causes of work-related stress, which often leads to burnout. This became even more obvious during the Covid-19 pandemic. This systematic review aimed to analyze articles where psychological interventions with elements of mindfulness (PIM) were used to support healthcare professionals to foster well-being and reduce burnout levels. Compared to other recently published reviews, it is unique, due to its focus on a wide group of healthcare professionals, a broader selection of psychological interventions, and the evaluation of any sustained effects.

**Methods:** Systematic searches were carried out in February 2021 with different combinations of Boolean operators within six electronic databases: PubMed, EBSCOhost, MEDLINE, PsycArticles, Cochrane Library, JSTOR and Cobiss. We included articles that had been published in the last ten years (2011 to 2021) and which reported on original research focused on evaluating the influence of PIM on healthcare professionals. MERSQI was used to assess the quality of the included studies.

**Results:** Of 1315 identified studies, 15 were included in this systematic review. Regardless of the specific type, duration and setting (individual vs group) of PIM applied, the results demonstrated a positive impact on well-being and burnout in participating healthcare professionals. The most studied interventions involved MBSR (mindfulness-based stress reduction) and other mindfulness training programmes, in online as well as in-person versions.

**Conclusion:** Given the new reality with the presence of the SARS-Cov-2 virus, it is of the utmost importance to offer feasible, effective interventions for burnout reduction to vulnerable groups of healthcare professionals. By focusing on their needs, several key aspects of burnout and mindfulness could be efficiently improved; this review demonstrates that short, online interventions could be as effective as longer, in-person ones.

**Keywords:** mindfulness, burnout, perceived stress, well-being, Covid-19, MBSR

## Introduction

Healthcare professionals (HCP) are a vulnerable population as they are highly likely to experience various causes of work-related stress.<sup>1</sup> During the Covid-19 pandemic the existing risk was heightened, as HCP were often exposed to close contact with infected patients, an excessive workload, constantly changing protocols, and subsequent physical and emotional exhaustion.<sup>2,3</sup> As a consequence, we are currently facing high burnout rates in a variety of HCP, including physicians, nurses, psychologists, and others.<sup>3-6</sup> A recent Canadian survey revealed that over 40% of nurses reported burnout.<sup>7</sup> Studies conducted in China during the Covid-19 outbreak showed high rates of sleep problems, psychological distress, anxiety, and depressive symptoms in more than 70% of samples of surveyed HCP.<sup>2</sup> Similarly, in Spain over 80% of HCP working during the Covid-19 pandemic reported psychological distress.<sup>8</sup>

The current situation in healthcare worldwide can be harmful for HCP and their organizations,<sup>9,10</sup> as burnout in HCP adversely affects quality of care and threatens professionalism.<sup>11,12</sup> At the organizational level, burnout has been related

to low performance, high turnover intentions, suboptimal care, and medical errors.<sup>13</sup> These are solid arguments for the crucial importance of safeguarding the mental health of HCP, and thus improving the success of healthcare delivery.<sup>2</sup>

There have been several training programmes developed recently to combat burnout and improve the wellbeing of HCP; however, mindfulness training is one of the most thoroughly studied worldwide. Mindfulness is defined as an awareness which arises when paying attention to the present moment without judgement, with openness, acceptance, and curiosity.<sup>14</sup> In 1977, Jon Kabat-Zinn began developing MBSR (mindfulness-based stress reduction) for application in healthcare, by integrating Buddhist and other contemplative practices with modern psychological knowledge about stress coping and resilience.<sup>15</sup> Mindfulness training has been implemented for HCP as a means of decreasing burnout, improving patient care, and increasing satisfaction at work.<sup>16,17</sup> Krasner et al<sup>18</sup> working with primary physicians, concluded that modified MBSR training resulted in improvements in different aspects of burnout, empathy, and mindfulness. Training also resulted in more emotional stability, higher work engagement, and better responsiveness to patients' problems. A recent study for frontline health workers during the Covid-19 outbreak in Spain confirmed the feasibility, safety and effectiveness of a brief on-site mindfulness-based intervention designed to reduce stress.<sup>2</sup> Our previous systematic review, conducted in 2021, which was focused on the professional group of physicians, also confirmed that regardless of the specific type of psychological intervention with mindfulness (PIM) used, the results demonstrated a positive impact on empathy and well-being, and a reduction in burnout in the participating physicians.<sup>19</sup>

Given the high workload burden, and understanding the existing challenges of the Covid-19 pandemic, it is very important to be able to offer feasible, easily accessible interventions, which take the least time for the effective burnout prevention for vulnerable groups of HCP.

In this systematic review, we wanted to find out:

Are PIMs effective in reducing burnout among healthcare professionals?

What are the differences in effectiveness of PIMs with regard to their formats (online vs in-person), duration, and setting (individual vs group)?

## Materials and Methods

This review analyzes the effect of psychological interventions with elements of mindfulness (PIM) on reduction of burnout and increased well-being for a group of healthcare professionals. In one way, it is a continuation and upgrade of a previously published paper by the same authors<sup>19</sup> which focused on a target group of physicians.

The review is reported according to the PRISMA guidelines.<sup>20</sup>

## Search Strategy

Systematic searches were conducted in February 2021 within six electronic databases: PubMed, EBSCOHost Medline, PsycARTICLES, the Cochrane Library, JSTOR and Cobiss (the Slovenian national library information system). Different combinations of Boolean operators were used: mindfulness, empathy, medicine, family medicine, general practice, primary care, burnout, healthcare professionals, doctors, physicians, intervention, MBSR and support groups. Additional articles were hand-searched from the lists of references in the articles we included.

A detailed search strategy is presented in [Figure 1](#).

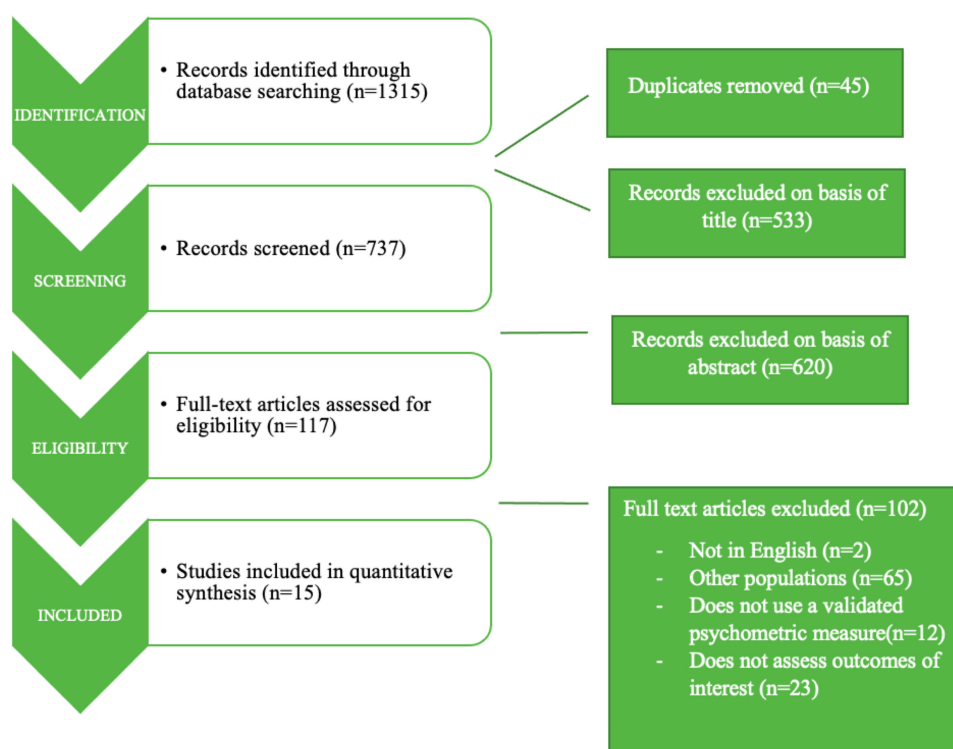
## Inclusion and Exclusion Criteria

This study included research papers (i) published in the last ten years, (ii) written in English, which had (iii) a quantitative or mixed-method design, and (iv) presented original research where PIM was implemented for burnout reduction in group of healthcare professionals.

Studies were excluded where the psychological interventions (PIM) (i) were used for educational or patients' treatment purposes, and (ii) focused solely on one professional group.

## Data Extraction

Data extraction was conducted independently by two reviewers (S.O.T., P.S.-Z.). In the case of disagreement, a third reviewer was included (Z.K.K.).



**Figure 1** Presentation of detailed search strategy.

For the selected studies, the following information was extracted: author and year of the study's research; sample size; topic and study type; experimental design; specialty of participants; intervention characteristics; study methods; instruments and measures; and main findings.

## Quality Assessment

The MERSQI (Medical Education Research Study Quality Instrument) was used for the quality assessment of the included studies; its criteria are data type, data analysis, study design, sampling, and validity of assessments.<sup>21</sup> A study can be appointed a total of 18 points, with a maximum of three points in each domain. The initial MERSQI assessment was made by S.O.T., and the evaluation and verification were completed by Z.K.K. and P.S.-Z.

## Results

### Search Results and Study Characteristics

Of 1315 identified articles, 15 studies met all the inclusion criteria and were analyzed. All the reviewed studies were interventional and used a quantitative or mixed methodological design. In the [Supplementary Material](#), there is a detailed description of the characteristics of the included studies. [Table 1](#) summarizes the main characteristics of the reviewed studies.

### Participants

In the reviewed studies, the participants were a heterogeneous group of HCP from various clinical environments, such as primary care, mental health professionals, and various hospital staff (paediatric oncology staff members, nurses and physicians from the departments of haematology and oncology, intensive care and surgical intensive care unit personnel, staff from a hospital specializing in musculoskeletal problems). The HCP included physicians, residents/trainees, nurses and nursing assistants, psychologists, dietitians, social workers, mental health professionals, and health researchers.

**Table 1** Main Characteristics of the Reviewed Studies

Author/Year/Ref No./Location	Study Design	Sample Size	Intervention (See Table 2 for Details)	Main Findings	QA
1. Kemper (2017); <sup>22</sup> USA	Prospective non-randomized pre-post intervention study	178	Three 1h online mindfulness modules	Small but significant increase in mindfulness scores	11
2. Dobkin (2016); <sup>23</sup> France	Prospective non-randomized pre-post intervention study	27	8-week MBSR	Significant reductions in stress and burnout; increase in mindfulness and meaningfulness	11
3. Kemper et al (2015); <sup>24</sup> USA	Prospective non-randomized pre-post intervention study	513	12 1h online modules; mind-body skills training programme	Acute improvements in stress levels, mindfulness, empathy and resilience	11
4. Goodman et al (2012); <sup>25</sup> USA	Prospective non-randomized pre-post intervention study	93	8-week MBSR + 1-day retreat	Significant reduction in burnout scores and improvements in mental well-being	10
5. Asuero et al (2014); <sup>26</sup> Spain	Randomized controlled trial	68	8-week mindfulness training and group discussions + 1-day retreat	Improvement in all measured scales – total mood disturbance, mindfulness, burnout and empathy	12.5
6. Sallon et al (2015); <sup>27</sup> Israel	Prospective non-randomized pre-post controlled intervention study	215	Caring for caregivers – 8 months of weekly workshops	Significant improvements in quality of work, decrease in symptoms of perceived stress and emotional exhaustion associated with burnout	10.5
7. Moody et al (2013); <sup>28</sup> USA, Israel	Randomized controlled pilot study	48	8-week mindfulness training	No significant improvement in scores of burnout, perceived stress or depression	12.5
8. Abeni et al (2014); <sup>29</sup> Italy	Prospective non-randomized pre-post intervention study	34	Modified “Balint Group” method according to a mindfulness technique	Development of more adaptive ways of using defence mechanisms	10
9. Lamothe et al (2018); <sup>30</sup> Canada	Prospective non-randomized pre-post intervention study	37	8-week MBSR	Significant improvements in perspective taking, identification of one's own emotions, and emotional acceptance	11.5
10. Gracia Gozalo et al (2019); <sup>31</sup> Spain	Prospective non-randomized pre-post intervention study	32	8-week mindfulness training	A decrease in emotional exhaustion and an increase in self-compassion	11
11. Suyi et al (2017); <sup>32</sup> Singapore	Prospective non-randomized pre-post intervention study	37	Modified MBSR	Significant improvements in four of the five mindfulness facets and compassion levels; gains maintained at 3 months follow-up	11
12. Steinberg et al (2017); <sup>33</sup> USA	Randomized controlled pilot study	32	8-week mindfulness training	Significant increase in work satisfaction which negatively correlated with burnout	12.5
13. Kemper et al (2015); <sup>34</sup> USA	Prospective non-randomized pre-post intervention study	103	Online MBS training – 12 1h modules	Significant improvements in stress, mindfulness, and confidence in providing calm, compassionate care	11.5
14. Barattucci et al (2019); <sup>35</sup> Italy	Prospective non-randomized pre-post intervention study	602	IARA training programme	Improvement in emotional regulation, anxiety and stress 6 months after intervention	11.5
15. Janssen et al (2020); <sup>36</sup> Netherlands	Prospective non-randomized pre-post intervention study	30	MBSR	Significant improvements in mindfulness, burnout dimension PA, quality of sleep, positive emotions and self-efficacy	10.5

**Abbreviations:** QA, quality assessment; USA, United States of America; MBSR, Mindfulness Based Stress Reduction; MBS, Mind Body Skills; IARA, an Italian acronym translatable into meeting, compliance, responsibility, autonomy.

## Interventions

All the interventions included elements of mindfulness, despite their great variety in duration, content, schedule, and mode of administration. The most often used intervention was MBSR (four studies), followed by mindfulness training (three studies). Of the 15 studies, four were conducted online. The duration was from a 1-hour module to 30 weekly sessions. A more detailed description of the included interventions is outlined in [Table 2](#).

**Table 2** Detailed Information About the Interventions

Author (Year); Ref No.	Intervention/Duration	Description
1. Kemper (2017); <sup>22</sup>	Three 1h online mindfulness modules	1. Introduction to mindfulness 2. Mindfulness in daily life 3. Mindful breathing and walking
2. Dobkin (2016); <sup>23</sup>	8-week MBSR + 1-day retreat 2.5h per class on a weekly basis for 8 consecutive weeks	MBSR is a systematic approach to group mindfulness training. Classes opened with meditation practice, and included mindful movement, sitting and body scan meditations; specific exercises were extended as homework. Two classes focused on stress management and three included exercises to enhance communication skills. Group discussions were encouraged.
3. Kemper et al (2015); <sup>24</sup>	Mind-body skills (MBS) training 12 1h online modules	3 modules for each of 4 types of mind-body skills: (1) Focused attention meditation (relaxation response); (2) Mindfulness; (3) Guided imagery and hypnosis (including autogenic training); and (4) Positive affect-generating meditation (such as gratitude and loving-kindness). The participants were allowed to complete the modules in any number, any order, and in any combination.
4. Goodman et al (2012); <sup>25</sup>	8-week MBSR + 1-day retreat	4 types of formal mindfulness practices were taught (body scan, mindful movement, walking meditation, sitting meditation). Each class had a topic: (1) Overview of mindfulness; (2) Applying mindfulness in everyday life; (3) Mindful movement; (4) Applying mindfulness to challenging situations; (5) Mindful communication; (6) Practising appreciation; (7) Compassion meditation; (8) Review.
5. Asuero et al (2015); <sup>26</sup>	8-week mindfulness training + 1-day retreat	Each weekly session included four types of activities: (1) Educational presentation of different topics; (2) Formal mindfulness meditation; (3) Narrative and appreciative inquiry exercises; (4) Discussion.
6. Sallon et al (2015); <sup>27</sup>	Caring for caregivers (CCG) 8 months of workshops (30 weekly sessions – 2.25 hours/week + a final full-day workshop)	Five components of CCG intervention: (1) Cognitive (mindfulness training); (2) Somatic (body awareness-relaxation; mindful movement and postural alignment); (3) Emotive-expressive (drawing/journaling/ listening circle); (4) Dynamic-interactive (movement/interactive dance); and (5) Hands-on (acupressure/shiatsu).
7. Moody et al (2013); <sup>28</sup>	8-week mindfulness-based course (initial 6h session; 6 weekly 1h follow-up sessions; final 3h wrap-up session)	Primary focus on the experiential practices (body scan, sitting meditation, mindful movement, STOP technique (Stop, Take a breath, Observe, Proceed), “loving-kindness” meditation) and discussion about them, and 20% didactic information (cultivating awareness of body sensations, thoughts, and emotions during pleasant and unpleasant events; identifying perceptual biases and filters; exploring individual reactivity to stress; reflecting on meaningful experiences and practice; training in skilful listening and communication, exploring self-care).
8. Abeni et al (2014); <sup>29</sup>	“Balint group” modified according to a mindfulness technique 30 1h sessions	This method promotes a group process of exploration and training based on reflection on the relational experience with patients, focusing on the development of attentive awareness of sensations, thoughts, and perceptions of reality at the time of the session.
9. Lamothe et al (2018); <sup>30</sup>	8-week MBSR	MBSR as already described. Participants received a workbook and audio recordings of guided meditations to help them with home practice.

(Continued)

**Table 2** (Continued).

Author (Year); Ref No.	Intervention/Duration	Description
10. Gracia Gozalo et al (2019); <sup>31</sup>	8-week mindfulness training Short practices (5–8 min) in the course of 8 weeks	On Monday of each week, the participants received a text file via WhatsApp explaining the exercise, and an audio file that could be used for guided meditation. Each day the participants received a practice reminder message in the form of a motivating phrase, image or video. Session objectives: (1) introduction to mindfulness; (2) knowing attention and internal anchoring in breathing; (3) attention to the body; (4) attention to thoughts; (5) informal practice; (6) knowing techniques in movement; (7) knowing the potential in emotional regulation; (8) introduction to compassion.
11. Suyi et al (2017); <sup>32</sup>	Modified MBSR 6 weekly 2h sessions	Topics: (1) introduction to practice; (2) perception and engaging with practice; (3) awareness of being stuck in one's life and how to get unstuck; (4) reacting and responding to stress, exploring perceptions and thoughts; (5) mindful communication in stressful situations; (6) cultivating kindness towards oneself and others. During the training, meditation practices were taught. Participants were asked to practise 30 min of formal meditation daily.
12. Steinberg et al (2017); <sup>33</sup>	8-week mindfulness-based intervention (weekly 1h group session at the workplace during work hours)	Participants were asked to do 20-minute daily individual practices.
13. Kemper et al (2015); <sup>34</sup>	Online MBS (mind-body skills) training 12 1h modules	4 general topics: (1) focused attention meditation (relaxation response); (2) mindfulness meditation; (3) positive affect meditation (positive or sacred word, gratitude, and loving-kindness/compassion meditation); (4) guided imagery/hypnosis (autogenic training; guided imagery to prepare for surgery, procedures, or childbirth; and guided imagery for sleep and changing habits).
14. Barattucci et al (2019); <sup>35</sup>	IARA training programme 4 meetings for 8 hours Group training (18–22 participants per group)	1st meeting: IARA principles, creation of a working group, developing awareness of here and now 2nd meeting: techniques of counselling, improving emotional awareness and patient-centred care 3rd meeting: SWOT analysis, creative imagination, IARA techniques 4th meeting: seven psychological types, planning changes, improving awareness of people's qualities
15. Janssen et al (2020); <sup>36</sup>	8-week MBSR + 1 day silence during working hours	1. Guided instruction in mindfulness meditation practices (body scan, sitting meditation) 2. Simple movement exercises (stretching and yoga) 3. Short group discussion 4. Informal meditation exercises: paying full attention to daily activities (eg brushing one's teeth, taking a shower, eating)

## Measuring Instruments

A wide variety of psychometric instruments were used. Among the most common were the Maslach Burnout Inventory (MBI) (in nine studies); the Perceived Stress Scale (PSS) and the Five Facet Mindfulness Questionnaire (FFMQ) (in six studies); and the Cognitive and Affective Mindfulness Scale-Revised (CAMS-R) and the Mindful Attention Awareness Scale (MAAS) (in three studies). Mindfulness was examined by three different measures, the FFMQ, the CAMS-R and the MAAS; in one study all three were used.<sup>22</sup>

Nearly all the studies examining mindfulness with the FFMQ reported a significant increase in mindfulness scores post intervention.<sup>22,23,26,32,36</sup> In the case of the PSS the results were also quite homogeneous; in five studies a reduction in perceived stress was reported, although one<sup>28</sup> reported no significant improvement in the perceived stress scores. In the studies reporting burnout with the MBI, in general an improvement was confirmed. In two studies post-interventional scores were not reported,<sup>24,33</sup> and in one study it was done only graphically.<sup>31</sup> Janssen et al<sup>36</sup> reported a significant improvement in PA, but did not find any significant changes in work engagement and mental distance (burnout



dimensions in the Dutch version of the MBI). The study by Moody et al,<sup>28</sup> carried out with a multidisciplinary group of paediatric oncology staff members, showed no significant improvement in burnout or perceived stress scores. One possible explanation for such results may be that nearly all the participants showed signs of burnout at baseline. However, the qualitative analysis in the same study revealed reduced stress, an improved sense of inner peace, joy and compassion, better focus, and less somatic symptoms in the intervention group.<sup>28</sup>

## Sustained Effect Measurement

Two studies examined whether there was a sustained effect after the intervention. Suyi et al.<sup>32</sup> showed that participants maintained improvements on self-compassion and mindfulness at the three month follow-up. There was no change observed for burnout. Barattucci et al.<sup>35</sup> found that the HCPs who attended mindfulness-based IARA training had better scores for anxiety, stress, and emotional regulation six months after the intervention, compared to the control group.

## Comparison of Online vs In-Person Interventions

In the fifteen included studies, there were four online and eleven in-person interventions. Despite the great variety in the duration and characteristics of the online interventions, generally an improvement was reported. Kemper et al.<sup>22</sup> reported a significant improvement in mindfulness scores. In another study using elective 1-hour modules of mind-body skills training,<sup>24</sup> Kemper et al confirmed improvements in empathy, mindfulness, resilience, and stress. The main advantage was that online MBS training reached diverse health professionals. Gracia Gozalo et al.<sup>31</sup> reported improvements in self-compassion and emotional exhaustion after an 8-week mindfulness programme based on individual training.

## Assessing Study Quality – MERSQI Scores

The mean MERSQI score of the included studies was 11.2, and the minimum appointed score was 10 and the maximum 12.5. The lower MERSQI results were found to be mostly due to the following: study design as there were many single group pre-post studies; small sample sizes; only one involved institution; use of self-assessment tools by participants; and not reporting the validity of the evaluation instrument. Moreover, the data analysis of the included studies did not exceed the descriptive analysis.

## Discussion

### Main Findings

The results of this systematic review demonstrated a positive impact on the selected psychological measures, regardless of the specific type of PIM used. The most commonly studied interventions involved MBSR and other mindfulness training programmes, the latter in online as well as in-person versions. These findings are in line with a previously published review by the same authors,<sup>19</sup> carried out on a professional group of physicians only.

### Comparison to Other Studies

The results of this systematic review are concordant with the findings of other recently published review papers,<sup>37,38</sup> showing that mindfulness-based interventions present an effective tool which could improve the psychological functioning of HCP. This knowledge is essential today as, during the Covid-19 pandemic, HCP working in the frontline were likely to experience an increased volume and intensity of work, as well as facing added pressure due to new working environments, constantly changing protocols, and exposure to trauma and contagion.<sup>39-41</sup> On top of organizational and personal challenges, the fear of Covid-19 contagion seems to be an additional burden which is associated with negative effects on mental health of HCP.<sup>39</sup>

This review is unique in several aspects when compared to other review papers.<sup>42,43</sup> It involves a wide and heterogeneous group of HCP, whereas others are focused mostly on one specific group (eg nurses, primary physicians, psychologists, etc.). It seems that the same mindfulness-based interventions can be used regardless of the profession of the healthcare team members. In primary care, integrated care is more and more important,<sup>44</sup> and it can involve many

healthcare professionals. This review suggests that a common approach to strengthening the resilience and mental health of all team members is feasible and effective.

The review's most important characteristic is the inclusion of various interventions in online and in-person formats, from which we can gain a better understanding of the efficiency, feasibility, and cost-effectiveness of the two formats. As already stated, four studies used an online approach<sup>22,24,31,34</sup> from which we can conclude that online training is feasible, less time-consuming, and associated with significant improvements in perceived stress and mindfulness. This finding is in line with a recently published (2022) randomized controlled trial carried out with undergraduate nursing students during the Covid pandemic in China.<sup>45</sup> A 6-week online mindfulness intervention was confirmed to be effective in improving mental health and reducing the symptoms of anxiety and stress.<sup>45</sup> In-person interventions were all designed for group training, whereas online interventions were carried out individually.

## Theoretical Implications

Based on these findings, we can summarize that there were no major differences between group and individual training, and it seems that the online format is as effective as an in-person format, which is also in line with other studies.<sup>46</sup>

One crucial piece of information for future planning is also the presence of a sustained effect, which is included in this review. It seems that mindfulness-based interventions have the potential to provide a long-term positive effect.<sup>32,35</sup>

This review also showed that even training with a short duration can lead to significant benefits for HCP, which has also been confirmed by other researchers.<sup>47,48</sup>

Least but not last, it seems very important to consider several variables associated with reactivity to stress and predisposing HCP to burnout. Important predictors of burnout syndrome are exhaustion, depression, anxiety, decreased professional satisfaction, stigmatization, young age and female gender. Young age can be connected to several explanations, such as longer working hours, higher empathy, and lack of experience. Emotional intelligence also plays an important role in mitigating reactivity to stress. There are contradictory data on the connection between relationship status and sensitivity to burnout.<sup>49,50</sup>

Since specialties in the front line are at the highest risk of developing burnout,<sup>51</sup> it is worth mentioning that the majority of the included studies were conducted in a hospital environment, some of them in a very specific population, eg paediatric oncology staff members,<sup>28</sup> staff in an intensive care unit,<sup>31</sup> or mental health professionals.<sup>32</sup> It is therefore especially important for future studies to also address HCP in primary care. All our findings are intriguing in terms of effective burnout prevention, so future studies should focus on answering questions about long-term impact and cost-effectiveness when comparing in-person and online interventions. It is also recommended that effective interventions are identified and offered in the first place to the most vulnerable groups of HCP.

## Practical Implications

HCP, especially at the primary care level, are overburdened with work and find it difficult to attend in-person activities.<sup>18</sup> Based on the results of our study, they can be encouraged to attend online activities without the fear of them not being effective.

Healthcare workers need to understand the importance of maintaining and preserving their own mental health and resilience. Achieving mindfulness in their daily lives and work should become part of their daily routine. Our study showed that there is a need to include education on this topic in the curricula of undergraduate and postgraduate healthcare studies.

The findings of this study could be used not only by managers of healthcare organizations but also by HCP themselves to improve their resilience; they can still benefit significantly even by attending short training courses.

## Strengths and Limitations

This review has several strengths. It follows PRISMA reporting guidelines with a clear demonstration of a search strategy, and a high number of included studies. In contrast to other reviews, which focused on a specific professional group, this review includes a heterogeneous group of HCP which could upgrade our knowledge of burnout in this setting, as well as the role of mindfulness-based interventions in addressing the problem. The studies were conducted in eight



different countries, which is positive from the aspect of generalization. Apart from the United States, Canada, and European countries, one was carried out in Israel, and another in Singapore. The review is unique because of its comparison of in-person and online interventions, and the special focus on follow-up and the measurement of a sustained effect after the completion of the intervention.

As rather weak experimental designs were used in most of the studies, with different durations of intervention applied and various instruments administered for the assessment of psychological qualities, it was a challenge to compare the results and generalize the main findings. Some studies used small samples and some reports presented a substantial risk of bias. Some studies did not have a control group, and the participants were mostly self-selected based on their interest, and did not evaluate the baseline levels of sensitivity to burnout of the participating HCP.

Based on these limitations, there is a strong suggestion for future research to thoroughly describe the implemented interventions and to use methodologically rigorous and uniform designs, eg the same psychometric measure for each quality and the same duration of intervention.

## Conclusion

This review provided solid evidence that by offering HCP effective, feasible interventions focused on their needs we could efficiently improve several key aspects of burnout, empathy, and mindfulness, and also indirectly influence patient care. The interventions offered can be shaped in such a way that would not significantly affect the already busy schedule of HCP, as short and on-line interventions have been shown to be as effective as long, in-person ones. Nevertheless, the inclusion of mindfulness education in undergraduate and postgraduate curricula could be very important; it could enable a long-term positive effect on the health of HCP.

There are several important questions yet to be addressed by future research: What are the long-term impacts and cost-effectiveness of different formats (in-person vs online), durations and types of specific PIM for HCP? How long does the sustained effect last and what is the optimum frequency of refresher courses to sustain or augment their effects? How can training programmes support ongoing practice? How much impact can be attributed to the group support offered by in-person training? How do initial stress and burnout levels affect cooperation and the likelihood of ongoing practice? It is also recommended that effective interventions are identified and offered in the first place to the most vulnerable groups of HCP.

We believe that the new findings presented in this review would be accepted as a positive challenge for healthcare system management and HCP themselves during the Covid-19 pandemic and beyond, as well as being an inspiration for researchers to initiate further investigation in this field.

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## Disclosure

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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