

Mindfulness therapies on health professionals

Authors

María Dolores Ruiz-Fernández, PhD, MSN, RN

Department of Nursing, Physiotherapy and Medicine, University of Almería, Almería, Spain

Rocío Ortiz-Amo, MSC

Department of Nursing, Physiotherapy and Medicine, University of Almería, Almería, Spain

Ángela María Ortega-Galán, PhD, MSN, RN

Department of Nursing, University of Huelva, Spain

Olivia Ibáñez-Masero, PhD, MSN, RN

Department of Nursing, University of Huelva, Spain

María del Mar Rodríguez-Salvador, RN

Andalusian Health Service, Almería Center District, Almería, Spain

Juan Diego Ramos-Pichardo, PhD, MSN

Department of Nursing, University of Huelva, Spain

Corresponding Author: Ángela María Ortega-Galán, Department of Nursing, Faculty of Nursing, University of Huelva, El Carmen Campus, University of Huelva, Avda. Tres de Marzo, s/n, 21071 - Huelva, Spain (angelaortega96@gmail.com)

Author contributions

All authors have participated in the development of this study. Ruiz-Fernández and Ortega-Galán conceived the study and participated in the data collection, in data analysis, and in writing the manuscript. Ortiz-Amo and Rodríguez-Salvador managed the data, created the database, and participated in the data analysis. Ramos-Pichardo and Ibañez-Masero participated in the interpretation of the data and in writing the manuscript.

Conflicts of interest statement

All authors declare that there are no conflicts of interest in this investigation

Funding information

This study was supported by Project AP-0100-2016 ‘Evaluating Burnout and Compassion Fatigue among Nursing Professionals of the Public Health System of Andalusia’, Ministry of Health, Regional Government of Andalucía, Spain.

The final, definitive version of this paper has been published in *International Journal of Mental Health Nursing*, 29(2), 127-140 (2020) DOI: 10.1111/inm.12652 published by John WILEY & Sons, Inc. All rights reserved.

ABSTRACT

Health professionals are exposed to situations of emotional vulnerability by being in continuous contact with patients and their suffering, which can cause conditions such as compassion fatigue. To address this issue, therapies such as mindfulness are being used to reduce stress and promote self-compassion. The objective of this research was to carry out a systematic review and meta-analysis to analyse the types of mindfulness interventions that are being used for healthcare professionals and their effectiveness in reducing stress and improving self-compassion and mindfulness. Following the PRISMA guideline, a systematic review of original studies was carried out in the following databases: Medline, Scopus, Cinhal, PsycINFO, Lilacs, and Science Direct, without a limited time frame. Controlled experimental mindfulness interventions on health professionals were selected, in which the following outcome variables were measured: stress, self-compassion, and mindfulness. A meta-analysis was performed with a random effects model. In cases of very high heterogeneity, the data were analysed by subgroup. Mindfulness-Based Stress Reduction Therapy (MBSR) was the most often used in the studies. There is diversity in the implementation of MBSR, and a common finding is a reduction of stress and increased mindfulness in health professionals. However, studies that analyse self-compassion are scarce. The effect of these therapies varies depending on how long the individual has been practising meditation. In conclusion, more studies are needed to describe the clinical usefulness of these programmes, to jointly analyse these three variables (stress, self-compassion and mindfulness), and to measure compassion fatigue as an outcome variable.

Keywords: health professionals, mindfulness, stress, self-compassion, mindfulness therapies

INTRODUCTION

Health professionals are continually exposed to complex situations in their daily tasks and have a high risk of suffering from mental health problems (Johnson et al. 2018 Shanafelt et al. 2009), mainly related to experiences of stress and feelings of physical or emotional tension (Kolthoff & Hickman 2017; Allsbrook et al. 2016). Over time, these stressful experiences and negative feelings related to work can lead to burnout, low job satisfaction or work absenteeism, and has a negative impact on patient satisfaction (McHugh, Kutney-Lee, Cimiotti, Sloane & Aiken 2011; Michie & Williams 2003; Vahey, Aiken, Sloane, Clarke, & Vargas 2004).

Lazarus (2000) defined stress in his transactional model as a relationship between the person and the environment, which has been evaluated by the individual as exceeding his possibilities and resources to cope with it. The stress of nursing care work has also been described as an important factor that can lead to compassionate fatigue (Zhang, Zhang, Han, Li & Wang 2018). Compassion fatigue, initially described by Joinson (1992), is defined as the emotional and physical burden derived from exposure to traumatic and demanding situations, that is, the response of the body and mind of the individual to these experiences (Cocker & Joss 2016).

Compassion fatigue can lead to changes in mood, sadness, pain, complaints, detachment, apathy, or emotional isolation, among others (Bellolio et al. 2014). Together, the feeling of compassion towards the suffering of others decreases in professionals, who also feel that their professional development and emotional well-being are being affected (Kelly et al. 2015), which can potentially also affect the quality of care that professionals provide (O'Mahony et al. 2017). It is for this reason that the physical and emotional effects resulting from working with patients in traumatic situations is gaining increasing attention (El-bar et al. 2017).

In recent years, treatments and interventions aimed at promoting compassion have been developed as a protective factor for compassion fatigue (Anderson & Gustavson, 2016). Compassion has been defined as understanding or being aware of another person's suffering and actions to end this suffering (Schantz, 2007). According to Mooney et al. (2017), compassion implies feeling motivated and having the ability to alleviate the suffering of others. In this way, self-compassion is applying these abilities to one's own experience. That is, compassion directed towards oneself, as a beginning and previous step in widening the circle of compassion towards other's sufferings. Recently, programs with mindfulness through meditation are considered an effective method for developing

compassion and self-compassion (Gauthier et al. 2015) and are potentially useful for reducing stress and exhaustion (Goodman & Schorling, 2012).

Non-pharmacological interventions that have been shown to be effective in reducing stress in different populations include mindfulness-based interventions (Goyal et al. 2014; Li & Bressington 2019; Zimmerman, Burrell & Jordan 2018). Mindfulness is a concept adapted from the Buddhist tradition and can be cultivated through a variety of meditation practices (Duarte & Pinto-Gouveia, 2016). The most quoted definition of mindfulness is that of Jon Kabat-Zinn, who is considered the introducer of mindfulness in the West: "The non-judgmental consciousness that unfolds moment by moment, which is cultivated by paying attention in a specific way: in the present moment and in the least reactive and judgmental way possible, and with the greatest openness of heart" (Kabat-Zinn, 2005). Therefore, full attention should be focused towards the present moment in a deliberate and non-judgmental manner (Kabat-Zinn, 2009).

The objective of mindfulness programmes is to train people to respond to situations in a reflective way instead of responding automatically (Jakel et al. 2016). Through the practice of cultivating the mind, people who practice mindfulness learn to be more aware of their thoughts, feelings and body sensations as they occur in the moment (Duarte & Pinto-Gouveia, 2016).

The most extended programme of mindfulness is the Mindfulness-Based Stress Reduction (MBSR) programme developed by Kabat-Zinn (2003), which aims to reduce the level of stress of the practitioner and, as a result, increase their psychological well-being. The MBSR practice is based on meditation and adopts different variations, such as active meditation. Through MBSR, participants learn the practice of mindfulness with an experimental and participatory programme, which combines theoretical explanations, formal training practices and moments of dialogue (Kabat-Zinn 2003). MBSR has been shown to be effective in reducing stress and anxiety by increasing vitality and awareness of the moment (Goyal et al. 2014).

Another development in the practice of mindfulness is the Mindful Self-Compassion (MSC) programme, which focuses on the ability to cultivate self-compassion and aims to teach participants to respond to difficult emotions with care and understanding (Hevezi, 2016). The structure is similar to that of MBSR; it is an eight-week programme focused on training the person to be kinder to oneself, with two or one-and-a-half hour sessions once a week and a half-day meditation retreat (Neff & Germer

2013). In turn, MSC has been used to cultivate self-compassion, yielding results related to emotional well-being (Germer & Neff 2013).

In the last decade, numerous studies have been conducted in which interventions mindfulness-based intervention have been applied to health professionals, using different outcome variables such as stress, mindfulness and self-compassion. However, these results have not yet been the object of a systematic review and meta-analysis that allow us to reach conclusions about their effectiveness in health professionals. Guillaumie, Boiral & Champagne (2017) published a review and meta-analysis in which they included studies on the effectiveness of mindfulness-based interventions for a multitude of outcome variables (thirteen psychological variables and twelve physical health indicators), carried out in samples of nurses and nursing students. However, we have not located in the literature any meta-analysis that evaluates the effectiveness of mindfulness-based interventions exclusively in health professionals.

The sources of stress among health professionals, as mentioned above, has to do mainly with the continuous exposure to complex and emotionally tense situations, related to the suffering of the patients and the relatives they attend. However, the sources of stress among health professions students are different and are mainly related to workload and academic results, or to the uncertainty caused by facing complex situations or the handling of technical equipment for the first time (Pulido-Martos, Augusto-Landa and López-Zafra 2012). In addition, factors such as age and family or financial responsibilities can also have different effects in stress management between professionals or students. Therefore, it is necessary to carry out a systematic review and a meta-analysis on the effectiveness of mindfulness-based interventions in health professionals.

AIM

The aim of this systematic review and meta-analysis was to evaluate and synthesize the evidence of the effectiveness of mindfulness-based interventions to reduce stress and improve self-compassion and mindfulness, in health professionals.

METHODS

Search strategy

An exhaustive search was made in international databases following the recommendations of the PRISMA guide proposed by Moher et al. (2015). The databases consulted were Medline, Scopus, Cinhal, PsycINFO and Science Direct. The search strategy was as follows: (“health professional” OR “physician” OR “doctor” OR “GP” OR “medical staff” OR “nursing staff” OR “nurses”) AND (“intervention” OR “program”) AND (“mindfulness”) AND (“compassion” OR “self-compassion” OR “stress”). These terms were used both in natural language and in controlled language, through the corresponding thesauri.

Inclusion criteria

Original articles that fulfilled the following inclusion criteria were included: a) controlled experimental studies (control and experimental group), with or without randomisation and pre- and post-intervention measures; b) a sample of health professionals (physicians, nurses or both); c) evaluation of a mindfulness-based intervention, either as a single treatment or within a broader multicomponent programme; and d) stress, self-compassion and mindfulness (as defined by Kabat-Zinn, 2005) as outcome variables from the intervention. In addition, to be selected the articles had to be written in English or Spanish and have been as full-text article in peer-reviewed journals before April 2018.

Procedure and data extraction

First, potential articles were selected based on the title and abstract of the studies. The full text of the articles that were initially considered to be relevant was obtained.

A data extraction form was designed that included information on the established inclusion criteria (design, sample, intervention. and outcome variables), as well as information on the objective of the study, the work context, and the intervention programme (methodology, content, duration, and sessions). With the help of this form, quantitative data were extracted relative to the sample size, and the measures of the outcome variables were described pre- and post-intervention for the control and experimental groups.

This process was carried out by two independent reviewers, ensuring the maximum reliability of the collected information. The cases where there was controversy

between the reviewers were resolved in consensus meetings with the participation of a third researcher.

Risk of bias

Cochrane Collaborations' risk of bias assessment tool (Higgins et al. 2011) was used. Two researchers independently (AOG and JDRP) assessed the risk of bias, resolving disagreements at a consensus meeting in which main researcher participated (MDRF).

Data analysis: meta-analysis

For the meta-analysis, studies were selected that provided numerical data for the sample size, mean, and standard deviation of the outcome variables (stress, self-compassion, and mindfulness) of both post-intervention groups (the control group and experimental group). An inverse variance statistical method was used with a random effects model (Borenstein et al. 2010). The standardised mean differences, 95% confidence intervals, size of the total effect, and weight of each of the studies according to each of the outcome variables (perceived stress, mindfulness, and self-compassion) were calculated. The size of the effect was considered to be small for values of $d \leq 0.20$, moderate with approximate values at $d = 0.50$, and large with values of $d \geq 0.80$ (Cohen 1988). To assess the heterogeneity between the studies, the I^2 statistic was calculated, and approximate values of 25%, 50%, and 75% were interpreted as low, medium, and high heterogeneity, respectively (Ausina & Meca 2015). In cases where a very high heterogeneity was observed, the meta-analysis was performed by subgroup according to the effect sizes of the different studies. The publication bias associated with the statistical significance of the research could not be analysed graphically with a funnel plot due to the number of selected studies (Higgins & Green 2011). The meta-analysis was performed with the statistical programme of the Cochrane Review Manager (Rev Man), version 5.3.

RESULTS

Figure 1 shows the process of selecting studies. A total of 4,654 studies were identified, and 90 articles were selected by title and abstract for their relevance to the research question. Eleven duplicates were eliminated. A total of 79 studies were reviewed,

of which 70 were excluded for different reasons. A total of nine and six articles were included in the systematic review and meta-analysis, respectively.

Figure 1. Flowchart of the article selection process

The nine selected studies had similar objectives—the application of mindfulness therapies in health professionals; some focused on attempts to reduce stress levels (Wang et al. 2017; Shapiro et al. 2005), others to improve self-compassion and mindfulness (Aranda-Auserón et al. 2018; Franco-Justo 2010; Gracia-Gozalo et al. 2018), and others to reduce burnout and exhaustion, manage stress, and increase empathy and well-being by developing mindfulness (Verweji et al. 2016; Duarte et al. 2016; Martín Asuero et al. 2014; Cohen-Katz et al. 2005). Table 1 describes the main characteristics of the participants and the selected interventions.

Table 1. Characteristics of included studies

The studies used a controlled experimental design; four articles were randomized (Aranda-Auserón et al. 2018; Cohen-Katz et al. 2005; Martín-Asuero et al. 2014; Shapiro et al. 2005), and five were non-randomized (Duarte et al. 2016; Franco-Justo 2010; Gracia-Gozalo et al. 2018; Verweji et al. 2016; Wang et al. 2017).

The samples sizes ranged from between 27 to 78 participants in the studies and were composed of doctors and nurses (Aranda-Auserón et al. 2018; Cohen-Katz et al. 2005; Duarte et al. 2016; Wang et al. 2017; Franco-Justo 2010; Verweji et al. 2016), along with other health professionals (Gracia-Gonzalo et al. 2018; Martín Asuero et al. 2014; Shapiro et al. 2005).

Regarding the gender composition of the samples, in two articles the sample was all women (Cohen-Katz et al. 2005; Wang et al. 2017), and in one article, the majority of the sample were men (Verweji et al. 2016). Two studies did not specify the gender of the sample population (Martín Asuero et al. 2014; Shapiro et al. 2005), and in the rest of the articles, there were both males and females (Aranda-Auserón et al. 2018; Duarte et al. 2016; Franco-Justo 2010; Gracia-Gozalo et al. 2018). The health professionals worked mainly in hospitals (Cohen-Katz et al. 2005; Duarte et al. 2016; Gracia-Gozalo et al. 2018; Shapiro et al. 2005; Wang et al. 2017) and in primary care in the rest of the studies

(Verweji et al. 2016; Martín Asuero et al. 2014; Franco-Justo 2010; Aranda-Auserón et al. 2018).

The MBSR programme was used in the nine selected studies. In one of them (Aranda-Auserón et al. 2018), the MSC programme was used in combination with MBSR.

The interventions had different characteristics in terms of the duration of the sessions and the duration of daily practice. Mostly, the duration of the programme was eight weeks, ranging from 6 to 10 weeks. The variability was greater regarding the duration and frequency of the sessions, as seen in Table 1.

Some studies also described the use of audio-visual, theoretical, and daily practice material to support meditation at home (Aranda-Auserón et al. 2018; Cohen-Katz et al. 2005; Duarte et al. 2016; Martín Asuero et al. 2014). In other studies, the use of instant mobile messaging systems (WhatsApp) was used for sending text and audio files at the beginning of each week to support and guide the meditation exercises, as well as daily reminder messages in the form of a motivational phrase (Gracia-Gonzalo et al. 2018).

Regarding the effects, a significant reduction in the levels of stress, emotional fatigue, exhaustion, compassion fatigue, and anxiety was observed (Aranda-Auserón et al. 2018; Duarte et al. 2016; Gracia-Gonzalo et al. 2018; Wang et al. 2017; Martín Asuero et al. 2014; Franco-Justo 2010; Shapiro et al. 2005). In one study, the results focused on other variables such as improving well-being and self-compassion and obtaining greater life satisfaction (Verweji et al. 2016). In addition, several studies found an increase in life satisfaction, along with an increase in mindfulness (Gracia-Gonzalo et al. 2018; Aranda-Auserón et al. 2018; Shapiro et al. 2005). The instruments used for the evaluation of the outcome variables were varied, and in all cases, versions adapted to the characteristics of the sample population were used (Table 1)

Some of the selected studies had a longitudinal design and described follow-up results at three months (Cohen-Katz et al. 2005) or at six months after the end of the intervention (Wang et al. 2017; Duarte et al. 2016; Franco-Justo 2010). In all of the studies, significant reductions in stress and compassion fatigue were maintained despite the time elapsed since the intervention. The rest of the studies did not include follow-up (Gracia-Gonzalo et al. 2018; Aranda-Auserón et al. 2018; Verweji et al. 2016; Martín Asuero et al. 2014; Shapiro et al. 2005).

The acceptability of the intervention and regular attendance at the sessions by the participants was a topic that was discussed in several studies (Duarte et al. 2016; Martín

Asuero et al. 2014; Shapiro et al. 2005). In the other studies, the opinions of the participants about the interventions were not assessed (Aranda-Auserón et al. 2018; Gracia-Gozalo et al. 2018; Wang et al. 2017; Verweji et al. 2016; Franco-Justo 2010; Cohen-Katz et al. 2005).

The risk of bias (Figure 2) according to the Cochrane Collaborations' risk of bias assessment tool, was generally high for domains related to the selection bias (random sequence generation and allocation concealment) and with the performance bias (blinding of participants and personnel), and unclear for the other domains evaluated, mainly due to the lack of information.

Figure 2. Risk of bias summary

Summary of results: meta-analysis

Three studies were excluded from the meta-analysis: Cohen-Katz et al. (2005) did not indicate the numerical values of the outcome variables when assessing the efficacy of the MBSR intervention and only showed the results graphically. Shapiro et al. (2005) and Gracia-Gozalo et al. (2018) did not provide data on the standard deviations of both groups (control and experimental) in the pre- and post-test measurements. The meta-analysis was performed for the variables of stress and mindfulness. Of the three studies that measured the variable self-compassion (Table 1), only one of them contributed data that could be used for the meta-analysis (Aranda et al. 2018); the other two provided only partial data. In the study by Aranda et al. (2018), a significant increase was observed in the experimental group with respect to the control group in self-compassion, as measured using the Self-Compassion Scale (SCS) instrument, in three dimensions: self-kindness, common humanity and mindfulness.

Outcome variable: stress

Four of the selected studies, with a total of 185 participants, used stress as an outcome variable of the MBSR intervention (Figure 3). In three of them, a positive effect of the programme was observed in the experimental group with respect to the control group, which indicates a clear improvement in perceived stress. Only one of the studies showed a negative effect. The standardised mean difference was 0.65 (0.08-1.22), which is considered a moderate effect according to Cohen (1988). The total effect size test was significant ($Z = 2.25$, $p \leq 0.05$). With respect to the heterogeneity and inconsistency

between the different studies, the I^2 statistic showed a moderate heterogeneity ($I^2 = 72\%$). We must be cautious when interpreting this result, since it indicates that there are differences between the studies. These may be due to the intervention used or due to another variable.

Figure 3. Standardised mean difference for variable "stress"

When performing the analysis by subgroup (Figure 4) and including only those studies in which the effect size was positive (Aranda et al. 2017; Duarte et al. 2016 and Justo 2010), the statistical test of heterogeneity decreased ($I^2 = 6\%$), the standardised mean difference increased to 0.90 (0.52-1.28) (considered high (Cohen 1988)), and the total effect size was higher ($Z = 4.66$, $p \leq 0.001$). When analysing these studies, we observed that although the duration of the intervention in weeks varied in each of them, there was a daily practice of mindfulness, which was not the case with the study by Wang et al. (2017).

Figure 4. Standardised mean difference for the variable "stress", eliminating the study by Wang et al. (2017)

Outcome variable: mindfulness

Five studies were included for the analysis of the variable mindfulness, with a total of 178 participants (Figure 5). The effect of the intervention programme was positive and effective in all studies; that is, mindfulness increased in the experimental group compared to the control group in each study, indicating the effectiveness of the programme for mindfulness training. The standardised mean difference was 1.1 (0.17-2.04), which is high according to the criteria of Cohen (1988), with a significant total effect size ($Z = 2.33$, $p \leq 0.05$). The statistic of heterogeneity and inconsistency indicated high diversity among the different studies ($I^2 = 92\%$). Therefore, we must also be cautious when interpreting the results and perform an analysis by subgroup.

Figure 5. Standardised mean difference for the variable "mindfulness"

In the studies by Wang et al. (2017), Duarte et al. (2016) and Martín-Usero et al. (2014), similarities were found in the mindfulness programme used in terms of its

duration and the inclusion of a single intensive day or meditation retreat at the end of the programme. These three studies had the smallest difference in mindfulness scores between the control and experimental groups; therefore, if we perform the analysis taking into account only these three studies, we observe a moderate effect size according to the criteria of Cohen (1988) (0.36; $CI = 0.05-0.84$). Thus, the heterogeneity between the different studies disappears ($I^2 = 0\%$), and there is a significant total effect size ($Z = 2.3$, $p \leq 0.05$) (Figure 6).

Figure 6. Standardised mean difference for the variable "mindfulness" without Aranda et al. (2017) and Verweij et al. (2016)

DISCUSSION

Summary of evidence

The available literature shows that mindfulness-based interventions can be beneficial for the management and reduction of stress and other variables in different populations. This is the first systematic review and meta-analysis that evaluates the effectiveness of these interventions exclusively in health professionals (nurses and doctors), with the added novelty that we include the analysis of self-compassion as an outcome.

We identified nine studies in which all of them applied the MBSR program to health professionals, although with some variability in the application of the program in terms of duration or interval between sessions. Of the nine studies selected, three provided incomplete data on their results, so only six could be included in the meta-analysis. In addition, it was not possible to perform a meta-analysis on the outcome variable self-compassion, since only three selected articles contemplated it and only one of them provided complete data. For variables stress and mindfulness a significant mean effect size was observed in the meta-analysis, and the data indicated that the mindfulness programmes can be effective for the reduction of stress and the promotion of mindfulness. The average effect size was moderate-high for both variables. However, the confidence intervals were very small, with the lower limits close to 0 (zero effect). From this perspective, the effectiveness shown by mindfulness-based interventions for reducing stress and improving mindfulness is relative.

The reduction of stress in health professionals through the use of mindfulness programmes has been the target of different investigations in recent years (Suyi et al. 2016; Zeller & Levin 2013). The data from our meta-analysis indicate a moderate significant effect on stress reduction, in line with other systematic reviews (Burton et al. 2017; Khoury et al. 2015). One of the studies included in our review had a minor effect compared to the rest (Wang et al. 2017). In this result it is possible that two factors related to the context and the sample have influenced. On the one hand, it is the only study of the selected ones carried out with recently graduated health professionals, for whom a specific stress related to limited competences and inexperience in the management of complex patients has been described (Wu, Fox, Stokes & Adam 2012). On the other hand, the study was conducted in a Buddhist hospital, which could significantly influence the results, since the practice of mindfulness has its origins in Buddhism, in which the conception of personal identity (basic to practice of mindfulness) differs from that existing in Western countries. Some authors have discussed the possible influences on the results of the practice of mindfulness that cultural and contextual factors may have, taking into account that the application that Western psychology has made of mindfulness as curative or preventive therapy does not correspond to the ethical and moral dimensions with which it is practiced from Buddhism (Kirmayer 2015; Panaïoti 2015).

In addition, longitudinal measurements showed that the decrease in stress can be maintained for a time after the intervention (Gauthier et al. 2015). These disparate effects may be due to the methodological design of the research (Rush & Sharma 2017). In our research, only randomised controlled trials with control and experimental groups were included. This controversy can make us reflect on the importance of other factors that may be affecting the stress of professionals, such as the work environment in which they are immersed (Zeller & Levin 2013).

The three analysed variables (stress, mindfulness, and self-compassion) are related to a certain extent. In fact, several studies have negatively linked stress levels with mindfulness and self-compassion (Gauthier et al. 2015; Olson & Kemper 2014). That is, reducing stress levels in health professionals with mindfulness therapies indirectly improves the levels of compassion and mindfulness as outcome variables (Olson & Kemper 2014). Being aware of one's own stressful emotions, in the present moment, apart from reducing emotional stress (Goodman & Schorling 2012), encourages self-compassion (Gauthier et al. 2015) and improves one's awareness of the moment (Goyal et al. 2014). The increased ability to identify and describe emotions, a term known as

emotional clarity, could be a key element in the management of emotions (Cooper et al. 2018).

Mindfulness programmes have been observed to help workers more adequately respond to stressors in the workplace (Kemper et al. 2015) and prevent burnout syndrome (Virgili, 2015). However, there are few results regarding the influence that these variables have on compassion fatigue syndrome, assuming that they are factors related to it (Zeidner et al. 2013). Duarte et al. (2016) determined significant decreases in stress and increased mindfulness and self-compassion, with a simultaneous improvement in compassion fatigue.

In general, mindfulness-based therapies require great acceptance and commitment by the participants to achieve satisfactory results, and it requires daily practice, which is a great effort (Burton et al. 2017). Several studies included in our review dealt with the acceptance and commitment of professionals to participate in and practice meditation (Duarte et al. 2016; Martín Asuero et al. 2014; Shapiro et al. 2005). The commitment to the practice of meditation implies obtaining more satisfactory results. In fact, we have observed in the analysis of the variables stress and mindfulness that the periodicity and continuity in the practice of meditation is a very important aspect related to the effect of the intervention.

Risk of bias was high or at least unclear in all domains. None of the selected articles presented a low risk of bias in all domains evaluated, so the quality of the data provided by the studies seems quite questionable. We could conclude that the positive results that the selected studies present have no validity. However, we think that the negative evaluation of the risk of bias may be influenced by a possible non-adequacy of the Cochrane Collaborations' risk of bias assessment tool for this type of studies. The interventions based on mindfulness, and specifically the MBSR program, require attendance at the group sessions but also require the necessary motivation to be able to perform the daily activities between sessions individually, and also the variables usually evaluated are self-reported. It is therefore very difficult to carry out randomization and blinding processes similar to those usual in studies of other interventions. Other reviews of mindfulness-based interventions report generally unclear risk of bias (Li & Bressington 2019) even though they do not evaluate the seven domains measured by the tool (Zimmermann, Burrell & Jordan 2018). For an adequate assessment of the risk of bias, it would be necessary in our opinion to develop an extension or modification of the Cochrane Collaborations' risk of bias assessment tool that is better suited to this type of

non-pharmacological interventions. Even so, and in comparison with other reviews on mindfulness-based interventions, the studies selected in our review presented major methodological problems.

Limitations

One limitation of this review is the scarcity of intervention studies with a rigorous design that have jointly analysed the three variables: stress, burnout and compassion fatigue, bearing in mind that they are three closely related constructs. The number of participants in these interventions was very limited when considering the volume of professionals working in healthcare. Another limitation is the methodological variability in the implementation and development of mindfulness programmes, despite being an established therapy. Furthermore, our search strategy has focused on international databases (Medline, Scopus, Cinhal, PsycINFO and Science Direct), so it is possible that we have unintentionally omitted works published in other resources or in grey literature.

Future lines of research should delve into these three concepts that affect the well-being of health professionals, with intervention studies designed rigorously for an adequate control of biases, taking into account the specific characteristics of mindfulness-based interventions. In addition, it would be advisable to take into account other external variables related to the work environment that may be causing some discomfort for the workers, such as poor relationships with colleagues or working many hours per shift (Hinderer et al. 2014). For this purpose, it would be ideal to implement mindfulness therapies in the workplace, taking into account occupational characteristics such as the care context, work shift, or work situation, and carrying out the studies in places where daily meditation and the commitment of the participants is encouraged. These aspects would better assess the effectiveness of the intervention programmes under these conditions, with similarity in the interventions.

The available evidence on the effectiveness of mindfulness-based interventions is limited, especially for the improvement of self-compassion, an outcome that very few studies include. More methodological quality studies are needed on the clinical usefulness of these programmes that jointly analyse stress, self-compassion and mindfulness. Even more research is needed to analyse compassion fatigue as an outcome variable in such a way that we can clearly determine the relationship between these variables and their influence on the well-being of health professionals.

CONCLUSION

This systematic review examined nine studies that investigated the effectiveness of mindfulness-based interventions to improve stress, self-compassion or mindfulness in healthcare professionals. Among mindfulness-based programmes, MBSR is the only one used in selected studies. The results from the analysed variables of reducing stress and improving mindfulness show that it is effective, although the risks of bias detected call into question the validity of these results. There is variability in the implementation and development of MBSR programmes, and the effect varies depending on the amount of daily meditation practice. Thus, in those studies in which there is a daily practice of meditation, stress is reduced, and mindfulness increases significantly. Therefore, this factor is a priority and must be taken into account in the design of mindfulness programmes with the aim of achieving greater effectiveness. Studies in which self-compassion is considered as an outcome variable are scarce.

RELEVANCE TO CLINICAL PRACTICE

The emotional well-being of professionals affects the quality of care and services they provide to patients in the health system. Mindfulness-based interventions could be considered as an adjunctive element of treatment or even as a possible preventive intervention, although the evidence on its effectiveness in reducing stress and improving mindfulness is relative.

The most widely used mind-based intervention is the MBSR (Mindfulness-based Stress Reduction) program, although applied with some variability in the number and duration of the sessions. In any case, the periodicity and continuity in the individual practice of meditation between sessions seems to be a very important aspect related to the effect of the intervention. This is something that must be taken into account when implementing this type of intervention.

The implications of this study for mental health nursing are in two ways. On the one hand the stress and emotionally difficult situations that all professionals suffer are especially frequent in the field of mental health care, so that mental health nurses can benefit from mindfulness-based interventions to improve or maintain their emotional well-being. And on the other hand, given the closeness and availability of mental health nurses in health systems, mental health nursing could be the specialty that, with adequate prior training, will implement and lead mindfulness-based interventions of which the rest of health professionals could benefit.

REFERENCES

- Allsbrook, K., Atzinger, C., He, H., Engelhard, C., Yager, G. & Wusik, K. (2016). The relationship between the supervision role and compassion fatigue and burnout in genetic counseling. *Journal of Genetic Counseling*, 25(6), 1286-1297. <https://doi.org/10.1007/s10897-016-9970-9>
- Anderson, L.W. & Gustavson, C.U. (2016). The impact of a knitting intervention on compassion fatigue in Oncology nurses. *Clinical Journal of Oncology Nursing*, 20(1), 102. <https://doi.org/10.1188/16.CJON.102-104>
- Aranda-Auserón, G., Rosario, M., Viscarret, E., Goñi, C.F., Rubio, V.G. & Sainz de Murieta, E. (2018). Evaluation of the effectiveness of a Mindfulness and Self-Compassion program to reduce stress and prevent burnout in Primary Care health professionals. *Atención Primaria*, 50(3), 141–150. <https://doi.org/10.1016/j.aprim.2017.03.009>
- Ausina, J.B. & Meca, J. S. (2015). *Meta-analysis in Social and Health Sciences*. Madrid: Editorial Síntesis.
- Bellolio, M.F., Cabrera, D., Sadosty, A.T., Hess, E.P., Campbell, R.L., Lohse, C.M. & Sunga, K.L. (2014). Compassion fatigue is similar in emergency medicine residents compared to other medical and surgical specialties. *Western Journal of Emergency Medicine*, 15(6), 629. <https://doi.org/10.5811/westjem.2014.5.21624>
- Borenstein, M., Hedges, L.V., Higgins, J.P. & Rothstein, H.R. (2010). A basic introduction to fixed-effect and random-effects models for meta-analysis. *Research Synthesis Methods*, 1(2), 97-111. <https://doi.org/10.1002/jrsm.12>
- Burton, A., Burgess, C., Dean, S., Koutsopoulou, G.Z. & Hugh-Jones, S. (2017). How effective are mindfulness-based interventions for reducing stress among healthcare professionals? A systematic review and meta-analysis. *Stress and Health*, 33(1), 3-13. <https://doi.org/10.1002/smi.2673>
- Cocker, F. & Joss, N. (2016). Compassion fatigue among healthcare, emergency and community service workers: a systematic review. *International Journal of Environmental Research and Public Health*, 13(6), 618. <https://doi.org/10.3390/ijerph13060618>
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. New York: Academic Press.

- Cohen-Katz, J., Wiley, S.D., Capuano, T., Baker, D.M. & Shapiro, S. (2005). The effects of Mindfulness-based Stress Reduction on Nurse Stress and Burnout, Part II A Quantitative and Qualitative Study. *Holistic Nursing Practice*, 19(1), 26–35. <https://doi.org/10.1097/00004650-200501000-00008>
- Cooper, D., Yap, K. & Batalha, L. (2018). Mindfulness-based interventions and their effects on emotional clarity: A systematic review and meta-analysis. *Journal of Affective Disorders*, 235, 265–276. <https://doi.org/10.1016/j.jad.2018.04.018>
- Curtis, K., Gallagher, A., Ramage, C. et al. (2017). Using Appreciative Inquiry to develop, implement and evaluate a multi-organisation ‘Cultivating Compassion’ programme for health professionals and support staff. *Journal of Research in Nursing*, 22(1-2), 150-165. <https://doi.org/10.1177/1744987116681376>
- Duarte, J. & Pinto-Gouveia, J. (2016). Effectiveness of a mindfulness-based intervention on oncology nurses’ burnout and compassion fatigue symptoms: A non-randomized study. *International Journal of Nursing Studies*, 64, 98-107. <https://doi.org/10.1016/j.ijnurstu.2016.10.002>
- El-bar, N., Levy, A., Wald, H.S. & Biderman, A. (2013). Compassion fatigue, burnout and compassion satisfaction among family physicians in the Negev area-a cross-sectional study. *Israel Journal of Health Policy Research*, 2(1), 31. <https://doi.org/10.1186/2045-4015-2-31>
- Franco-Justo, C. (2010) Reducing stress levels and anxiety in primary-care physicians through training and practice of a mindfulness meditation technique. *Atención Primaria*, 42(11), 564-570. <https://doi.org/10.1016/j.aprim.2009.10.020>
- Gauthier, T., Meyer, R.M., Grefe, D. & Gold, J.I. (2015). An On-the-Job Mindfulness-based Intervention for Pediatric ICU Nurses: A Pilot. *Journal Pediatric Nurse*. 30,402–409. <https://doi.org/10.1016/j.pedn.2014.10.005>
- Germer, C. K. & Neff, K. D. (2013). Self-compassion in clinical practice. *Journal of Clinical Psychology*, 69(8), 856-867. <https://doi.org/10.1002/jclp.22021>
- Goodman, M.J. & Schorling, J. B. (2012). A mindfulness course decreases burnout and improves well-being among healthcare providers. *The International Journal of Psychiatry in Medicine*, 43(2), 119-128. <https://doi.org/10.2190/PM.43.2.b>
- Goyal, M., Singh, S., Sibinga, E.M. et al. (2014). Meditation programs for psychological stress and well-being: a systematic review and meta-analysis. *JAMA Internal Medicine*, 174(3), 357–368. <https://doi:10.1001/jamainternmed.2013.13018>

- Gracia-Gozalo, R., Ferrer-Tarrés, J., Ayora-Ayora, A. et al (2018). Application of a mindfulness program among healthcare professionals in an intensive care unit: Effect on burnout, empathy and self-compassion. *Medicina Intensiva*. <https://doi.org/10.1016/j.medin.2018.02.005>
- Guillaumie, L., Boiral, O. & Champagne J. (2017). A mixed-methods systematic review of the effects of mindfulness on nurses. *Journal of Advanced Nursing*, 73(5), 1017-1034. <https://doi.org/10.1111/jan.13176>
- Hevezi, J.A. (2016). Evaluation of a meditation intervention to reduce the effects of stressors associated with compassion fatigue among nurses. *Journal of Holistic Nursing*, 34(4), 343-350. <https://doi.org/10.1177/0898010115615981>
- Higgins, J.P. & Green, S. (2011). *Cochrane handbook for systematic reviews of interventions version 5.1.0*. Available at: <http://handbook.cochrane.org>. Accessed July, 2018
- Higgins, J. P. T., Altman, D. G., Gøtzsche, P. C., Jüni, P., Moher, D., Oxman, A. D., ... Cochrane Statistical Methods Group. (2011). The Cochrane Collaboration's tool for assessing risk of bias in randomised trials. *BMJ (Clinical Research Ed.)*, 343, d5928. <https://doi.org/10.1136/bmj.d5928>
- Hinderer, K.A., VonRueden, K.T., Friedmann, E. et al. (2014). Burnout, compassion fatigue, compassion satisfaction, and secondary traumatic stress in trauma nurses. *Journal of Trauma Nursing*, 21(4), 160-169. <https://doi.org/10.1097/JTN.0000000000000055>
- Jakel, P., Kenney, J., Ludan, N., Miller, P.S., McNair, N. & Matesic, E. (2016). Effects of the use of the provider resilience mobile application in reducing compassion fatigue in oncology nursing. *Clinical Journal of Oncology Nursing*, 20(6), 611-616. <https://doi.org/10.1188/16.CJON.611-616>
- Johnson, J., Hall, L. H., Berzins, K., Baker, J., Melling, K. & Thompson, C. (2018). Mental healthcare staff well-being and burnout: A narrative review of trends, causes, implications, and recommendations for future interventions. *International Journal of Mental Health Nursing*, 27(1), 20-32.
- Joinson, C. (1992). Coping with compassion fatigue. *Nursing*, 22(4), 116-118. <https://doi.org/10.1097/00152193-199204000-00035>
- Kabat-Zinn, J. (2003). Mindfulness-based interventions in context: past, present, and future. *Clinical Psychology: Science and Practice*, 10(2), 144-156. <https://doi.org/10.1093/clipsy.bpg016>

- Kabat-Zinn, J. (2006). *Coming to our senses: healing ourselves and the world through mindfulness*. New York, NY, US: Hyperion.
- Kabat-Zinn, J. (2009). *Full catastrophe living: Using the wisdom of your body and mind to face stress, pain, and illness*. New York, NY, US: Bantam Dell.
- Kelly, L., Runge, J. & Spencer, C. (2015). Predictors of compassion fatigue and compassion satisfaction in acute care nurses. *Journal of Nursing Scholarship*, 47(6), 522-528. <https://doi.org/10.1111/jnu.12162>
- Kemper, K.J., Mo, X. & Khayat, R. (2015). Are mindfulness and self-compassion associated with sleep and resilience in health professionals?. *The Journal of Alternative and Complementary Medicine*, 21(8), 496-503. <https://doi.org/10.1089/acm.2014.0281>
- Kirmayer, L.J. (2015) Mindfulness in cultural context. *Transcultural Psychiatry*, 52(4), 447-469. <https://doi.org/10.1177/1363461515598949>.
- Kolthoff, K.L. & Hickman, S.E. (2017). Compassion fatigue among nurses working with older adults. *Geriatric Nursing*, 38(2), 106-109. <https://doi.org/10.1016/j.gerinurse.2016.08.003>
- Khoury, B., Sharma, M., Rush, S.E. & Fournier, C. (2015). Mindfulness-based stress reduction for healthy individuals: A meta-analysis. *Journal of Psychosomatic Research*, 78(6), 519-528. <https://doi.org/10.1016/j.jpsychores.2015.03.009>
- Lamothe, M., Rondeau, É., Malboeuf-Hurtubise, C., Duval, M. & Sultan, S. (2016). Outcomes of MBSR or MBSR-based interventions in health care providers: A systematic review with a focus on empathy and emotional competencies. *Complementary Therapies in Medicine*, 24, 19-28. <https://doi.org/10.1016/j.ctim.2015.11.001>
- Lazarus, R.S. (1999). *Stress and emotion: a new synthesis*. New York, NY, US: Springer.
- Li, S.Y.H & Bressington, D. (2019) The effects of mindfulness-based stress reduction on depression, anxiety, and stress in older adults: A systematic review and meta-analysis. *International Journal of Mental Health Nursing*. Retrieved from <https://onlinelibrary.wiley.com/doi/abs/10.1111/inm.12568>
- Martín-Asuero, A., Moix Queral, J.O., Pujol-ribera, E. et al. (2014). Effectiveness of a Mindfulness Education Program in Primary Health Care Professionals: A Pragmatic Controlled Trial. *Journal of Continuing Education in the Health Professions*, 34(1), 4-12. <https://doi.org/10.1002/chp.21211>

- McHugh M.D., Kutney-Lee A., Cimiotti J.P., Sloane D.M. & Aiken L.H. (2011) Nurses' widespread job dissatisfaction, burnout, and frustration with health benefits signal problems for patient care. *Health Affairs*, 30(2), 202-210. <https://doi.org/10.1377/hlthaff.2010.0100>
- Michie, S. & Williams, S. (2003) Reducing work related psychological ill health and sickness absence: a systematic literature review. *Occupational and Environmental Medicine*, 60(1), 3-9. <https://doi.org/10.1136/oem.60.1.3>
- Moher, D., Shamseer, L., Clarke, M. et al. (2015). Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015 statement. *Systematic Reviews*, 4(1), 1. <https://doi.org/10.1186/2046-4053-4-1>
- Mooney, C., Fetter, K., Gross, B.W. et al. (2017). A preliminary analysis of compassion satisfaction and compassion fatigue with considerations for nursing unit specialization and demographic factors. *Journal of Trauma Nursing*, 24(3), 158-163. <https://doi.org/10.1097/JTN.0000000000000284>
- Neff, K.D., & Germer, C.K. (2013). A pilot study and randomized controlled trial of the mindful self-compassion program. *Journal of Clinical Psychology*, 69(1), 28-44. <https://doi.org/10.1002/jclp.21923>
- Olson, K. & Kemper, K.J. (2014). Factors associated with well-being and confidence in providing compassionate care. *Journal of Evidence-based Complementary & Alternative Medicine*, 19(4), 292-296. <https://doi.org/10.1177/2156587214539977>
- O'Mahony, S., Ziadni, M., Hoerger, M., Levine, S., Baron, A. & Gerhart, J. (2018). Compassion fatigue among palliative care clinicians: findings on personality factors and years of service. *American Journal of Hospice and Palliative Medicine*, 35(2), 343-347. <https://doi.org/10.1177/1049909117701695>
- Panaïoti, A. (2015) Mindfulness and personal identity in the Western cultural context: A plea for greater cosmopolitanism. *Transcultural Psychiatry*, 52(4), 501-523. <https://doi.org/10.1177/1363461515573106>
- Pulido-Martos, M., Augusto-Landa, J. M., & Lopez-Zafra, E. (2012). Sources of stress in nursing students: A systematic review of quantitative studies. *International Journal of Nursing Review*, 59(1), 15-25. <https://doi.org/10.1111/j.1466-7657.2011.00939x>
- Rush, S.E. & Sharma, M. (2017). Mindfulness-based stress reduction as a stress management intervention for cancer care: a systematic review. *Journal of*

- Evidence-based Complementary & Alternative Medicine*, 22(2), 348-360.
<https://doi.org/10.1177/2156587216661467>
- Schantz, M. L. (2007). Compassion: A Concept Analysis. *Nursing Forum*, 42(2), 48–55.
<https://doi.org/10.1111/j.1744-6198.2007.00067.x>
- Shanafelt, T.D., Balch, C.M., Bechamps, G.J. et al. (2009). Burnout and career satisfaction among American surgeons. *Annals of Surgery*, 250(3), 463-471.
<https://doi.org/10.1097/SLA.0b013e3181ac4dfd>
- Shapiro, S.L., Astin, J.A., Bishop, S.R. & Cordova, M. (2005). Mindfulness-Based stress reduction for health care professionals: results from a randomized trial. *International Journal of Stress Management*, 12(2), 164–176.
<https://doi.org/10.1037/1072-5245.12.2.164>
- Suyi, Y., Meredith, P. & Khan, A. (2017). Effectiveness of mindfulness intervention in reducing stress and burnout for mental health professionals in Singapore. *Explore: The Journal of Science and Healing*, 13(5), 319-326.
<https://doi.org/10.1016/j.explore.2017.06.001>
- Vahey, D.C., Aiken, L.H., Sloane, D.M., Clarke, S.P. & Vargas, D. (2004) Nurse burnout and patient satisfaction. *Medical care*, 42(2 Suppl), II57-II66.
<https://doi.org/10.1097/01.mlr.0000109126.50398.5a>
- Verweij, H., Waumans, R.C., Smeijers, D. et al., (2016). Mindfulness-based stress reduction for GPs: results of a controlled mixed methods pilot study in Dutch primary care. *British Journal of General Practice*.
<https://doi.org/10.3399/bjgp16X683497>
- Virgili, M. (2015). Mindfulness-based interventions reduce psychological distress in working adults: a meta-analysis of intervention studies. *Mindfulness*, 6(2), 326-337. <https://doi.org/10.1007/s12671-013-0264-0>
- Wang, S.C., Wang, L.Y., Shih, S.M., Chang, S.C., Fan, S.Y. & Hu, W.Y. (2017). The effects of mindfulness-based stress reduction on hospital nursing staff. *Applied Nursing Research*, 38, 124-128. <https://doi.org/10.1016/j.apnr.2017.09.014>
- Wu, T.Y., Fox, D.P., Stokes, C. & Adam, C. (2012). Work-related stress and intention to quit in newly graduated nurses. *Nurse Education Today*, 32(6), 669-674.
<https://doi.org/10.1016/j.nedt.2011.09.002>
- Zhang, Y.Y., Zhang, C., Han, X.R., Li, W. & Wang, Y.L. (2018) Determinants of compassion satisfaction, compassion fatigue and burn out in nursing: A

correlative meta-analysis. *Medicine (Baltimore)*, 97(26), e11086.
<https://doi.org/10.1097/MD.00000000000011086>

Zeidner, M., Hadar, D., Matthews, G. & Roberts, R.D. (2013). Personal factors related to compassion fatigue in health professionals. *Anxiety, Stress & Coping*, 26(6), 595-609.

Zeller, J.M. & Levin, P.F. (2013). Mindfulness interventions to reduce stress among nursing personnel: an occupational health perspective. *Workplace Health & Safety*, 61(2), 85-89. <https://doi.org/10.1177/216507991306100207>

Zimmermann, F.F., Burrell, B. & Jordan, J. (2018). The acceptability and potential benefits of mindfulness-based interventions in improving psychological well-being for adults with advanced cancer: A systematic review. *Complementary Therapies in Clinical Practice*, 30, 68-78.
<https://doi.org/10.1016/j.ctcp.2017.12.014>

Table 1: Characteristics of included studies

Author s	Sample (n)	Study methodol ogy	Aim	Intervent ions	Control intervent ion	Instrum ents for evaluatio n	Main outcomes
Aranda - Auseró n et al. (201 8)	n = 45 CG: n = 22 IG: n = 23 Physici ans and nurses	RCT	Evaluate the effectiven ess of a program me of mindfulne ss and self- compassi on on the levels of stress and burnout in primary care health professio nals	MBSR and MSC 8 weeks; Sessions of 2.5 hours/wee k; 45 min of daily practice	No interventi on	PSQ, SCS, FFMQ	Improve ment of perceived stress and self- compassi on. Signifi cantly improves mindfuln ess
Cohen- Katz et al. (2005)	n = 27 CG: n = 13 IG: n = 14 Nurses	RCT	To explore the effects of MBSR program me on burnout, emotional exhaustio n, psycholog ical distress and mindfulne ss	MBSR 8 weeks; Sessions of 2.5 hours/wee k 6-hour retreat in the 6th and 7th weeks	Wait-list control group that received MBSR later	MBI, BSI, MAAS	Reductio n of exhaustio n and stress. Improve ment in mindfuln ess
Duarte & Pinto- Gouvei a. (2016)	n = 48 CG: n = 19 IG: n = 29 Nurses	Experime ntal non- randomiz ed controlled study	To explore the effectiven ess of a mindfulne ss-based interventi on on psycholog ical outcomes	MBSR 6 weeks Daily practice of 15 min	Wait-list control group that received MBSR later	SCS, FFMQ, DASS-21	Significa nt decreases in stress and increase in mindfuln ess and self- compassi on

Franco-Justo (2010)	n = 38 CG: n = 19 IG: n = 19 Physicians	Experimental non-randomized controlled study	To evaluate the effectiveness of a mindfulness-based intervention on stress and anxiety.	MBSR 10 sessions, one session of 1.5 hours/week. Daily practice	Wait-list control group that received MBSR later	PSS, STAI	Decreased perceived stress
Gracia-Gonzalo et al. (2019)	n = 53 CG: n = 21 IG: n = 32 Physicians and nurses	Experimental non-randomized controlled study	To evaluate the effect of a mindfulness training programme on burnout, mindfulness, empathy and self-compassion	MBSR 8 weeks. One face-to-face session. Daily practice of 5–8 min	No intervention	MBI, FFMQ, JSE, SCS	Increased self-compassion. No significant overall differences in mindfulness, if 4 of 5 dimensions
Martín-Asuero et al. (2014)	n = 68 CG: n = 25 IG: n = 43 Physicians and nurses	RCT	To assess the effectiveness of a mindfulness training programme to reduce burnout and mood disturbance, increase empathy, and develop mindfulness	MBSR 8 weeks. One session of 2.5 hours/week. An intensive session of 8 hours. Daily practice between sessions	Wait-list control group that received MBSR later	MBI, FFMQ, JSE	Decreased exhaustion and increased mindfulness
Shapiro et al. (2005)	n = 38 CG: n = 20 IG: n = 18	RCT	To examine the effects of MBSR on stress, psychological distress	MBSR 8 weeks. One session of 2 hours/week	Wait-list control group that received MBSR later	BSI, SWLS, SCS	Reduction of perceived stress and increased self-compassion

	Physicians and nurses		and job burnout				
Verweij et al. (2016)	n = 43 CG: n = 20 IG: n = 23 Physicians	Experimental non-randomized controlled study	To examine the effectiveness of MBSR training on burnout, work engagement, empathy and mindfulness	MBSR 8 weeks, sessions of 2.5 hours/week. One-day silent retreat in the 6th and 7th weeks. 30–45 min/day of practice	Wait-list control group that received MBSR later	FFMQ, JSE, UWES, UBOS-C	Increased well-being
Wang et al. (2017)	n = 78 CG: n = 35 NIG; n = 12 IG: n = 31 Nurses	Experimental non-randomized controlled study	To explore the effects of MBSR intervention on stress levels	MBSR 8 weeks 3 hours/week One-day retreat	Humanities class (CG) or no intervention (NIG)	FFMQ, NSC	Decreased stress and increased mindfulness

BSI, Brief Symptom Inventory; CG, control group; DASS-21, Depression, Anxiety, Stress Scales; FFMQ, Five Facets of Mindfulness Questionnaire; IG, intervention group; JSE, Jefferson Scale of Empathy; MAAS, Mindfulness Attention Awareness Scale; MBI, Maslach Burnout Inventory; MBSR, Mindfulness-Based Stress Reduction Programme; MSC, Mindfulness Self-Compassion Programme; NIG, non-intervention group; NSC, Nurse Stress Checklist.; PSQ, Perceived Stress Questionnaire; PSS, Perceived Stress Scale; RCT, Randomized Controlled Trial; SCS, Self-Compassion Scale; STAI, State-Trait Anxiety Inventory; SWLS, Satisfaction with Life Scale; UBOS-C, Utrecht Burnout Scale for Contactual Occupations; UWES, Utrecht Work Engagement Scale.

Figure 1. Flowchart of the article selection process

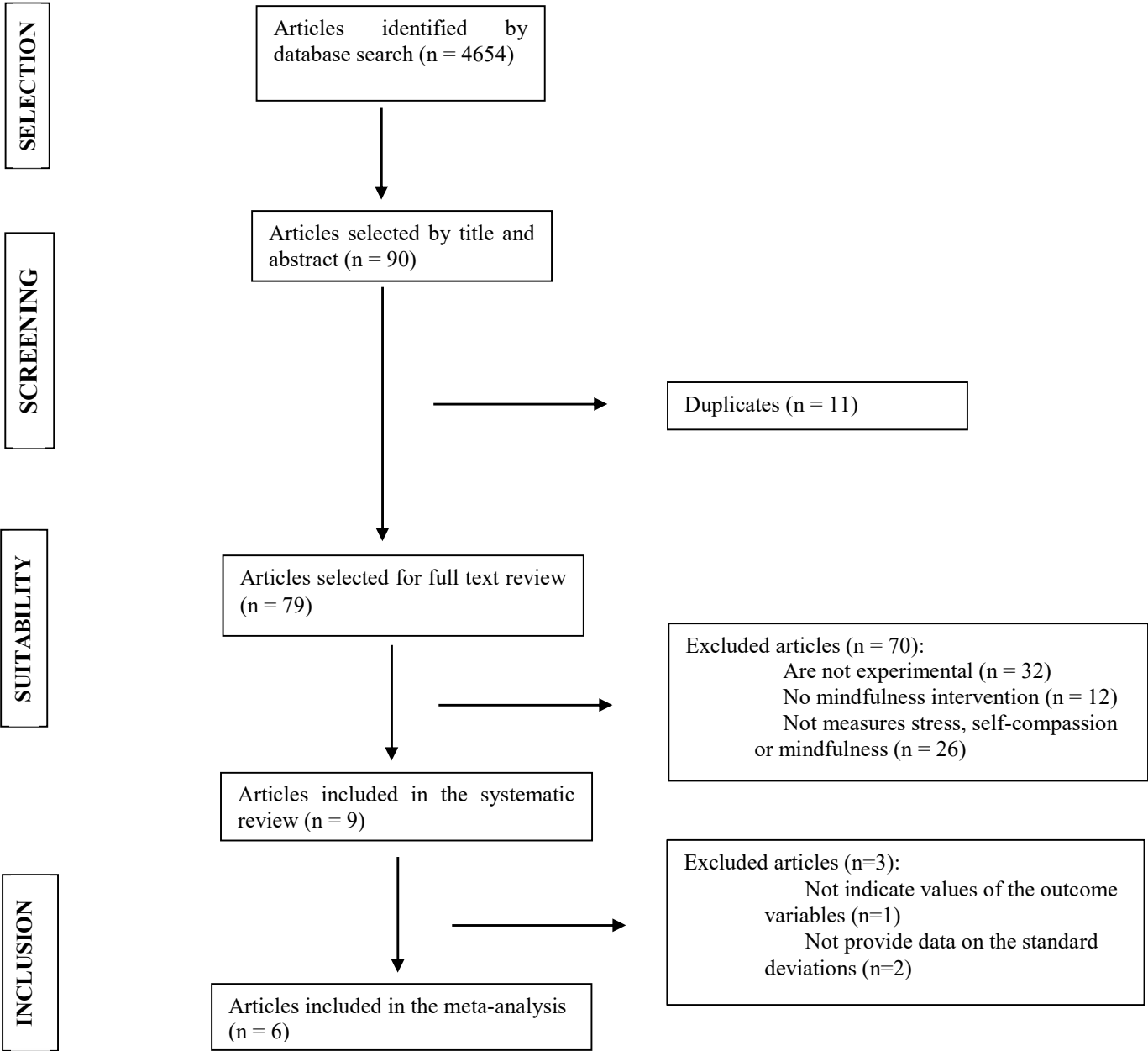


Figure 2. Risk of bias summary

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Aranda-Auserón et al. (2018)	+	-	-	?	+	?	+
Cohen-Katz et al. (2005)	-	-	-	?	?	?	-
Duarte & Pinto-Gouveia (2016)	-	-	-	?	+	?	?
Franco-Justo (2010)	?	?	-	?	?	?	?
Gracia-Gozalo (2018)	-	-	-	-	?	?	-
Martin-Asuero (2014)	-	-	-	?	?	?	-
Shapiro et al. (2005)	?	?	-	?	?	?	-
Verweij et al. (2016)	-	-	-	?	?	?	-
Wang et al. (2017)	-	-	-	?	+	?	-

Figure 3. Standardised mean difference for variable "stress"

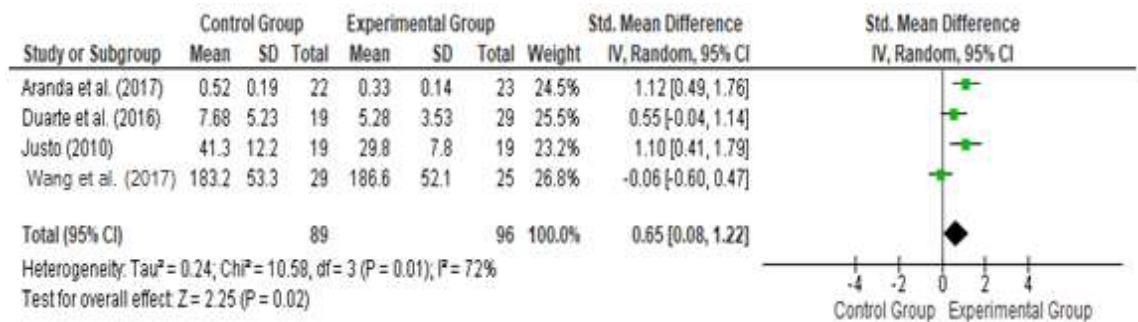


Figure 4. Standardized mean difference for the variable 'stress', eliminating the study by Wang et al. (2017)

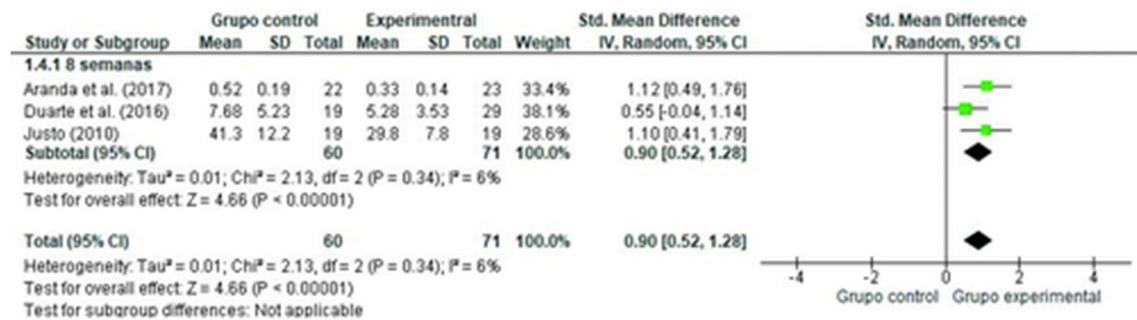


Figure 5. Standardized mean difference for the variable 'mindfulness'

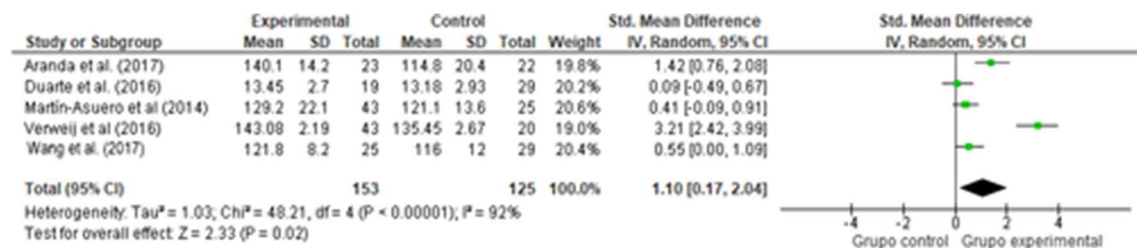


Figure 6. Standardized mean difference for the variable ‘mindfulness’ without Aranda-Auserón et al. (2018) and Verweij et al. (2016)

