Nurse burnout group versus individual mindfulness interventions: A systematic review

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ATTESTATION OF AUTHORSHIP

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements) nor material which to a substantial extent has been accepted for the award of any other degree or diploma of a university or other institution of higher learning.

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Abstract

Background: Nurses are prone to burnout due to the physically and emotionally taxing characteristics of the job and the high workloads required. This has been particularly apparent in the context of COVID-19. In New Zealand, almost 50% of nurses have reported experiencing work-related burnout, although this is a worldwide phenomenon. Mindfulness-based interventions have been proven to mitigate burnout and foster resilience in healthcare professionals. The aim of this study was to determine whether mindfulness interventions for burnt out nurses are better implemented in a group or individual format.

Methods: A systematic review was chosen to investigate this question and the PRISMA systematic review guidelines were followed. The databases used to search for articles on this topic were CINAHL, Medline, EMCare, PsycINFO, Scopus and Science Direct databases. The searches occurred in September 2022 and included studies from 2012 to 2022. Studies were included if they treated burnout symptoms in nurses with mindfulness-based interventions. Studies had to be quasi-experimental, randomised control trials, non-randomised control trials and pilot studies that included pre- and post-burnout measurements. The study quality was assessed using the RoB2 and ROBINS-I tools.

Results: Seven studies met the inclusion criteria and were included. Two were randomised control trials, one was a non-randomised control study, three were a quasi-experimental study, and one was a mixed method study some of which were pilot studies. The seven studies used the Maslach Burnout Inventory, the Copenhagen Burnout Inventory, and the ProQOL scale. They used a mix of mindfulness-based interventions such as, mindfulness-based yoga, abbreviated mindfulness-based stress reduction (MBSR) intervention, and Mindful Living with Stress intervention and the Community Resilience Model mindfulness-based intervention. Five interventions used a group format and two an individual one. Both formats showed statistically significant improvements in burnout.

Discussion: Findings showed that group and individual-format mindfulness interventions were both effective in improving burnout in nurses. Only one study specified the reasoning of using a group format, the other studies did not. It did not appear to be an important consideration although it is possible that aspects of both could have affected the outcome of the interventions. In the group format, coordination of groups appeared to be a barrier to engagement, but peer support may have been a beneficial aspect. In the individual format, participants reported liking the flexibility and brevity of practice.

In conclusion, all studies showed an improvement in burnout scores, although not all were statistically significant. Overall, there was not enough evidence and the evidence included was varying in quality. Thus, it was impossible to conclude which format better supported an improvement in burnout for nurses. Therefore, further research is needed to further our understanding of the treatment of burnout for nurses.

Keywords: Nurse, mindfulness intervention, burnout, burnout measurement, group format, individual format, group versus individual format

Introduction

Burnout in healthcare settings became a focus of research in the 1970s and 1980s as it became apparent that burnout was having significant consequences for individuals and the healthcare organisations they worked for (Freudenberger, 1974; Maslach & Jackson, 1981). More recently the term burnout has been described in over 60 professions and groups of individuals (Kaschka et al., 2011). Despite growth in our knowledge around the prevalence and causes of burnout (Adriaenssens et al., 2015; Borteyrou et al., 2013; Jun et al., 2021; Rössler, 2012) there is still much to be learnt around the management of burnout. The importance of this for healthcare workers, specifically nurses, has become much more apparent in the last few years with an increase in burnout associated with the global COVID-19 pandemic (Galanis et al., 2021).

The term burnout is defined by the Oxford Dictionary of Psychology as an overworked-related acute stress illness or response that includes worry, exhaustion, sleeplessness, depression, and a decline in work performance (Coleman, 2015). In 1981, Maslach and Jackson (1981) defined burnout as having three dimensions, emotional exhaustion; depersonalisation; and a lack of personal accomplishment. Emotional exhaustion is experienced as feeling run down, lacking in energy, weakened, and lethargic. Depersonalisation is portrayed through having a negative or distant attitude, feeling irritable and resigned. Lastly, the personal accomplishment dimension is demonstrated by an individual's inability to cope, becoming less productive and having low work confidence. In more recent definitions, Hill (2020) defined burnout as compassion fatigue, which occurs when a person feels drained after giving so much to a client; and Guseva Canu et al. (2020) defined burnout as "…occupational physical AND emotional exhaustion… due to prolonged exposure to work-related problems" (pg. 1).

Although the definitions outlined above describe burnout in slightly different ways, some common themes have been identified. The most predominant one being the emotional exhaustion aspect of burnout, originating from an individual over-working. Though, there is also some consistency around the subsequent decline in work performance. Generally, the Maslach and Jackson (1981) theory and definition have been the most widely adopted in the burnout literature (Ahola et al., 2017).

In 2019 the World Health Organization/ICD-11 added burnout as a syndrome that results from ineffectively managing workplace stress. Its diagnostic criteria are the three Maslach Burnout Inventory (MBI) dimensions of emotional exhaustion, depersonalisation, and lack of personal achievement (World Health Organisation, 2019; Maslach & Jackson, 1981). Although it is part of the ICD-11, it has not yet been recognised as a diagnosis in the Diagnostic and Statistical Manual of Mental Disorder, fifth edition (DSM-5) (American Psychiatric Association, 2013). However, burnout is recognised as an "occupational sickness" or a condition in nine European nations (Denmark, Estonia, France, Hungary, Latvia, Netherlands, Portugal, Slovakia and Sweden) and fortunately, many of these countries are setting a precedence for how burnout is seen and treated (Lastovkova et al., 2018).

The prevalence of burnout in the nursing population seems to range widely. Woo et al. (2020) looked at 113 burnout studies across 49 countries (49,539 nurses) and found on average 11.23% of nurses had high burnout symptoms, with individual study prevalence rates ranging from 0.2% to 47.83%. Another recent review indicated consistently higher prevalence rates. Jun et al. (2021) researched articles covered 6 countries (80,359 nurses) and found 23% to 36.5% of participants had high burnout scores. In New Zealand studies, the prevalence of burnout was found to be 46.5% among registered nurses (Tabakakis et al., 2019) and 42.7% in New Zealand emergency department nurses (Kumar et al., 2019). Therefore, highlighting the importance of investigating burnout within the nursing population.

The prevalence of burnout in nurses is particularly concerning when compared to other healthcare and non-healthcare profession rates. Kumar et al. (2019) found a 27.5% burnout prevalence rate in New Zealand's emergency department doctors. Other countries found doctor burnout prevalence rates range from 19% in Japan to 24% in Australia, and up to 54.3% in the United Kingdom (Imo, 2017). The non-healthcare profession burnout prevalence rates are even lower by ranging from 2.4% in 'university teachers', 3.6% in 'middle managers', up to 8.3% in 'social workers' and 10.2% in 'financial workers' (Bocheliuk et al., 2020; Metlaine et al., 2017).

As outlined above, the nurse burnout prevalence is high in New Zealand and worldwide. It is well understood that healthcare jobs are emotionally intense roles due to their emotionally demanding environments (Rössler, 2012; Borteyrou et al., 2013). Montgomery et al. (2015) found that emotional job demands in nurses were positively associated with emotional exhaustion. It is possible that certain subspecialties in nursing may be more at risk of burnout than others. For example, oncology nurses were found to be more at risk of burnout than other health specialties, and it was proposed that this was due to constantly confronting the high physical and emotional suffering of their patients (Eelen et al., 2014). In a New Zealand study, registered nurses described wanting to leave their jobs due to feeling emotionally exhausted and burned out as they must "care all the time" (Moloney et al., 2017). This could suggest, that emotionally taxing jobs, like nursing, may be more prone to burnout (Kumar et al., 2012; Kaschka et al., 2011).

The following paragraphs outline the organisational and personal characteristics that are associated with burnout. There are several personal characteristics that have been found to be associated with burnout in nurses. These include high ambition, perfectionism, a strong need for recognition, people-pleasing behaviours, not delegating enough, and work being the most important part of a person's life (Kaschka et al., 2011). Insecure attachment style has been suggested to make health and human workers more vulnerable to burnout, (West, 2015), as well as being younger, and suffering from family issues (Dall'Ora et al., 2020). A history of poor mental health also seems to be associated with burnout although it is unclear whether this is a predictor or an outcome (Dall'Ora et al., 2020).

There appear to be many organisational factors that generate burnout (Rössler, 2012; Borteyrou et al., 2013). Maslach and Leiter (2017) have proposed six categories of workplace predictors of burnout, which are workload, control, reward, community, fairness, and values. These include elements such as heavy patient loads (Andela et al., 2016) low staff numbers, long hours (Zhou et al., 2015), low job control (Galletta et., 2016 ; Cao & Naruse, 2018), low work-life balance, time constraints (Cao & Naruse, 2018), high job and psychological demands, low task variation, interpersonal conflict, low autonomy (Tabakakis et al., 2019), low job satisfaction (Halter et al., 2017), bad nurse-physician interactions, poor support from superiors, poor leadership, a bad team relationship, bullying (Tabakakis et al., 2019) and a lack of job security (Dall'Ora et al., 2020).

Although burnout is a workplace phenomenon that has detrimental consequences for patients and organisations, there are also personal consequences from burnout that can affect an individual's life and health. The following paragraphs outline the consequences of burnout in each of these areas.

Research has shown several physical symptoms and diseases that people can experience when burnt out. These include symptoms like fatigue, headaches, (Kim et al., 2011; Merces et al., 2017), nausea, tremors, frequent colds, gastrointestinal problems, back pain, dizziness, hypertension (Merces et al., 2017), respiratory infections (Kim et al., 2011), and musculoskeletal pain (Salvagioni et al., 2017). As well as grave physical outcomes such as cardiovascular diseases, including coronary heart disease (Toker et al., 2012).

Research has consistently shown that nurse burnout is negatively associated with patient safety. For example, it was found that nurses who experience burnout due to heavy workloads might compromise patient care and safety (Liu et al., 2018) by making them less likely to avoid patient falls, report safety problems (Van Bogaert et al., 2017), stop infections, and cause medication errors (Nantsupawat et al., 2016). Heavy workloads can result in the loss of social connection with patients, which has been suggested can lead to detrimental clinical signs and symptoms being missed and mental and emotional needs being neglected. (Van Bogaert et al., 2017). High levels of burnout and specific aspects of the depersonalisation dimension were also related to nurses experiencing patient and family verbal abuse and patient family complaints (Van Bogaert et al., 2014; Dall'Ora et al., 2020).

Nurses who experience burnout are more likely to leave, be absent, perform poorly, and/or be less committed to their position (Van Bogaert et al., 2014; Dyrbye et al., 2019; Chang et al., 2017). Van Bogaert et al. (2014), stated burnout is negatively related to the desire to leave an organisation. As the scores increase on a burnout scale so does the chance of organizational turnover (Kelly et al., 2020; Basar & Basmin, 2016). Halter et al.'s (2017) American, Canadian, and Australasian nurse turnover study found the monetary cost of nurse turnover ranges from $10,098 to $88,000 per nurse and has a total of $0.55 million to $8.5 million.

Despite the vast amount of research into burnout there is still no universal way of measuring it. In 1981, Maslach and Jackson (1981) developed the Maslach burnout inventory (MBI) with three dimensions to measure the levels of burnout in individuals. This has become one of the most popular inventories for measuring burnout. It has been further developed and refined since its' inception in 1981 (*Manual 4th Edition (Printed for Shipping) - Maslach Burnout Inventory*, n.d.).

In addition to the MBI, there are other burnout measures, such as the Burnout assessment tool (BAT) (Schaufeli et al., 2020), the Copenhagen burnout inventory (CBI) (Kristensen et al., 2005), the Oldenburg burnout inventory (OLBI) (Demerouti & Bakker, 2008), the Shirom Melamed burnout

questionnaire (SMBQ) (Kaschka, 2011), the Professional quality of life (ProQOL) (Stamm, 2005), and the Compassion fatigue self-test (CFST) (Figley and Stamm, 1996).

It is important to understand how to manage and mitigate burnout, as it is a problematic phenomenon in the nursing profession. Addressing burnout can be attempted through structural or organisational changes and individual interventions. Systematic reviews and meta-analysis researching healthcare profession interventions, argue that burnout requires a multi-faceted approach where both organisational and individual interventions should be used and implemented (Panagioti et al., 2017; Aryankhesal, et al., 2019). Organisational changes include job redesigns, changes to organisational processes and policies, and safe staffing levels (Jarden et al., 2018). Training to improve communication skills, computer programmes, and coping strategies have also been found to help reduce burnout (Aryankhesal et al., 2019). Individually centred interventions include stress management, yoga, cognitive behavioural interventions (CBT), resilience training (Jarden et al., 2018), team-based support groups, and mindfulness-based education and interventions (Lee et al., 2016). Although it is acknowledged that a multi-faceted approach to burnout is needed, this systematic review's focus will be within the individually centred interventions and how they are administered. Specifically, whether interventions for burnout are better administered on a one-on-one format or within a group format.

In the wider psychological literature both group and individual psychological interventions have proven to be helpful. For example, Burlingame et al. (2003) undertook a meta-analysis of 111 studies that demonstrated group therapy was helpful compared to untreated controls. Linden et al. (2014) also found their cognitive behavioural therapy (CBT) intervention group outperformed their control group, as their intervention group participants reported a reduction in the pain experienced and an improvement of their attitudes and coping towards it. Individual CBT has also been proven to be successful for the participants suffering from physical illness depressive symptoms (Tovote et al., 2014).

Further research has shown mindfulness-based interventions such as mindfulness-based cognitive therapy (MBCT) are able to be conducted in both groups and individual formats (Schroevers et al., 2016). Tovote et al. (2014) found their individual format MBCT intervention to be effective in reducing physical illness depressive symptoms in its intervention group compared to its wait-list control group. In a group format, Parcover et al. (2017) found group mindfulness interventions increase college students' mindfulness states and decreased their anxiety and depression. Lunsky et al. (2017) also

found group mindfulness interventions successfully reduce psychological distress for parents of adults with autism spectrum disorder. Lastly, Schroevers et al. (2016) found their group and individual formatted MBCT intervention to be equally as effective and helpful for their participants with depression. Thus, we can see mindfulness interventions are effective within several diagnosis settings.

Research has shown that mindfulness-based interventions can successfully treat burnout in nurses (Xie et al., 2020 & Smith., 2014). But it is yet unclear whether these interventions are best implemented in a group or individual format. Research has highlighted there are a few factors related to the format of an intervention, that may influence an intervention's effectiveness, such as group composition and setting (Burlingame et al., 2003). For example, group therapy can be overwhelming, draining, and frustrating for some (Schroevers et al., 2016; Griffiths et al., 2009) and individual format interventions can be beneficial for individuals who have time constraints and need to choose their own intervention time (Schroevers et al., 2009). Therefore, to better treat burnout in nurses, which is a global issue, we need to establish which mindfulness-based intervention delivery method (i.e., group versus individual) is best.

Research objective

In this study, we will look at whether mindfulness interventions are more effective for burnout in nurses when delivered in a group versus individual format. The original hypothesis for this research question was around whether a group format may help to counteract the depersonalisation and withdrawal that can occur in the context of burnout. Additionally, the group setting may offer encouragement, fresh problem-solving perspectives, observational learning, emotional support, and increased motivation for at-home tasks. (Schroevers et al., 2016). This thinking was broadened to also consider the practical factors associated with implementing an intervention in a hospital setting, like co-ordination and cost-effectiveness of group versus individual formats (Schroevers et al., 2016).

Therefore, the research question for this systematic review is "Are group or individual mindfulness interventions more effective when treating burnout in nurses?"

Methods

This systematic review followed the PRISMA 2020 guidelines to ensure transparent non-biased reporting and to allow replicability (Page et al., 2021). A systematic review was chosen to understand

the mindfulness interventions used to address nurse burnout and whether they are more effective done in a group or individually.

Eligibility criteria

The inclusion and exclusion criteria for this study were based on the Population, Intervention, Comparison & Outcome (PICO) framework (Eriksen, 2018). Therefore, the studies included in this systematic review were ones investigating mindfulness interventions (intervention) conducted with nurses (population). The systematic review looked at whether the mindfulness interventions were administered individually or within a group (comparison) and their impact on burnout scores (outcome).

A group intervention was defined as any study where most mindfulness teachings occurred in a group setting, regardless of completing mindfulness practice individually. An individual intervention was defined as mostly being taught one-on-one, online, or through an app.

The inclusion criteria were studies:

1. With nurses
2. That treated burnout symptoms
3. Using mindfulness interventions (see the full definition of mindfulness interventions below)
4. That included pre- and post-burnout measurements
5. Using quasi-experimental or randomised control trial (RCT) study designs
6. Published in the English Language
7. That had been peer-reviewed
8. Published between 2012- 2022 (in order to understand the current contemporary research)

Mindfulness definition

Mindfulness originated from the Buddhist beliefs and traditions of being in the present moment (Burns & Lundgren, 2015; Coleman, 2015), and is the awareness of one's current state, events, and experiences (Coleman, 2015). Mindfulness can be achieved through meditation (among other interventions), resulting in *metacognition,* as an individual creates space between their thoughts and thinking in a non-judgmental way (Burns & Lundgren, 2015).

The purpose of mindfulness is for the individual to begin to see their thoughts as just thoughts, and they will pass without needing to accept, reject or act on them (Burns & Lundgren, 2015; Coleman,

2015). In the hopes that mindfulness will provide a better understanding of new information and new problem-solving ways. This is due to the insight facilitation that mindfulness provides which has been shown to improve an individual's health and psychological wellbeing (Coleman, 2015).

Mindfulness-based interventions are defined as interventions that aim to promote mindfulness, which entails teaching people to accept and be in the present moment with their experiences, such as managing stress (Creswell, 2017). Participants in these mindfulness-based therapies should learn to accept their emotions and feelings rather than trying to repress them and to live in the present moment rather than ruminating on unpleasant past experiences (McLeod, 2013; Burns & Lundgren, 2015). These treatments can be mindfulness-based stress reduction programmes (MBSR) or mindfulness-based cognitive therapy (MBCT), among others, and include, but are not limited to, mindful body scans, gentle stretches, and mindfulness meditation (Creswell, 2017).

The exclusion criteria were studies:

1. With any other discipline than nursing
2. With children or the elderly as participants
3. That were not based on mindfulness interventions or included mindfulness interventions with other non-mindfulness interventions, for example, mindfulness yoga and self-care strategies (see the full explanation of excluded mindfulness interventions below)
4. That did not have quasi-experimental or randomised control trial (RCT) study designs
5. That did not measure burnout symptoms pre and/or post-intervention
6. With unclear methods
7. That used a qualitative methodology
8. That were systematic, scoping, literature reviews, grey literature, bibliographies, dissertations, case studies, or any non-articles such as conference slips
9. Not peer-reviewed
10. Not published in the English language
11. Not available in Full text
12. Published before 2012

The exclusion criteria for mindfulness-based interventions are any activities that create a fake mindfulness practice. Such as a "sham mindfulness meditation training" (Creswell, 2017, pg. 6) for example, that requests individuals to occasionally "take a deep breath while fostering mindfulness" (pg.6) but without explaining how to be mindful by being in the present moment. For example, but

not limited to yoga for exercise and meditation to calm the mind but not be in the present moment (Creswell, 2017).

Information Sources

The search platforms and databases used for this systematic review were the EBSCO platform which searched the CINAHL and Medline databases. The OVID platform which searched the EMCare and PsychINFO databases. The Scopus and ScienceDirect databases were searched directly (Auckland University of Technology, 2022). The searches were mostly saved in the platforms and databases, exported, and then imported into EndNote on the 8th of September 2022. See Table 1 for all platforms and databases as per PRISMA guidelines.

Table 1. Platform, database, coverage, and dates searched.

Platform	Database	Coverage	Date searched
EBSCO			08.09.22
	CINAHL	1981 to present	08.09.22
	Medline	1946 to present	08.09.22
OVID			08.09.22
	EMCare	1995 to present	08.09.22
	PsychINFO	1804 to present	08.09.22
N/A			
	Scopus	1788 to present	08.09.22
	Science Direct	1994 to present	08.09.22

Note that the coverage years are provided for informational purposes only and that, per the study eligibility criteria, records from before 2012 were omitted.

Search Strategy

The search strategy was created based on the PICO structure (Eriksen, 2018) and inclusion criteria. This was done to ensure the correct articles were found. There were no exclusion search terms used so as not to lose important articles, and instead, these were excluded manually with the criteria at hand. As this was a systematic review done in New Zealand, but research is universal, the * was used to include all spelling of words such as randomised or randomized. The different search terms for each platform and database are stated below. As different platforms and databases search differently, the specific search terms for each have been detailed and grouped.

As part of the search strategy, the following idea keywords were used.

- Idea one: burnout or “emotional exhaustion” or burn-out or “burn out”.
- Idea two: nurse or nursing or nurses.
- Idea three: “random* control* trial*” or RTC or RTCS or “random* control* stud*” or “quasi-experimental” or “quasi experimental”.
- Idea four: mindfulness or mindful or meditation or “present moment” or metacognition.

When using the search terms on the OVID (EMCare, PsycINFO), EBSCO (CINAHL, Medline), and Scopus platforms and databases, the following exact terms were used:

- (burnout or "emotional exhaustion" or burn-out or "burn out") and (nurse or nursing or nurses) and ("random* control* trial*" or RTC or RTCS or "random* control* stud*" or "quasi-experimental" or "quasi experimental") and (mindfulness or mindful or meditation or "present moment" or metacognition).

And for ScienceDirect the following exact terms were used:

- (burnout OR "emotional exhaustion") AND (nurse OR nursing) AND ("randomised control trial" OR "randomised control study" OR "quasi experimental") AND (mindfulness OR "present moment").

Selection and Data Collection Process and Data Items

One reviewer (GC) performed the selection and data collection process for this systematic review. The reviewer performed all the platform and database searches with the search terms specified above. Articles were then imported into EndNote X9 (The EndNote Team, 2013), where the programme removed the first batch of duplicates. Following this, the reviewer manually removed the remaining duplicates and carried out the level one screening of articles based on titles and abstracts and the level two screening based on the full text (exclusion criteria specifications are outlined in Appendix A, Table 4).

Study Risk of Bias Assessment

One reviewer (GC) assessed the final articles for risk of bias. The tools used by the reviewer were the RoB2, version 2 (Sterne et al., 2019) for the randomised control trials and ROBINS-I, version 2 (Sterne et al., 2016) for the non-randomised control trials.

Effect Measures and Synthesis Methods

All studies were based on nurses, although the specialty varied. They had different types of mindfulness-based intervention categories and duration, as some were unifactorial (e.g. mindfulness yoga only) and others multifactorial (e.g. abbreviated MBSR which includes various mindfulness-based techniques). The interventions were taught in an individual or group setting, and all studies were looking at the improvement or reduction of burnout scores depending on their mindfulness-based interventions.

Therefore, the categories created for the synthesis matched our PICO (Eriksen, 2018) structure to be able to synthesize and analyse the results. The categories were:

1. Nursing profession
2. Mindfulness interventions, multi or unifactorial
3. Mindfulness-based interventions taught in a group or individual setting
4. With an improvement or redution in any burnout measures

Thus, the effect measures to be analysed in this systematic review were the improvements or reductions in burnout measures in nurses. The burnout measures in the studies were the MBI (Maslach & Jackson, 1981), the ProQOL (Stamm, 2005), and CBI (Kristensen et al., 2005). The statistically significant improvement of the pre-post measurements would determine the intervention's effectiveness.

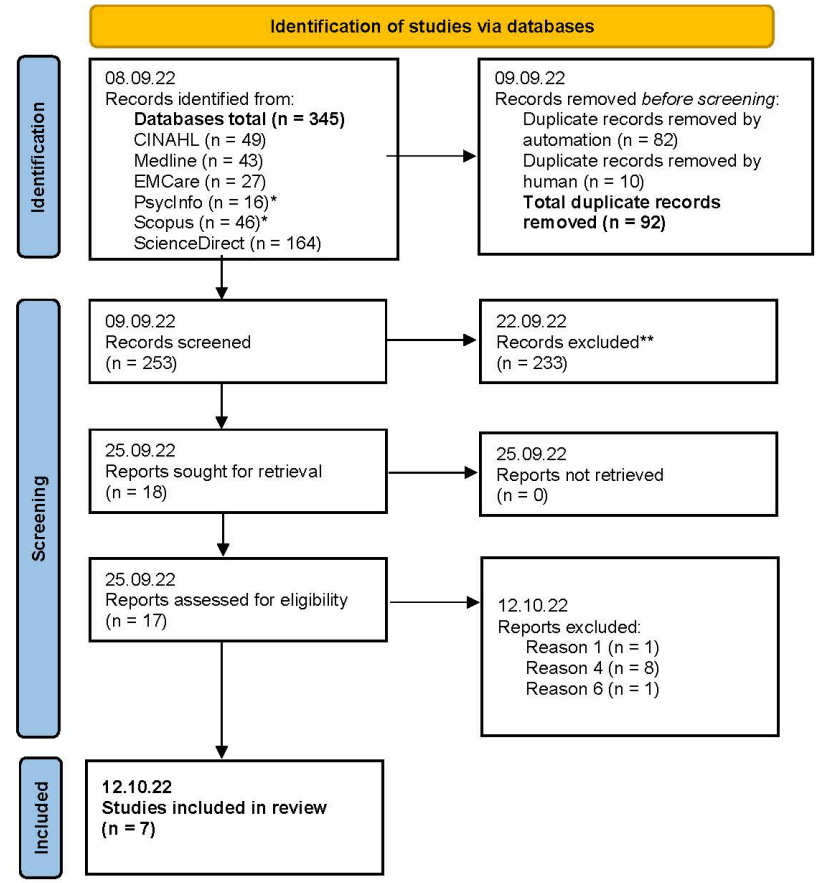
Results

Study Selections

The study selection process started with 345 articles from all platforms and databases, which were then imported into EndNote X9 (see Figure 1 for PRISMA Flowchart). Next, the first duplicates were removed with EndNote, which removed 82 articles and resulted in 263 articles. And a secondary manual duplicate removal eliminated 10 articles leaving 253 articles to be sorted in the level one screening.

Level one screening was based on the exclusion criteria. It was executed by reviewing the title and abstracts, removing 236 articles, and leaving a total of 17 articles for level two screening. Level two was a full text screening based on the inclusion and exclusion criteria. After the level two screening, there was a further removal of 10 articles (see level two article exclusion reasoning in Appendix B,

Table 5). This left a total of 7 articles to answer the research question, "Are group or individual mindfulness interventions more effective when treating burnout in nurses?".



- * Duarte and Pinto Gouveia, 2016, was used instead of Duarte and Pinto, 2017, as the 2017 version didn't have the results included, and the 2016 version was not found by the systematic review, although there was a duplicate of the 2017 study.

From: Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, Mulrow CD, et al. The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021;372:n71. doi: 10.1136/bmj.n71

For more information, visit: http://www.prisma-statement.org/

Figure 1 PRISMA flowchart of study selection

Study Characteristics

The demographic and study characteristics were as follows (see Table 2).

Two interventions were taught in an individual format (Best et al., 2020; Owens et al., 2020) and five were taught in a group format (Alexander et al., 2015; Duarte & Pinto-Gouveia, 2016; Grabbe et al., 2020; Pan et al., 2019; Seidel et al., 2021). Three of the studies included were pilot studies (Alexander et al., 2015; Best et al., 2020; Pan et al., 2019). Two of the studies had a randomised control trial design (Alexander et al., 2015; Grabbe et al., 2020), three quasi-experimental (Best et al., 2020; Owens et al., 2020; Seidel et al., 2021), Duarte and Pinto-Gouveia (2016) described their study as a non-randomised control trial and Pan et al. (2019) as mixed methods. Three studies had control groups for comparison (Alexander et al., 2015; Duarte & Pinto-Gouveia, 2016; Grabbe et al., 2020), and the rest did not have any comparison groups. Participant numbers ranged from four (Best et al., 2020) to 77 (Grabbe et al., 2020).

One study did not report on the gender of their sample (Grabbe et al., 2020), but for the rest, the vast majority of participants were female. The range of mean ages of participants was 27.68 (Pan et al., 2019) to 46.33 (Alexander et al., 2015). Best et al. (2020) did not report the mean age. Mean number of years in the profession ranged from 6.84 (Pan et al., 2019) to 17.7 (Grabbe et al., 2020). Seidel et al. (2021) did not report years in the profession.

Three different self-reporting burnout questionnaires were used. Three studies used the Maslach Burnout Inventory (Alexander et al., 2015; Pan et al., 2019; Seidel et al., 2021; Maslach & Jackson, 1981), three used the ProQOL scale (Best et al., 2020; Duarte & Pinto-Gouveia, 2016; Owens et al., 2020; Stamm, 2005), and one used the Copenhagen Burnout Inventory (Grabbe et al., 2020; Kristensen et al., 2005). All studies reported that they administered measures before the intervention, but only two provided exact timing (Pan et al., 2019; Seidel et al., 2021). All studies reported administering measures again at the end of the intervention and three studies administered follow up measures three to twelve months after the intervention (Duarte & Pinto-Gouveia, 2016; Grabbe et al., 2020; Seidel et al., 2021).

Table 2. Study characteristics

Authors / Format	Study Design	Participant Sample Size	EG Participants demographics	Burnout Measures	Measuring and follow-up points
Alexander et al., 2015 Group	Pilot study Randomised control study	40 participants enrolled EG: 20 CG: 20	Academical medical centre nurses Gender: 39 F, 1 M Age: M = 46.33, SD = 10.23 Years in profession: M = 14.21, SD = 11.02 Country: USA	MBI	Pre-intervention: exact timing not provided Post-intervention: at the end of the 8-week intervention period No follow-up measurement
Best et al., 2020 Individual	Pilot study Quasi-experimental	6 participants enrolled EG: 4 completed the study CG: n/a	Military active duty women's health practitioners Gender: 4 F Age: not disclosed Years in profession: at least 5 years Country: USA	ProQOL-burnout	Pre-intervention: exact time not provided Post-intervention: exact timing is not provided) No follow-up measurement
Duarte and Pinto-Gouveia, 2016 Group	Non-randomised control study	93 participants were assigned to experimental and control groups EC: 29 CG: 19 waitlisted	Oncology Nurses Gender: EG: 26 F, 3 M CG: 16 F, 3M Age: M = 38.90, SD = 8.34 Range = 25 – 54 years Years in profession: M =15.92, SD = 7.84 Country: Portugal	ProQOL-burnout	Pre-intervention: exact timing not provided Post-intervention: immediately 6 weeks post-intervention Follow up: 3 months but not used as only 6 participants completed measures
Grabbe et al., 2020 Group	Randomised control study	196 nurses completed the baseline surveys and were randomised into the groups	Nurses working in an urban tertiary care hospital Gender: 73 F, 4 M	CBI	Pre-intervention: (exact timing not provided Post-intervention: 1 week

		77 in total came to a class and completed one follow-up survey EG: 40 Community Resilience Model CG: 37 nutrition	Age: M = 45.3, SD = 13.2 Range of ages 23 - 73 years Years in profession (all): M = 17.7, SD = 13.3 Country: USA		Follow up: 3 months and 1 year after intervention
Owens et al., 2020 Individual	Quasi-experimental design	45 nurses were recruited EG: 32 registered acute care nurses completed the full study CG: n/a	Acute care nurses Gender: not specified Age: M = 40 years , SD = 13.39 Years in profession: M = 16 years, SD = 12.61 Country: USA	ProQOL-burnout	Pre-intervention: exact timing not provided Post-intervention: at the end of the 4-week intervention period No follow-up measurement
Pan et al., 2019 Group	Pilot study Mixed methods	43 nurses were recruited EG: 19 nurses participated and completed pre- and post-intervention questionnaires. CG: n/a	AIDS department nurses Gender: 18 F, 1 M Age: M = 27.68, SD = 5.90 Range of ages 21–41 Years in profession: M = 6.84, SD = 6.44; Range of length 2–23 Country: China	CMBI	Pre-intervention: 1-week before intervention started Post-intervention: 1-week after 6-week intervention finished (included in-depth interviews) No follow-up measurement
Seidel et al., 2021 Group	Quasi-experimental design	28 nurses enrolled EG: 25 nurses completed the course CG: n/a	Academical medical centre nurses Gender: 24 F, 4 M Age: M = 40, SD = 10.8 years Years in profession: not reported Country: USA	MBI-HSS	Pre-intervention: before the first class Post-intervention: end of final session of 4-week intervention Follow-up measurement: 6 months later (n = 23) and 18 months later (n = 13)

Abbreviations: EG: experimental group, CG: control group, MBI: Maslach Burnout Inventory, CMBI: Chinese Maslach Burnout Inventory, MBI-HSS: Maslach Burnout Inventory- Health Services Survey, CBI: Copenhagen Burnout Inventory

Reporting Biases

As per Figure 2, the two randomised control trial studies (Alexander et al., 2015; Grabbe et al., 2020) were submitted to a risk of bias judgment by assessing the randomisation process (D1), the deviation from the intended intervention (D2), the missing outcome data (D3), the measurement outcome (D4) and the selection of the reported result (D5).

Both randomised control studies had some issues, Alexander et al. (2015) was assigned an overall high risk and Grabbe et al. (2020), some concern. Both studies did not appear to take into consideration baseline confounders such as mental health and one study allowed participants to choose their intervention class time (Grabbe et al., 2020) (D1). Grabbe et al.'s (2020) control group had almost double the number of participants with “possible clinical depression” than the experimental group.

Given the nature of the interventions, it was likely that both participants and assessors knew they were in the trial intervention, creating a possible bias in the outcome (D2). Both studies got lower risk of bias judgment scores due to good management of missing data (D3). Finally, Grabbe et al. (2020) had a low risk of bias judgment due to multilinear models implemented at the time points that found a non-significant result for the group by time effects (D4) and had low concerns as the data of all measurements were fully reported in the results (D5). Alexander et al. (2015) however, had a serious risk of bias judgment due a detection bias (D4) and some concerns of risk of bias judgment due to not specifying the number of participants on the table although the results were fully reported.

As per Figure 3, the quasi-experiments (Best et al., 2020; Owens et al., 2020; Seidel et al., 2021), mixed method study (Pan et al., 2019), and non-randomised study (Duarte & Pinto-Gouveia, 2016) were also submitted to a risk of bias judgment. This was based on: bias due to confounding (D1), bias due to selection of participants (D2), bias in classification of interventions (D3), bias due to deviation from intended interventions (D4), bias due to missing data (D5), bias in measurement of outcomes (D6), and bias selection of the reported result (D7).

Three of the studies had a serious overall risk of bias judgment (Best et al., 2020; Seidel et al., 2021; & Owens et al., 2020) and two critical (Duarte & Pinto-Goveia, 2016; & Pan et al, 2019). All five studies did not adequately consider or mitigate baseline confounding variables as four studies did not consider mental health variables (D1) (Best et al., 2020; Duarte & Pinto-Gouveia, 2016; Owens et al., 2020; Seidel et al., 2021). Although the remaining study did, their participant sample had no ethnic

diversity (Pan et al., 2019) therefore, all studies created a baseline confounding bias (Stern et al., 2019).

Four studies had a low risk of bias judgment for D2 as the selection of participants was done at the appropriate time and their starting time was the same (Best et al., 2020; Duarte & Pinto-Gouveia, 2016; Owens et al., 2020; Seidel et al., 2021). However, Pan et al. (2019) had a moderate risk of bias judgement as participants had different starting times, therefore creating an inception bias.

Three studies had a low risk of bias judgment as the interventions were done correctly and in a timely manner (D3) (Best et al., 2020; Owens et al., 2020; Seidel et al., 2021) and two studies had moderate and serious risk of bias judgment scores. The two studies with moderate and serious scores were due to misclassification bias as one control group was not defined properly and, researchers allowed participants to self-select their experimental or control groups which resulted in a serious risk of bias judgment (Duarte & Pinto-Gouveia, 2016). While the second study allowed self-selection between the 10 experimental groups created that resulted in a moderate risk of bias judgment (Pan et al., 2019).

Three studies had a low risk of bias judgement as there seemed to be no deviations from the study protocol (D4) (Best et al., 2020; Duarte & Pinto-Gouveia, 2016; Seidel et al., 2021). And two studies had a serious risk of bias judgment due to participants not adhering to prescribed practice time (Owens et al., 2020) and participant attendance rate being lower than expected (Pan et al., 2019), therefore both creating an implementation bias.

One study had a low risk of bias judgment, due to having no missing data from enrolled participants (D5) (Best et al., 2020). Three moderate risks of bias judgments were based on participant attrition (Owens et al., 2020), participants missing intervention sessions (Pan et al., 2019) and participants not completing follow-up measurements (Seidel et al., 2021). The serious risk of bias judgment was made by only acquiring full data from half of the participants assigned to experimental and control groups (Duarte & Pinto-Gouveia, 2016).

All five studies had a moderate risk of bias due to participants and assessors knowing the intervention group assignment (D6) (Best et al., 2020; Duarte & Pinto-Gouveia, 2016; Owens et al., 2020; Pan et al., 2019), by not having control groups (Best et al., 2020; Owens et al., 2020; Pan et al., 2019; Seidel et al., 2021) and therefore, creating a detection bias. This moderate risk of bias judgement was also

created by not showing the participant numbers on the results table (Seidel et al., 2021) and creating a non-differential measurement error bias.

Two studies scored a low risk of bias for D7 (Duarte & Pinto-Gouveia, 2016; Pan et al., 2019) and three studies scored a moderate risk of bias (Best et al., 2020; Owens et al., 2020; Seidel et al., 2021). The low scoring studies reported results correctly and transparently to randomised control standards (Duarte & Pinto-Gouveia, 2016) despite participants non-attendance (Pan et al., 2019). And the moderate scoring studies were all reported correctly but not to a randomised control standard (Best et al., 2020) due to low participant numbers (Owens et al., 2020) and not showing participant numbers on the result table (Seidel et al., 2021), and therefore creating a selective reporting of a subset of the participants.

Risk of Bias in Studies

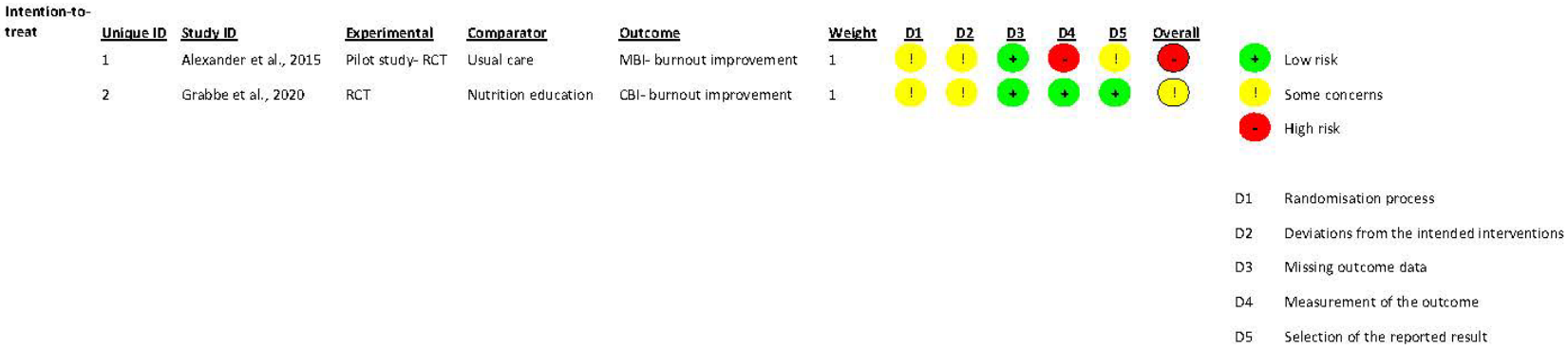


Figure 2. Risk of Bias Assessment for randomised control trials

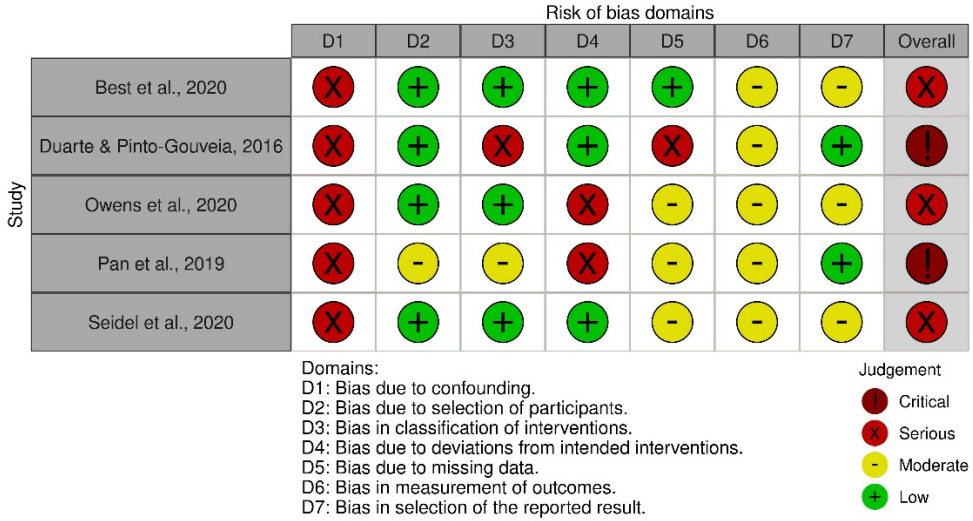


Figure 3. Risk of Bias Assessment for non-randomised control studies, quasi-experiments, and mixed methods studies.

Results of Synthesis

Results from each study are displayed in table 3. All seven studies reported on nurses in different specialties such as an academic medical centre (Alexander et al., 2015; Seidel et al., 2021), the military (Best et al., 2020), an urban tertiary care hospital (Grabbe et al., 2020), acute care (Owens et al., 2020), an AIDS department (Pan et al., 2019), and oncology department (Duarte & Pinto-Gouveia, 2016).

All seven studies taught mindfulness-based interventions. Two were unifactorial with mindful yoga (Alexander et al., 2015), and the 3 Minute Breathing Space mindfulnes-based intervention (Owens et al., 2020). Five were multifactorial with an abbreviated MBSR (Best et al., 2020; Duarte & Pinto-Gouveia, 2016), the Community Resilience Model (Grabbe et al., 2020), Mindful Living with Stress (Pan et al., 2019), and Building a Mindful CommUnity (Seidel et al., 2021) programmes.

The two individually taught intervention studies found improvements in their burnout measurements. The first study, Best et al. (2020) showed 75% (n = 3) of their participants had lower burnout scores at post-intervention measurements (ProQOL). But although they reported reduced burnout measures, with such a small sample size no statistical analysis was performed. The second individually taught study was Owens et al. (2020) and their study showed significant improvements in their ProQOL burnout measurement that shifted from “average” at baseline to “low” level after the intervention, and this change was found to be statistically significant ($p = 0.0113$).

The five studies taught in a group format had mixed results. Two studies had statistically significant changes as follows: Alexander et al. (2015) found statistically significant improvements over time in the group that received the mindfulness-based yoga intervention for the emotional exhaustion ($p = 0.008$) and depersonalisation ($p = 0.007$) Maslach Burnout Inventory subscales but not in the personal accomplishment subscale. Their analyses also showed statistically significant improvements compared to the control group in the emotional exhaustion ($p = 0.028$) and depersonalisation ($p = 0.048$) subscales. The second study, Duarte and Pinto-Gouveia (2016) showed a significant decrease in ProQOL burnout scores for participants that received their mindfulness intervention, ($p = 0.002$). They also demonstrated statistically significant interactions between practice, time, and burnout, demonstrating large effect sizes for participants who practiced more ($p = 0.007$).

Burnout scores in the final three studies followed a common pattern. Seidel et al. (2021) found that although all measures moved in the desired direction immediately after the Mindful CommUnity training, the changes in the Maslach Burnout Inventory- Health Services Survey burnout scores were

not statistically significant. Grabbe et al.'s (2020) burnout measurement also moved in the desired direction following their Community Resilience Model intervention class, however the changes in the Copenhagen Burnout Inventory scores were not statistically significant either ($p = 0.777$). Lastly, Pan et al. (2019) found no statistically significant differences from pre- to post-intervention on the Chinese Maslach Burnout Inventory subscales of emotional exhaustion ($p = 0.73$), depersonalisation ($p = 0.46$) and personal accomplishment ($p = 0.52$) despite general improvements in scores.

Results of Individual Studies

Table 3. Individual results of studies

Study/ Intervention type (GRP/INDIV)	Type of intervention	Duration of Intervention	Control Group Intervention	Outcomes of the Study		
				MBI-EE	**MBI-D**	**MBI-PA**
Alexander et al., 2015 Group	Yoga - intent to improve awareness Included: postural alignment, deep breathing, simple meditation Supervised instruction	8 weeks	Usual care (not described)	EG Pre: M = 17.60, SD = 10.36; Post: M = 12.95, SD = 8.76, CG Pre: M = 20.40, SD = 13.19; Post: M = 20.60, SD = 12.09 Group by time interaction: p = 0.041 Within group changes: EG p = 0.008 Between group post intervention: p = 0.028 Significant improvements	EG Pre: M = I4.05, SD = 5.09; Post: M = 2.50, SD = 3.65 CG Pre: M = 4.35, SD = 3.83; Post: M = 5.15, SD = 4.51 Time by group interaction: p = 0.035 Within group changes: EG p = .007 Between group post intervention: p = 0.048 Significant improvements	EG Pre: M = 37.15, SD = 8.53; Post: M = 39.60, SD = 8.90 CG Pre: M = 36.10, SD = 9.93; Post: M = 37.05, SD = 9.98 Improvement No significant results
Pan et al., 2019 Group	Mindful Living with Stress (MLWS) interventions Included: mindful body movement (tai chi and yoga) and mindful breathing and listening.	6 weeks	N/A	Pre: M = 24.79, SE = 10.64; Post: M = 23.84, SE = 9.44 Within group changes: p = 0.73 Improvement No significant results	Pre: M = 7.31, SE = 5.52; Post: M = 6.63, SE = 5.08 Within group changes: p = 0.46 Improvement No significant results	Pre: M = 19.53, SE = 7.05; Post: M = 20.58, SE = 8.17 Within group changes: p = 0.52 Improvement No significant results

Seidel et al., 2021 Group	Building a Mindful CommUnity intervention Included: mindfulness skills in-person and digitally 1-hour weekly classes Practices: 15 minutes daily	4 weeks	N/A	Pre: M = 21.00, SD = 11.29; Post: M = 17.72, SD = 9.57 6 months: M = 16.08, SD = 11.58 18 months: M = 18.15, SD = 12.33 Improvement No significant results	Pre: M = 6.56, SD = 6.36; Post: M = 5.88, SD = 4.79 6 months: M = 5.04, SD = 4.83 18 months: M = 9.00, SD = 2.8 Improvement No significant results	Pre: M = 37.32, SD = 6.10; Post: M = 39.64, SD = 5.11 6 months: M = 39.87, SD = 6.05 18 months: M = 40.84, SD= 5.06 Improvement No significant results
				CBI Work		
Duarte & Pinto-Gouveia, 2016 Group	Based on MBSR principles Included: mindfulness breath, thoughts, emotions, and communication 2-hour weekly classes Practice: 15 mins at home with CD	6 weeks	Waitlisted Intervention option afterwards	EG: Pre:M = 26.57, SD = 6.09 Post: M = 24.29, SD = 5.09 P = 0.002 Significant improvement CG: Pre:M = 24.74, SD = 4.64 Post: M = 23.89, SD = 4.82 No significant result Time: p = 0.007 Significant improvement Time x group: p = 0.197 No significant results		

Grabbe et al., 2020 Group	Community Resiliency Model (CRM) mindfulness psycho-therapeutic approach Included: a body sensation awareness, and grounding using the "iChill" app (https://www.ichillapp.com/) 1x 3-hour class	Not reported	Nutrition education CG Using "My Plate" app 1x 3 hours class	EG Pre: M = 48.1, SD = 20.14 1 week: M = 43.58, SD = 20.31 3 months: M = 43.64, SD = 20.60 1 year: M = 43.90, SD = 18.32 Improvement No significant results CG Pre: M = 48.51, SD = 21.44 1 week: M = 42.18, SD = 21.31 3 months: M = 41.02, SD = 20.26 1 year: M = 38.22, SD 20.26 Improvement No significant results Baseline group differences p = 0.891 Group: p = 0.866 Time: p = 0.149 Group-by-time: p = 0.777 No significant results		

				ProQOL		
Best et al., 2020 Individual	Abbreviated MBSR programme Included: 6 online mindfulness/ compassion fatigue modules and web-based and mobile application Insight Timer (https://insighttimer.com) Practice: 15-20 min a day	4 weeks	N/A	Participant 1: Pre: 30 (average); Post: 25, (average) Participant 2: Pre: 25 (average); Post: 22, (low) Participant 3: Pre: 25 (average); Post: 18, (low) Participant 4: Pre: 10 (low); Post: 14, (low) Improvement No significant results		
Owens et al., 2020 Individual	3 Minute Breathing Space (3MBS) Included: grounding oneself through breathing One instructional session and tracking sheets and Practice: 3x per day	4 weeks	N/A	Pre: M = 23.34 (average), SD = 6.25; Post: M = 21.72 (low), SD = 6.15 Within group: p = .0113 Significant improvements		

Abbreviations: MBI: Maslach Burnout Inventory, EE: emotional exhaustion, D: depersonalization, PA: personal accomplishment, CBI: Copenhagen Burnout Inventory, EG: experimental group, CG: control group

Discussion

The purpose of this systematic review was to find whether group versus individual mindfulness and mindfulness-based interventions were best in reducing nurses' burnout scores. This review assessed intervention effectiveness by comparing pre- and post-burnout measurements, comparisons between their experimental and control groups, and any statistical significance if given. Results from the small number of studies (seven) included in this review were mixed. The seven studies included all had improvements in burnout scores, although some were statistically significant improvements (Alexander et al., 2015; Duarte & Pinto-Gouveia, 2016; Owens et al., 2020) and others were not (Best et al., 2020; Grabbe et al., 2020; Pan et al., 2019; Seidel et al., 2021). In addition, the quality of the studies was variable. These factors made it difficult to conclusively answer the main question posed by this systematic review.

The studies using an individual intervention format had the following results. Best et al.'s (2020) study, a pilot quasi-experimental study done in an individual format, found their abbreviated mindfulness-based stress reduction (MBSR) intervention reduced participants' ProQOL (Stamm, 2005) burnout scores from average to low. Still, the sample only included four participants, so statistical analysis was not performed. Owens et al. (2020), a quasi-experimental design study implemented in an individual format based on mindfulness-based cognitive therapy's (MBCT) 3-minute breathing space. Their participants reported a reduction in ProQOL (Stamm, 2005) burnout scores which was statistically significant.

Two group format studies found statistically significant improvements following the intervention period. Alexander et al.'s (2015) randomised control trial study implemented a mindfulness-based yoga intervention in a group format. This study found experimental group improvements in the Maslach Burnout Inventory (MBI) (Maslach & Jackson, 1981) burnout measurement dimensions of emotional exhaustion and depersonalisation, as well as significant differences in the experimental and control group comparisons in the emotional exhaustion and depersonalisation subscales. The second study (Duarte and Pinto-Gouveia, 2016), which was a non-randomised control study applied in a group format, used a mindfulness-based intervention centred on MBSR's principles. This study found a statistically significant decrease in the Copenhagen Burnout Inventory (CBI) (Kristensen et al., 2005) burnout scores at post-intervention and found a relationship between practice, time, and burnout as those who practiced more had a greater decrease in burnout.

Three group format studies found improvements in burnout scores moving in the right direction, although none had statistically significant results. Grabbe et al.'s (2020) randomised control study implemented the mindfulness-based Community Resilience Model intervention in a group format that showed CBI (Kristensen et al., 2005) score improvements that were not statistically significant. Pan et al.'s (2019) mixed methods pilot study found small non-significant improvements in their CMBI (Maslach & Jackson, 1981) emotional exhaustion, depersonalisation, and personal accomplishment dimensions after administering the Mindfulness Living with Stress intervention in a group format. Last of all, Seidel et al.'s (2021) quasi-experimental study designed in a group format, used the Build a Mindful CommUnity mindfulness-based intervention, and demonstrated a small improvement of their MBI-HSS (Maslach & Jackson, 1981) scores. Still, again the changes were not statistically significant.

This systematic review investigated group versus individual interventions for burnout because research has shown that burnout can create a sense of isolation and hinder the development of coping strategies (Bentein et al., 2017). Thus, it was hypothesised that group interventions may be more beneficial in treating burnout as group settings could foster a sense of support and connection for people. This newly found social connection in a group format could be a healing benefit alongside the new skills learnt (Mashinter, 2022; Ezhumalai et al., 2018; Wahl et al., 2018). In addition, through this process it was also acknowledged that the practical application of a group intervention with nurses may have barriers for group attendance and ongoing engagement.

Most of the articles included in this review did not discuss their rationale for using the format they did. The authors focused on the type of intervention they were implementing but not how the implementation might affect burnout or whether it was appropriate for the context. The only exception was one study (Seidel et al., 2021) that stated that they wanted to have a community of support rather than having their participants learn in isolation. Unfortunately, Seidel et al. (2021) did not measure community support, so they could not investigate further this element of the intervention.

The general lack of consideration for these intervention factors seems counter to research that has demonstrated that group and individual intervention formats have strengths and weaknesses in terms of individual participant differences (Lau et al., 2012), practical aspects of the intervention setting (Schroevers et al., 2016; Layous et al., 2012) and longer-term engagement of the intervention content (Higgins et al., 2022). These factors may have played a role in the outcomes for the studies included

and the subsequent inconclusive findings of this systematic review. The following paragraphs will discuss these factors in relation to the studies included in this review.

As noted in the introduction, nurses can have a particularly constrained time schedule. This can make the coordination of shifts for multiple nurses and the instructor difficult in the setting of a group intervention. Scheduling conflicts can be a great barrier to intervention attendance in a group setting, and this could possibly affect study outcomes (Breitbart et al., 2015). Unfortunately, two studies suffered from scheduling conflicts (Pan et al., 2019; Grabbe et al., 2020). One study showed that even though participants were given a choice of 10 classes to attend, the attendance rate was low, as out of 19 participants and a 6-week intervention, 16 attended 4 – 6 sessions, and 3 participants attended 2 – 3 sessions (Pan et al., 2019). It is possible that this contributed to the authors only finding a small non-statistically significant improvement in their CMBI burnout scores. Grabbe et al. (2020) also gave their participants different time choices to suit their schedules, and they had more success mitigating these scheduling conflicts. But still suffered from lower-than-desired attendance as out of the 196 participants enrolled, only 77 came to class and completed the pre- and post-measurement.

In another review study, researchers allowed participants to self-select into the experimental or waitlist control group to suit their working schedules (Duarte & Pinto-Gouveia, 2016). They had a higher attendance rate in the intervention group, and Duarte and Pinto-Gouveia (2016) did in fact, attribute their higher attendance rates to the lack of participant randomisation. Stating that allowing their participants to self-select and choose to participate in the experiment or control group improved their attendance rate. This element of their study, however, was a methodological weakness, as they did not control for enough confounding variables after this self-selection process.

Another time-related factor in a time-poor population such as nurses is the time commitment required for an intervention in a group format. Nurses commonly have limited time and many time constraints due to their demanding jobs (Cao & Naruse, 2018). The self-guided and individual interventions tend to have minimal and more flexible time requirements (Canfield et al., 2021). Therefore, a self-guided intervention, with a lack of time restraints, could be advantageous for time-poor nurses, and as discussed above, group format interventions that have time schedules can hinder adherence to intervention requirements (Breitbart et al., 2015; Koffel et al., 2018).

For two individual format review studies, flexible time requirements were advantageous (Best et al., 2020; Owens et al., 2020). Both individual formatted mindfulness-based interventions allowed their participants to practice at a personally chosen time, and their exercises were a minimal length.

Although Best et al. (2020) stated their participants' practice sessions ranged from 11 to 122 minutes per day, they stated that participants enjoyed the carved-out time for mindfulness practice through the free Insight Timer app (insighttimer.com). Although participants reported having trouble beginning to practice, they did manage to find the time and incorporated their 15 – 20-minute practice daily. Owens et al. (2020) stated that a benefit of their MBCT 3-minute breathing space was the absence of time obligation.

The cost-effectiveness of an intervention is also an important factor when considering the long-term implementation of an intervention. Best et al. (2020) indicated the benefit of implementing an intervention on an online app due to the low cost it offers and the help it can provide already stretched nurses. Ebert et al. (2018) also highlighted the benefits a low cost online intervention can provide, as it can reduce costs compared to face-to-face counselling and therefore reduce the overall cost of treatment. This is an important factor as cost is a barrier when searching for professional help and continuing an intervention (Andrade et al., 2013).

An online self-guided app has further benefits around the ease of continued practice after the intervention period finishes (Andersson & Titov, 2014). Andersson & Titov (2014) found that online-based interventions allow individuals to continue the intervention at their convenience and help retain information while continuing to learn. Continued mindfulness practice is important to maintain the experienced benefits of mindfulness because they can fade if not practiced (Hubbling et al., 2014). A self-guided app provides a post-intervention continuation of the learnings in the same format without much change. Therefore, it is speculated that Best et al.'s (2020) military nurses could possibly further reduce their burnout scores if they continued practicing and learning more mindfulness interventions through the online meditating app Insight timer post-intervention.

Unlike apps however, group formats tend to be time-limited (Ezhumalai et al., 2018) and, therefore, difficult to continue indefinitely. Participants in one group format study expressed a desire to continue using their mindfulness-based skills both formally and informally after the intervention (Grabbe et al., 2020). Most of the urban tertiary hospital nurses who participated in Grabbe et al.'s (2020) study said they wanted to continue using their skills after the intervention, and some even wanted to become certified Community Resilience Model instructors.

Mutual peer support and a socially supportive environment are, however, group format benefits (Ezhumalai et al., 2018; Hubbling et al., 2014). Evidence shows they can create a healing environment

(Wahl et al., 2018). Hubbling et al. (2014) conducted a randomised control trial that taught a MBSR intervention to adults who suffered from chronic insomnia and stated that their MBSR group participants enjoyed the group aspect of the intervention because they felt the "energy" in the room that allowed them to bond and feel socially supported.

One of the studies included in this review discussed that fact that one of the benefits of their mindfulness-based Community Resilience Model group intervention was the supportive environment it fostered through normalising stress responses in the class (Grabbe et al., 2020). A second study, the only study that commented on the rationale for their group format, stated that a purpose of their Build a Mindful CommUnity was to allow participants to learn mindfulness in a supportive community instead of in isolation by watching videos (Seidel et al., 2021). Unfortunately, neither study measured this supportive element to determine the impact it had on the intervention outcomes.

In terms of individual differences, none of the studies included discussed individual participant differences. This refers to possible learning and social preferences. For example, for those who prefer learning with others, a group format offers the ability to learn observationally, have experiences normalised by others, and get peer encouragement, support, and motivation (Schroevers et al., 2016). It should also be noted, however, that there are also people for whom a group dynamic may not be the best fit. For some people, a group format may be frustrating and overwhelming, which could get in the way of their engagement with the intervention content (Griffiths et al., 2009; Schroevers et al., 2016). For these people, an individually based intervention may be more appropriate.

For someone who is burning out, motivation could be an important aspect of seeking external support (ten Brummelhuis et al., 2011) and engaging in an intervention (Chan, 2011). Intrinsic and extrinsic motivation are differentially required in group and individual format interventions (Schroevers et al., 2016). In a self-guided or a face-to-face individual format intervention, intrinsic motivation is needed in greater quantities to support ongoing engagement with mindfulness practise (Mohr et al., 2011). Mohr et al. (2011) stated only a small minority of individuals possess the necessary intrinsic drive to apply and continue using self-guided learning materials as most people use extrinsic motivation to keep up with intervention requirements (Mohr et al., 2011). Extrinsic motivation is more of a feature in group interventions. A group format intervention allows participants to get extrinsic motivation from their peers (Schroevers et al., 2016; Hubbling et al., 2014).

This next finding does not relate to the group versus individual comparison, instead, it is most likely relevant for both formats. Duarte & Pinto-Gouveia (2016) looked at a dose-response effect and

importantly found that the higher the practice time, the higher the statistical improvement in burnout scores (Duarte & Pinto-Gouveia, 2016). Aligned with these findings is Green and Kinchen's (2012) research that found at least 50% of their nurse participants saw a reduction in burnout scores and a decrease in work errors while continuing to practice MBSR. Not practicing enough or stopping practice likely lessens the effects of an intervention, and in the long term, its positive outcomes fade (Diamond & Ling, 2016; Hubbling et al., 2014).

Limitations

This systematic review had a number of limitations. Firstly, there was only one reviewer, which made it possible that relevant studies in the systematic search were missed or that there is a bias in the articles that were included. Although only having one reviewer is time-efficient and consumes fewer resources, it does create a limitation (Waffenschmidt et al., 2019). Thus, research has recommended a 2-step selection process, ideally with a conventional double-blind screening (Waffenschmidt et al., 2019). There are circumstances where one reviewer is acceptable, such as when a review needs to be done in a timely manner, but it must be done by an experienced reviewer (Waffenschmidt et al., 2019), which was not the case in this systematic review.

A second limitation was the heterogeneity of the burnout measurements used in the studies reviewed. Three studies used the Maslach Burnout Inventory (Alexander et al., 2015; Pan et al., 2019, Seidel et al., 2021; Maslach & Jackson, 1981), two used the Copenhagen Burnout Inventory (Duarte & Pinto-Gouveia, 2016; Grabbe et al., 2020; Kristensen et al., 2005) and two used the ProQOL scale (Best et al., 2020; Owens et al., 2020; Stamm, 2005). This array of burnout measurements made comparing results impossible. Similar findings were reached in Rotenstein et al.'s (2018) burnout among physicians' systematic review, which recommended standardization of burnout measurements so comparisons can be made. After their review of 182 studies, the lack of consistent measurements across studies did not allow for a reliable conclusion to be reached (Rotenstein et al., 2018).

Two of the studies included in this review commented on this heterogeneity of measures and recommended using biomarkers for burnout (Grabbe et al., 2020; Alexander et al., 2015). Still, the general heterogeneity in this area of research (e.g., interventions used, varying measurement time points, etc) makes it equally as hard to compare across studies (Danhof-Pont et al., 2010; Vøllestad et al., 2012). Although new research is being undertaken to find more reliable burnout biomarkers (Penz et al., 2018).

None of the seven studies discussed the reasoning as to why the group versus individual format was chosen and whether this would be a factor in the intervention's effectiveness. Although the reviewer speculated why group versus individual would have been an advantage or a disadvantage of each study, there was no concrete information as it was not explained in the studies. Even though one reviewed study (Seidel et al., 2021) did state they wanted to create a supportive environment, it was not measured or investigated. Although, research has found that participants are content with the format they are given (Schroevers et al., 2016) further research is needed to clarify this.

Lastly, three out of the seven articles found were pilot studies. Therefore, the lack of participants in the reviewed studies does not allow for generalisable results, or the option to create a meaningful conclusion (Leon et al., 2011). Although pilot studies are important to test the inclusion and exclusion criteria of a study, their goal is to evaluate a novel interventional technique. Pilot studies allow one to test out a study before trialling it with a larger population, which can result in hypothesis testing, but this is not its purpose (Leon et al., 2011).

Summary and recommendations

In summary, in this systematic review, it has been learned that nurses are prone to burnout due to the demanding nature and high workloads of their job (Andela et al., 2016). Research has shown that nursing is both physically and emotionally taxing (Borteyrou et al., 2013). Up to 50% of nurses in New Zealand have experienced burnout related to their professions (Tabakakis et al., 2019; Kumar et al., 2019) which is in line with other prevalence rates worldwide (Woo et al., 2020; Jun et al., 2021). Burnout consequences can have personal and professional effects. Personal negative outcomes are fatigue (Kim et al., 2011), gastrointestinal problems (Merces et al., 2017) and coronary heart disease (Toker et al., 2012). Professional consequences are compromised patient care and safety (Liu et al., 2018), and medication errors (Nantsupawat et al., 2016).

Studies have demonstrated that individual mindfulness-based treatments can lessen nurse burnout and increase resilience (Lee et al., 2016). Mindfulness based treatments can be implemented in both a group or individual format, however studies do not appear to consider the implications of these formats. This systematic review was completed in order to assess whether one format might be more effective than the other.

Only seven studies met the inclusion criteria for the systematic review and only two of these studies used an individual format. Although both types of studies (i.e., group versus individual format) show statically significant improvements in burnout scores, the heterogeneity of measures and types of interventions, along with the methodological flaws of the studies and the low number of studies included means a conclusion cannot be made.

In practice, group, and individual formats both have benefits and drawbacks. For example, a self-directed apps are beneficial due to the lack of time constraints (Canfield et al., 2021). Self-directed app intervention can have low costs (Ebert et al., 2018) and can be continued post-intervention to allow for further reduction of burnout and more fostering of resilience (Andersson & Titov, 2014). Group formats can have scheduling conflicts that can lead to low attendance and hinder intervention results (Breitbart et al., 2015). However, group formats are good for peer support (Andersson & Titov, 2015) and extrinsic motivation from those peers (Schroevers et al., 2016; Hubbling et al., 2014).

This systematic review could not conclusively give recommendations around what intervention format is better. But in general, any future randomised control studies, non-randomised control studies and quasi-experiments focused on improvement or reduction of nurses' burnout scores through mindfulness-based interventions should consider the following: understand and find the most widely or best used burnout measure to help create homogeneity in the literature, as previous studies have found heterogeneity with burnout scores limit comparisons (Rotenstein et al., 2018). Confounding variables should be considered such as mental health status, age, ethnicity, and work experience to reduce a baseline confounding bias (Stern et al., 2016; Sterne et al., 2019). In general, the risk of bias in future studies needs to be considered in order to improve the quality of studies in this area. Studies should consider and report their rationale for developing a group or individual intervention, particularly in relation to intervention setting, personal preference (Lau et al., 2012) and ongoing practice (Schroevers et al., 2016).

Other Information

Competing Interests

There were no competing or conflicts of interest while undertaking or completing this systematic review.

Appendixes

Appendix A

The data collection was based on the eligible outcomes in the Inclusion and Exclusion Criteria in the Eligibility Criteria. Of these criteria, the outcome domains were Critical and Important. The *Critical* outcomes were based on PICO and the research question. And the *important* outcomes were based on the parameters the studies needed to meet to be considered contemporary and relevant to the research question.

Table 4. Article exclusion methods based on inclusion and exclusion criteria.

Eligibility Criteria & Outcome Domains (OD)	Exclusion Method	Exclusion Method	Exclusion Method
Studies on any other discipline than nursing: • **OD: Critical**	Only nursing professions were to be included therefore, any studies such as physicians, nurse aids, nurse students, psychologists, or psychiatrists were not included.		
Studies with children or elderly as participants: • **OD: Important**	Study participants were to be of working age as we looked at working nurses in any field, i.e., oncology, palliative, and emergency room.		
Studies that were not based on mindfulness interventions or included mindfulness interventions with other non-mindfulness interventions:	For example, any study with one mindful intervention, such as mindful yoga, was included.	Any studies with a scientifically proven mindfulness intervention, such as MBCT or MBSR, were included.	But if the study had created or adopted a mindfulness intervention, such as mindfully meditating with self-care techniques and psychoeducation, was

• **OD: Critical**			not included as they had not been scientifically proven to be a mindful intervention.
Studies that did not have quasi-experimental measurements or were not randomised control trials (RCT): • **OD: Critical**	Any study that was a quasi-experiment or a randomised control trial but did not have a pre- or post-measurement was not included		
Studies that did not measure the improvement of burnout symptoms or did not measure burnout at all: • **OD: Critical**	Any study that did not have pre- or post-measurements on a burnout measurement was not included	If pre- and post-measurements were included, any burnout measure was eligible, i.e., MBI, ProQOL, and CBI (Maslach & Jackson, 1981; Stamm, 2005; Kristensen et al., 2005)	Any study that was based on mindfulness interventions but did not measure burnout as an outcome was not included
Studies with unclear methods: • **OD: Important**	Any study that did not properly explain the intervention or how it was implemented was not included		
Any qualitative studies: • **OD: Important**	A mixed-methods study was eligible if the quantitative measurements met the required criteria	A study with only qualitative measures was not included	
Any systematic, scoping, literature views, case studies, grey literature, bibliographies, dissertations, or any non-articles such as conference slips and any non-peer reviewed studies: • **OD: Important**	Any study that was not a randomised control trial or quasi-experiment was not included	All studies had to be peer-reviewed to ensure scientific rigor, i.e., some dissertations were not peer-reviewed and were, therefore, not included	

Not published in the English language: • **OD: Important**	To ensure nothing was lost in translation and therefore not included		
Full text not available: • **OD: Important**	Due to not being able to find the study article to read, therefore physically unable to include them	As the review wanted contemporary research	
Any study before 2012: • **OD: Important**	As this is considered out of date and, therefore, not included		

Appendix B

Below are the level two article exclusion reasonings as shown in the Figure 1. PRISMA flowchart in the Data Selection statement on page 18.

Table 5. Article exclusion reasoning in level two screening, as per the Fig 1. PRISMA flowchart.

Author, year	Exc	Article Exclusion Reason	Reviewer Explanation
Horner et al., 2014	R # 1	"Participants included staff nurses, nurse aides, and clinical secretaries as well as the unit manager and supervisor" (pg. 2),	Study included professions other than nursing
Bianchini & Copeland, 2021	R # 4	"Re-Charge at Work is a 12-week, theory-based intervention designed to decrease sedentary time (Lafrenz et al., 2018), and the toolkit provided to the staff included an exercise band, timers for breaks, and instructional handouts and brochures on how to incorporate healthy movement during the day" (pg. 3)	The Re-Charge work tool kit is based on decreasing sedentary time and not mindfulness
Copeland, 2012	R # 4	"Nurses were randomized into five groups: meditation, journaling, gratitude, outside, and control" (pg.1)	Journaling and gratitude aren't mindful interventions
Delaney, 2018	R # 4	"The focus of this MSC program was on helping participants develop self-compassion, with a secondary emphasis on mindfulness" and "The core practices of MSC include Mindfulness Meditation (MM), Loving Kindness Meditation (LKM), and Compassion Meditation (CM)" (pg.5)	Three out of the four kinds of meditation were not mindfulness-based
Franco & Christie, 2021	R # 4	"Practices included writing activities (how do I treat a friend versus myself, writing a compassionate note to myself,	The primary goal was compassion, with a secondary goal of mindfulness

		reflecting on core values) and short facilitator-led practices (finding a supportive gesture, moments of mindfulness, self-compassion break)" (pg.2)	
Matigbay et al., 2017	R # 4	"This retraining is conducted through intentionally paying attention to life experiences and reframing those experiences through the principles of gratitude, compassion, acceptance, higher meaning, and forgiveness. The program goal is to enhance peace, joy, resilience, and altruism, thereby reducing stress and improving well-being" (pg. 2)	Mindfulness is not based on reframing experiences but rather on accepting what they are
Mealer et al., 2014	R # 4	"Finally, expressive writing experts conducted a 4-hour introduction to written exposure that served as a guide for the written exposure sessions that could occur during the 12-week program" (pg. 3)	Mindfulness-based stress reduction (MBSR) was taught but so was expressive writing, which is not a mindful activity.
Sawyer et al., 2021	R # 4	"To address this need, an 8-week psychoeducational group intervention called RISE was developed for nurses. The intervention's name is an acronym for its four themes: resilience, insight, self-compassion, and empowerment" (pg. 2)	The intervention is not mindfulness-based
Watanabe et al., 2019	R # 4	"The brief mindfulness-based stress management program was developed by combining mindfulness-based self-regulation of attention (Bishop et al., 2004) with the cognitive behavioural model of depression adapted from a previously established manual (Beck, 2011)." (pg. 2)	Programme was mindfulness-based combined with the cognitive behavioural model of depression but not an actual mindfulness intervention

Motaghedi et al., 2016	R # 6	“Variable, Mean, Standard deviation, Minimum, Maximum, Mean, Standard deviation, Minimum, Maximum” (pg. 5)	Although it was stated, there was a pre and post-test burnout measurement, the table did not specify this

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