# BMJ Open

# What are the solutions for well-being and burn-out for healthcare professionals? An umbrella realist review of learnings of individual-focused interventions for critical care

Nurul Bahirah Binte Adnan [1,2] Hila Ariela Dafny,[1,2] Claire Baldwin,[1,2] Samantha Jakimowitz,[3] Debra Chalmers,[4] Ammar Moh'd Ahmad Aroury,[1,2] Diane Chamberlain[1,2]

¹College of Nursing and Health Sciences, Flinders University, Adelaide, South Australia, Australia
²Flinders University Caring Futures Institute, Bedford Park, South Australia, Australia
³School of Nursing and Midwifery, University of Technology Sydney, Sydney, New South Wales, Australia
⁴Hawke's Bay Hospital, Hastings, New Zealand

**Correspondence to**
Nurul Bahirah Binte Adnan;
Nurul.Adnan@flinders.edu.au

## ABSTRACT

**Objective** To determine what, how, for whom and under what conditions individual-focused interventions are effective to improve well-being and decrease burn-out among critical care healthcare professionals.

**Design** This study is an umbrella review that used the realist approach, using Realist and Meta-narrative Evidence Synthesis: Evolving Standards guidelines. PsycINFO, Web of Science, CINAHL, MEDLINE, Scopus, ClinicalTrials.gov and ISRCTN databases were searched for published and unpublished systematic reviews and meta-analyses literature between 2016 and 2020. The team appraised and extracted data and identified relationships between content, mechanism and outcomes (CMOs). Theory prepositions were developed using CMOs and were used to refine the existing programme.

**Results** A total of 81 interventions from 17 reviews were mapped, including mindfulness interventions, cognitive–behavioural therapy, self-care and coping strategies. The revised programme theory determined that contextual factors such as ethnicity, workload, and work schedules play a crucial role in determining the effectiveness of interventions. Mechanisms including the interventions' interests, acceptance, and receptivity are also influential in determining engagement and adherence to the intervention. Findings suggest that the solution for burn-out is complex. However, it offers an optimistic view of tailoring and customising one or a combination of interventions, integrating structured education and components of emotional intelligence. Self-care, social support, awareness or mindfulness and self-efficacy are prime components to improve emotional intelligence and resilience for critical care healthcare professionals to improve well-being and decrease burn-out experience.

**Conclusions** These findings provide realistic and reliable reporting of outcomes to better support implementation within the 'real world'. Future research such as seeking validation using expert opinions can provide further in depth understanding of hidden contextual factors, mechanisms and their interactions to provide a greater depth of knowledge ready for application with the critical care population.

## STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Applying the principles of realist approach is paramount to understand individual-level interventions in improving well-being and decreasing burn-out experiences among critical care healthcare professionals.

⇒ This paper was able to expand the search to include both critical care and general healthcare professionals; and although contextual factors such as work environment and experiences are different between the two groups, there is a similarity in the experiences of burn-out which provides an estimated picture of the context, mechanisms and outcomes that critical care healthcare professionals may experience.

⇒ The one study that focused on critical care healthcare professionals were compared with other similar research to extrapolate contextual factors, which can be used in future research.

⇒ The combination of contextual factors and inconsistent outcome measures and intervention measures (ie, intensity, duration) made it difficult to conduct a meta-analysis of interventions. Instead, using the realist approach was beneficial for this review as it facilitated a platform to showcase the complexity of interventions using theory prepositions and programme theory.

⇒ The programme theory developed in this review can be used in other similar research that investigates solution for the burn-out endemic among healthcare professionals.

## INTRODUCTION

### Defining well-being, vitality and burn-out

WHO defines well-being as a state of mental, physical and social state, and not simply the absence of infirmity or disease.[1] It is the ability to flourish—promoting a 'good' life where individuals are healthy, happy, capable and engaged.[2] Positive mental health includes emotional, psychological and social

well-being.[3] It is characterised by a person's ability to fulfil several essential functions and activities, including the ability to learn, feel, express and manage a range of positive and negative emotions, and form and maintain good relationships with others.[3–5] Conversely, poor mental health may be related to rapid social change, stressful work conditions, gender discrimination, social exclusion, unhealthy lifestyle, physical ill health and human rights violations, where specific psychological and personality factors can make people vulnerable to mental health problems.[6–8] Applied to the workplace context, poor mental health includes stress, anxiety and depression, and syndromes such as burn-out and compassion fatigue.[9–11]

Acquiring well-being enables individuals to possess lifelong health and healthy ageing, whereas contrasting outcomes contribute to disease and mental disorders.[12] In general, well-being refers to the cognitive process of contentment, happiness and satisfaction.[12] Well-being can be classified into two categories of subjective and objective.[12] Subjective characteristics include components of well-being, for example, 'satisfied with life' and 'having a good feeling', whereas objective well-being includes economic, social and environmental factors.[12] Subjective well-being follows two schools of thought, hedonic and eudemonic.[12] Hedonic belief aims to reduce pain and maximise happiness by attaining satisfaction and pleasure when achieving a goal.[12] Eudemonic belief aims to attain both pleasant feelings and to pursue meaning and purpose.[12] Eudemonism follows the ethical theory pathway (living in accordance to their true self) and strives to actively contribute in life by giving rather than receiving and enjoying.[12]

Vitality refers to the psychological experience of spirit and enthusiasm.[13] The level of vitality is different among individuals because of changes within the environment such as feeling fatigued, having an illness, being loved.[13] When external controls do not burden a person, they will experience high vitality, which is accompanied by experiences of self-actualisation, autonomy and integration.[13] Vitality also demonstrates the highest level of sustainable work performance (highly vital employees), which reflects on positive employee health and well-being, leading to long-term productivity and viability.[14–16] van Mol et al also describe that factors including resilience, job satisfaction and vitality are characteristics that counterbalance work stressors. Therefore, vitality potentially represents an important indicator of well-being.[13 17]

Burn-out, according to Maslach, Jackson and Leiter, is defined as a psychological syndrome consisting of three dimensions: emotional exhaustion, depersonalisation and reduced personal accomplishment.[18 19] Burn-out takes place when individuals encounter chronic stress within the healthcare practice.[20] The foundation of emotional exhaustion stems from the depletion of emotional resources, which forces employees to feel that they cannot cope at a psychological level.[21] Depersonalisation refers to pessimistic, cynical and dehumanised perceptions and attitudes about the client, leading to the notion

that clients are deserving of their (employee) troubles.[21] Reduced personal accomplishment includes the negative evaluation of oneself, especially concerning work.[21] Burn-out poses a risk to the physiological, behavioural and psychological well-being of employees but is a conceptually different variable from well-being.[22 23]

Well-being among healthcare professionals has been of great interest within the last ten years.[23 24] It has the potential to deliver various benefits, including improvements in organisational culture, healthcare finances and workforce sustainability.[23 24] Positive psychology suggest that well-being within the workforce increases productivity and optimal functionality, professional satisfaction, organisational resilience, patient safety and the quality of healthcare delivered (at lower costs).[25 26] Nevertheless, maintaining well-being among healthcare professionals has been a challenging task, with the critical care workforce being particularly susceptible to a myriad of chronic occupational stressors.[27–29] These relate to the high patient acuity, increased sense of responsibility, caring for families in crisis, working with advanced technologies, and involvement with morally distressing situations in the critical care environment.[29] Chronic occupational stressors are complex due to the interplay between workload and job demands, lack of resources, control, flexibility, meaning, values, social support and work–life integration.[30]

The COVID-19 pandemic has also played a role in the physical and mental fatigue of Critical Care Healthcare Professionals (CCHP), exacerbating an already high prevalence of burn-out.[27 28 31] Anxiety and depression rates were identified as the highest among physicians and nurses during the first coronavirus wave, which most likely exacerbated burn-out.[31] Another European-wide study demonstrated higher self-reported burn-out of 51% among intensive care unit (ICU—specialised treatment for patients requiring critical medical care) employees during the pandemic[32] compared with pre-COVID-19 burn-out rates (25%–30%).[33–37] The results of burn-out can be severe for CCHP in terms of more severe types of psychological distress, manifested in various ways from normal emotional responses, to a greater intensity of developing post-traumatic stress disorder, depression, suicidal ideations and suicide.[38]

## Coping and interventions to improve and prevent well-being and burn-out

Coping is a vital component in dealing with stress and burn-out as the lack of sufficient coping resources leads to increased psychological vulnerability to the situation or threat.[39] Various emotions are seen as a natural response when working in ICU settings, ranging from feelings of guilt, anger, grief, sadness to emotional exhaustion and depersonalisation.[38] From this perspective, burn-out can be conceptualised as progressively developed resulting from ineffective coping strategies that professionals attempt to protect themselves from work stressors.[39] Preventative interventions seek to decrease the likelihood

of adverse outcomes by increasing protective factors and reduce risk factors.[40] Preventative approaches may be most effective when there is a collaboration between risk reduction and efforts to increase resources that build on an individual's strength.[40] This paper aimed to conduct an umbrella review on individually focused interventions for the promotion of CCHP's well-being and the prevention of burn-out. The review objectives were the following:

1. Conduct a realist synthesis analysing what, why and how interventions (such as mindfulness and cognitive training, self-care intervention, self-improvement, low-intensity exercise, social support, mixed interventions and miscellaneous uncategorised interventions) are effective for burn-out management and prevention; and produce actionable theory.
2. How context may affect the mechanisms to achieve an outcome.
3. How tailoring or modifying interventions can impact on the functioning of interventions.
4. Produce recommendations that support the tailoring, implementation, monitoring and evaluation of contextually sensitive strategies to improve well-being and prevent burn-out.

## METHODS
### Patient and public involvement
No patient involved.

### Study design
This realist umbrella review was conducted according to the RAMESES II reporting standards for realist evaluations and prospectively registered on PROSPERO (Registration No. CRD42020155386). The study was conducted in five phases described in detail and summarised in online supplemental file 1. It was identified early at the stage of search piloting that there was likely very little systematic review literature that specifically focused on CCHP. The decision was made to broaden the eligibility criteria to all health professionals (other variations at the conclusion of full-text review are later described). The realist approach allows gaps in knowledge to be bridged (such as between critical care and other health professionals) about 'what works, for whom, under what circumstances and how?'.[41] Briefly, this methodology synthesises evidence and interrogates data sources (in this case systematic review findings) to develop, refine and test what is known as context–mechanism–outcome configurations (CMOC).[41] CMOCs are then consolidated and configured to both develop and build a theoretical explanation or programme theory (PT) of the intervention's function regarding the circumstances.[42] This umbrella review fills the gap in the literature as there is minimal evidence and a lack of solid research to contribute to the effectiveness of individual interventions for CCHP. The initial PT (phase 1) is described in online supplemental

file 2, which provides an explanation of the initial PT (figure 1).

## PHASES OF THE REVIEW
### Phase 2: search methods
A search strategy (online supplemental file 3) was refined and administered in the PsycINFO, Web of Science, CINAHL, MEDLINE, Scopus, ClinicalTrials.gov and ISRCTN databases, augmented by reviewing eligible article's reference lists and performing further citation searches on Google Scholar and Web of Science. Study citations were imported to Endnote V.X9,[43] and duplicates were removed, before upload of search results into Covidence.[44] Initial screening of titles and abstracts was performed against the originally described (a priori) eligibility criteria, except for population, where modified criteria were used by independent authors in duplicate (NBBA, DeC, LT, SJ, CC, DiC, HAD, MM). Study full texts were then screened, using the same process. At both title/abstract and full-test screening stages, studies that had disputes (ie, disagreement to include/exclude the study) were resolved by discussion between the authors and an external author was prepared to be the mediator but was not required.

At the conclusion of full-text screening (and prior to data extraction), it was identified that there was an abundance of literature from systematic reviews, such that data extraction could be limited to this study design. Similarly, there was a large body of literature relating to organisational and practice environment interventions (n=18 reviews), at which time it was decided to exclude those from the present analysis, and instead focus on individual interventions. At the same time, the year of publication was limited to the last 5 years due to repetition of primary studies within the systematic reviews (ie, the same RCT among different systematic reviews), causing bias and weakening the validity of the review's outcome.[45] The last 5 years demonstrated the least number of duplicate publication when reviews were compared and were of the latest evidence.

### Phase 3: selection criteria
The a priori and modified eligibility criteria are outlined in table 1. The results of the search strategy reflect studies in which (1) participants were adult healthcare professionals (as defined by the WHO),[46] (2) interventions were initiated for the individual healthcare worker, (3) a comparison group was included and (4) an objective measure of well-being or burn-out was reported.

More specifically, the definition of individual-focused interventions included self-care interventions, coping strategies, well-being interventions and supplemental nutrients. Self-care was defined as an intrinsic and continuous (self-) practice to ensure positive mental, physical, emotional and social well-being, that may be used as both a preventative and therapeutic intervention to ensure a sustainable and healthy work–life
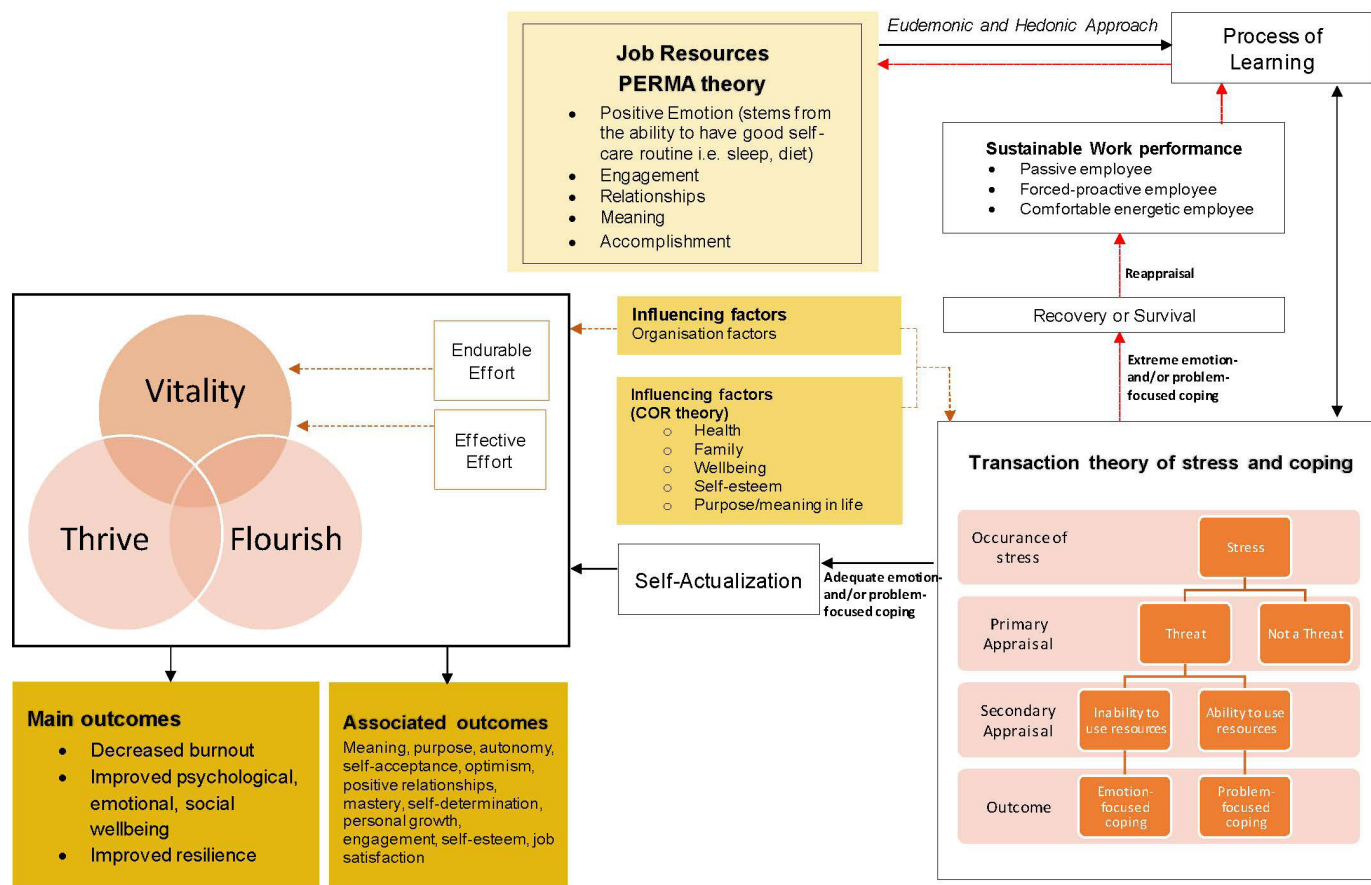
**Figure 1** Overview of the initial programme theory. PERMA, Positive Emotion, Engagement, Relationships, Meaning, Accomplishment.

balance.[47 48] Self-care examples include the practice of a healthy lifestyle (exercise, nutrition, sleeping habits) and coping strategies (psychological and behavioural counselling).[47] Interventions for well-being activities that promoted the experience of challenge, meaning and personal expressiveness to improve mental, physical, social and integrated (eudaimonic, life satisfaction, spiritual and overall quality of life) well-being and self-care were also included.[49 50] The comparison group included usual practice, no intervention or comparison between interventions.

In terms of outcomes, this review considered primary outcome measures of well-being and ill-being. Well-being outcomes refer to positive psychological components of health, characterised by positive feelings and functioning. Examples can include quality of life, resilience, mindfulness, positive mood, compassion and satisfaction.[51] Conversely, ill-being is described as pervasive negative feelings and poor functioning of life characterised by factors such as burn-out, violence, anger and coping.[51 52] To be eligible for inclusion, the above constructs needed to have been reported from an objective measure of health (eg, heart rate variability, blood pressure) or a validated psychological instrument (eg, Maslach Burnout Inventory). Secondary outcomes included measures of compassion satisfaction, mindfulness and resilience.

## Quality assessment

Quality appraisal was conducted in this review to 'illuminate the richest picture' and to warrant the reliability, verifiability and validity of findings as demonstrate in online supplemental file 5).[53] The full texts of included studies were appraised for quality using the Revised-Assessing the Methodological Quality of Systematic Reviews (R-AMSTAR) tool.[54] The R-AMSTAR tool documents assessed risk of bias at the review level to quantitatively measure the methodological quality of included systematic reviews by assessing the presence of 11 domains.[54] One reviewer (NBBA) conducted quality assessment of each full-text, and quality ratings were checked by a second expert reviewer (DeC). The publications not fulfilling the R-AMSTAR tool domains three (comprehensive literature search) and six (characteristics of the included studies) were excluded from this review. Meeting criteria 3 and 6 were essential as the inability to assess study characteristics meant no transparency in identifying individual interventions, participants, methods and outcomes of studies. This would make it difficult to map out individual interventions and their effectiveness implicating the inability to produce detailed findings in this review. One study by Stanulewicz *et al* met the inclusion criteria (population, intervention, comparator, outcome, time) of this study but did not meet domain six in the R-AMSTAR

**Table 1** Inclusion criteria, according to population, intervention, comparator, outcome, time period, (PICOT) types of studies, other

| PICOT | A priori criteria | | Modified criteria | Rationale for modification |
|---|---|---|---|---|
| | Inclusion criteria | Exclusion criteria | | |
| Population | Critical care healthcare professionals defined by the American Association of Critical Care Nurses (definition provided in online supplemental file 4).[96] | Healthcare professionals who do not practice in a critical care environment | Included all healthcare professionals defined by the WHO including student healthcare professionals (online supplemental file 4).[46] | There were insufficient studies (n=1 study) focusing on only critical care healthcare professionals. Students are also predisposed to high stress especially intensified during clinical years of training.[26] |
| Intervention | Individual- focused interventions (self-care interventions, coping strategies, well-being interventions, supplemental nutrients), Organisational interventions | Studies that do not have or did not report the intervention | Included individual-interventions only (excluded organisational interventions) | Healthcare is complex in nature. Combining both of individual and organisational interventions would impede quality of the review. |
| Comparator | Usual practice, no interventions, comparison between interventions. Included one or more experimental arms | Not applicable | No modifications made | Not applicable |
| Outcome | Well-being, compassion satisfaction, mindfulness, resilience, coping, burn-out, violence, self-care indicators, practice environment, work force retention and recruitment. | Review does not address well-being, ill-being and/or any type of modulating factor outcomes | Included well-being, compassion satisfaction mindfulness, resilience, coping, burn-out, and self-care indicators. | Workplace violence, practice environment, workforce retention and recruitment were excluded as these are outcome measures for organisational interventions. |
| Time period | No date restriction | Not applicable | Date restriction 2016 – 2020 | Extensive no of reviews to analyse—date restrictions provided latest evidence. |
| Types of Studies | Systematic review (in well published interventions) or randomised control trials (where there are no systematic reviews) or cohort studies if not randomised controlled trials. | Before- and after- studies, non-systematic literature, and scoping reviews | Systematic reviews only | Not applicable |
| Other | Excluded studies that did not meet criteria domains three and six of the R-AMSTAR tool | Not applicable | Not Applicable | Not applicable |

R-AMSTAR, Revised-Assessing the Methodological Quality of Systematic Reviews.

tool—that is, the absence of an included studies table. This has resulted in exclusion from the study.[55] Although this study was excluded, the study characteristics were still reported in the included studies of this review to demonstrate transparency.

### Phase 4: data extraction

A customised version of the 'Data collection form for intervention review' of The Cochrane Collaboration was developed by the authors in Microsoft Excel to facilitate later categorisation of interventions, context and mechanisms for the realist approach. The form was trialled on three studies from the review to ensure inclusion of all required data. Independent reviewers (NBBA and LT) completed data extraction, which was compared with ensure the rigour of the extraction process. Final data extraction columns included:

► Study details (date form completed, name of person extracting data).
► Author's details (study title, year, country, sponsorship source).
► Methods (aims/objectives, methodology, inclusion and exclusion criteria, outcome measure).
► Population (profession, context/setting, design, data source, sample size, follow-up length).
► Intervention (type of intervention, frequency, duration, delivery, resources, economic, engagement).
► Outcomes (description of outcome, scales, power, effect size, assumed risk estimates, mean difference, heterogeneity, narrative reporting).
► Other (funding, conflicts of interests, theories or mechanisms).

### Phase 5: data synthesis

#### Choosing middle-range theories to create CMOC

Each study was analysed for CMOC, interactions and theory informing each intervention.[56] To do this, authors assumed that each study design was informed by a middle-range theory, which authors had implicitly or explicitly stated. Authors discussed, reflected and extracted hidden data from all included studies, and sometimes used extracts of narratives to foster the reflection process. When discussing and reflecting, authors used the following analytical thinking process:

► Juxtaposition of the data sources—it aligns the sources to clarify and/or build on each other.

► Reconciling data discrepancies—explores reasons and rationales for data disparities.

► Adjudication of data—considers the relevance and trustworthiness (data quality).

► Consolidation of data—inference of mechanisms for outcomes.

► Situation of evidence—considers the setting of intervention.

Identifying the theories assisted the process of understanding how interventions may work to generate a specific outcome. The next stage identified common themes across the included studies. Using a narrative and interpretative approach, authors discussed and synthesised initial conclusions that was used to refine or refute the candidate theories. This process of synthesis was chosen in preference to a meta-analysis given the diversity in interventions, populations and outcomes.[57 58] All data were then categorised into context, mechanism and outcome table, where each intervention was examined based on for[42]: what were the effects of well-being and self-care interventions (outcomes) when implemented to health professionals (context)? What caused these effects (mechanisms) and were there internal and external influences (context) that facilitated such outcomes? 'Context' can be understood as external influencing factors on the mechanisms, whereas 'mechanisms' are the context-sensitive and hidden forces that create the 'outcome'.[42] The final synthesis was agreed on by all authors.

## Using CMOC to create theory prepositions and develop revised program theory

To integrate theories into different levels of social structures (micropertaining to individual and macropertaining to social),[56] authors appraised theories in accordance with four criteria (online supplemental file 6). It was important to note that this review did not focus on macrosystem as it describes organisational components, which were excluded from this review.

Theory prepositions (TPs) was developed by connecting underlying causal processes to CMOC concepts.[56] This was done by iteratively hypothesising how an outcome is achieved based on the understanding of (1) retroduction—how it was achieved in other circumstances and (2) abduction—development of a new hypothesis based on data. This process enabled the development of TPs.[56] The next step was to draw on connections and relationships between TPs.[56] Theories were positioned within a web of causations, which enabled the development of a rich picture.[56] Gaps identified within the overall theory enabled the formation of hypotheses using abductive and retroductive inferences—the same process forming original prepositions.[56] The TPs were then used to develop the revised PT (figure 2). The revised PT is explained in online supplemental file 7.

## RESULTS
### Study characteristics and design
The database search strategy yielded n=4467 records, and n=189 duplicates were removed. After screening the titles
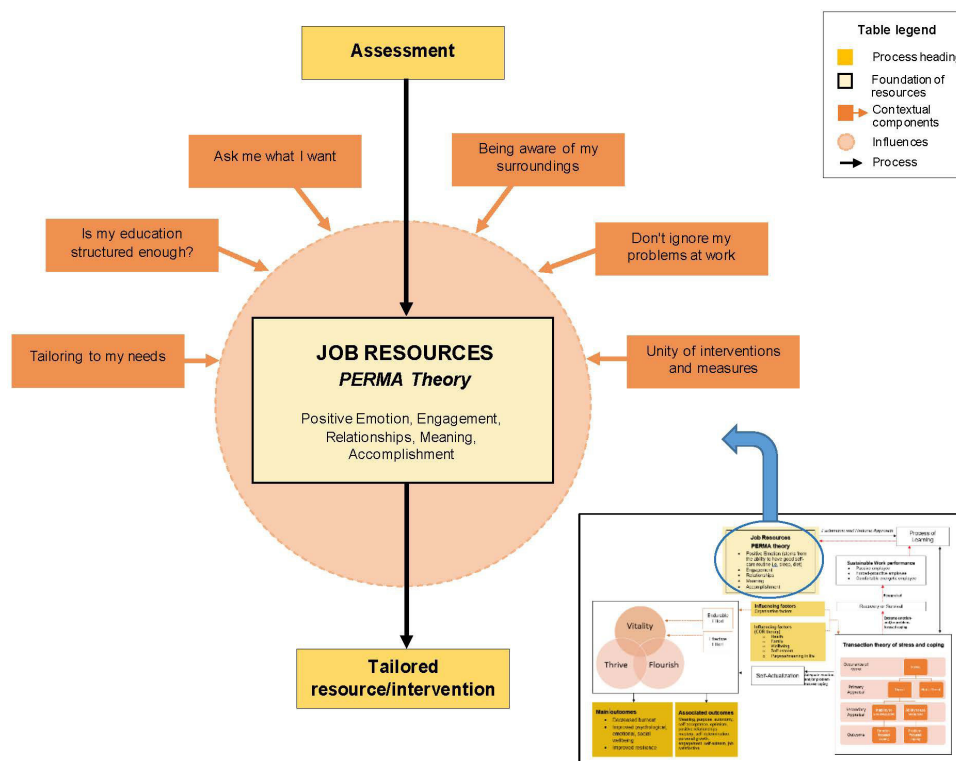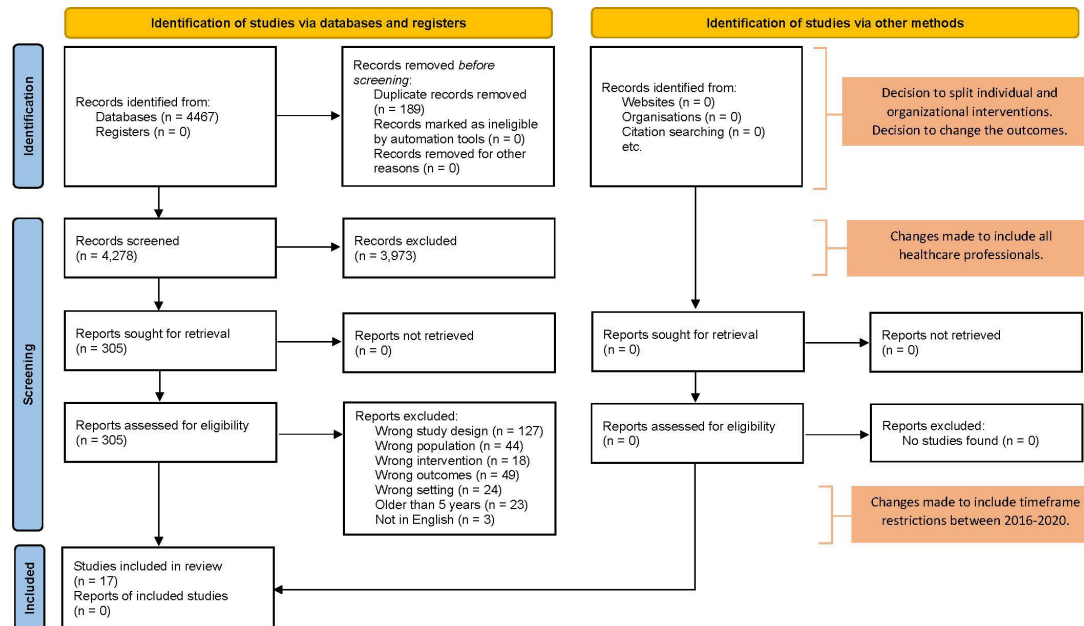


**Figure 2** Revised programme theory.

**Figure 3** PRISMA 2020 flow diagram. PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

and abstracts, the authors excluded 3678 studies. The remaining 3982 studies were retrieved for full-text assessment. A total of 287 studies were excluded as they did not meet the inclusion criteria. Finally, a total of 17 studies met the inclusion criteria. The process of including and excluding studies is reported on the PRISMA flow diagram (figure 3). Included studies were reported in characteristics of included studies (online supplemental file 8) and excluded studies reported in an excluded table with the rationale for exclusion. Included articles spanned a 5-year period (2016–2020), which incorporated the compilation of systematic reviews (n=17). The articles were derived from a range of countries, including UK (n=4), USA (n=3), Canada (n=2), Ireland (n=2), Malaysia (n=2), Australia (n=1), China (n=1), Germany (n=1) and Taiwan (n=1). Only one article by Alkhawaldeh *et al* specifically focused on the population of CCHP in comparison to all other 16 articles focusing on general healthcare professionals.[59]

A total of n=81 interventions were identified from n=17 systematic reviews. Data collected from each of the 17 included systematic reviews incorporated (1) specific programme context that may influence programme outcomes, (2) processes of programme implementation, (3) how contexts may shape specific mechanisms creating change and (4) programme impacts.[60] Variations of interventions included is summarised below:

▶ Mindfulness and cognitive training (n=37) (mindfulness (n=22), acceptance and commitment therapy (n=1) cognitive–behavioural therapy (n=1), emotional intelligence (n=5), resilience (n=1), self-management and recovery training (n=1), Balint group (n=1), neurolinguistic programming (n=1), resilience (n=1), Relaxation Response Resiliency Programme for Palliative Care Clinicians (n=1), Background Affect Trouble Handling and Empathy (n=1), Activities Contributing Comparisons Emotions Pushing Away Thoughts Sensations (n=1)).

▶ Self-care intervention (n=16) (self-compassion (n=2), massage (n=2), aromatherapy (n=4), breathing (n=1), relaxation (n=1), narrative (n=2), knitting (n=1), music (n=2), art (n=1).

▶ Self-improvement (n=9) (education/workshop (n=4), self-reflection (n=1), career training (n=1), mental practice session (n=1), micro-task (n=1), adaptation practice (n=1)).

▶ Low-intensity exercise (n=5) (yoga (n=2), Qigong (n=1), Tai chi (n=1), Physical exercise ((non-) workplace based, individually designed (n=1)).

▶ Social support (n=5) (counselling (n=1), support group (n=2), debriefing (n=2)).

▶ Mixed interventions (n=5) (education on CBT (n=1), job awareness with assertive training and time management (n=1), massage and aromatherapy (n=1), biofeedback relaxation and workshop (n=1), mindfulness and communication and self-awareness workshop (n=1).

▶ Miscellaneous uncategorised interventions (n=4) (heart touch (n=1), auriculotherapy (n=1), Didactic or interactive instruction in biopsychosocial approach (n=1), respiratory one (n=1)).

### Context-mechanism-outcome configurations

This section presents findings on the effectiveness of interventions and how context may affect the mechanisms to achieve an outcome, that is, the interaction to yield CMOC. Six 'plausible hypothesis' was identified by drawing on the Locus of Control theory, Job-Demand-Resources Model, and Self-Regulation Theory. The TP is postulated in table 2.

**Table 2** Six plausible hypothesis

| Identifier | Plausible hypothesis |
|---|---|
| TP1 | Healthcare professionals are more likely to engage with resources if they are personalised to their needs, considering that resources should cover two adaptive self-regulation strategies of recovery and job crafting.[97] The adaptive strategies modify the stressor or stress-response, which often result in new personal (individual) and job resources. |
| TP2 | Structured education is relative to intervention engagement as it teaches the process of 'how to cope'. |
| TP3 | Potential solution for preventing or decreasing burn-out experiences and improving well-being within healthcare workforces are influenced by the ability to engage with the intervention. Being engaged enables individuals to adhere to the intervention through self-initiated practices. The influences of contextual factors are equally as important to consider, for example, personality traits, ethnicity, workload and work schedule. |
| TP4 | Awareness is an important personal resource as it enables healthcare professionals to regulate feelings of stress and fatigue. Absence of awareness can aggravate the stressor or problem, resulting in increased daily job demands and decreased job and personal resources.[97] |
| TP5 | Having organisational resources is equally as important as it can offer right challenges and resources to employees. For example, training and hiring healthcare professionals that can be healthy and transformational leaders. |
| TP6 | If measures are unified, it is possible to determine the effectiveness of interventions and comprehensively understand why some interventions may or may not work for healthcare professionals. |

Recovery pertains to decreasing personal stress levels during and employee's off-job time, whereas job crafting is to adjust relationships, tasks or their job demands and job resources to optimise the work environment.
TP1, theory proposition 1.

## Theory proposition 1 (TP1): tailoring (tailoring to my needs)

Tailoring or modifying interventions can be observed across all included studies given that contextual factors such as ethnicity, work schedules, personality traits (ie, perfectionists) and unique environments and responsibilities can impact on the functioning of interventions.[61–63] Ghawadra *et al* found that adapting interventions to cater to specific populations is essential as it met their needs to facilitate effective delivery of interventions. For example, Malaysian participants found that a customised Mindfulness-Gym Programme was effective as it met the requirements of their multiethnic community.[61] Similarly, participants working with heavier work schedules, such as nurses, required shorter mindfulness programmes to enable them to attend the full-course of the intervention.[61] Chesak *et al* found that nurses used various holistic intervention to support healthful behavioural patterns and self-care to deliver high quality care.[64] The method of delivery such as the use of technology (ie, telephones, smartphones) is also promising as it is enables a greater sense of personalisation in terms of being less time consuming, cost-effective, and more suitable and easier to access for individuals with heavier workloads.[61]

## TP 2 (TP2): structured education (is my education structured enough?)

Alkhawaldeh *et al* suggested that integrating structured education within interventions is essential as it emphasises on the notion of how to cope with stressful events.[59] For example, stress management trainings that incorporated structured emotional intelligence education demonstrated improvements in the Expended Nursing Stress Scale (evaluates nurses' work-related stress) scores, 136.6 (SD=24.6, p=0.001) and 113.02 (SD=16.2, p=0.001) preintervention and postintervention accordingly. The structured education comprised of teaching the 5 major elements and 15 subscales of emotional intelligence.[59] This is further supported by other included studies that had also implicitly or explicitly included education and learning as the foundations of interventions. For example, Chesak *et al* reported mindfulness education programmes and communication training,[64] Clough *et al* reported on education intervention for cognitive–behavioural therapy,[62] and Venegas *et al* reported on adaptation practices that involves learning how to cope with anxiety, depression and stress.[65] Most interventions were modelled in a way that education is administered by teaching the intervention.[66 62 64 65]

## TP 3 (TP3): engagement (ASK me what I want)

Studies highlighted that 'engaging with the intervention' is essential to maximise intervention usage and prevent from avoidance practices.[67] Rudaz *et al* suggest that mental health professionals and trainees should engage with their own self-care, described as self-initiated practices, to enable positive well-being and improved health outcomes.[68] Interventions such as Acceptance and Commitment Therapy is promising to enhance psychological flexibility, which is used to engage individuals with meaningful patterns of activity while considering acceptance and mindfulness of arising issues.[68] Lee *et al* suggested that the use of frequent problem-focused coping can enable individuals to face crisis and engage themselves to solve problems and stressors, which leads to improvements in personal accomplishment.[67] Thus, the lack of intervention engagement can impede uptake of intervention and result to low adherence.[62] This is particularly important considering the contextual factors may impede intervention engagement, such as workload, shift work, and lack of support.[62]

## TP 4 (TP4): quiet mental space and awareness (being aware of my surroundings)

Incorporating interventions that facilitate a quiet mental space enables the mind to relax.[69] It allows agency and promote awareness of the situation, encompassing

understanding and acceptance of oneself and others.[70 71 69] Lamothe *et al* proposed that mindfulness interventions are particularly useful as it creates curiosity and acceptance of emotions without attempts to change the experience or perceived judgements.[72] Accepting emotions enables individuals to 'let go' of aspects of work which they were unable to do.[69] This is likely due to the inability to detect and name the emotion, leading to feelings of distress.[72] Hunter *et al* found that healthcare professionals who can practice acceptance are likely to provide enhanced care to patients and become more attentive towards both colleagues and patients.[73]

### TP 5 (TP5): individual-focused interventions should not replace work stressors (do not ignore my problems at work)

Two studies reported that although individual-focused interventions exist to address stress and burn-out, interventions to improve work conditions should not be overlooked. Lomas *et al* emphasised that addressing underlying structural causes is crucial to enhance the effects of individual-focused interventions.[63] This is especially profound considering that healthcare sectors are overworked and practice is becoming more acute in nature.[63 74]

### TP 6 (TP6): unity of interventions and measures

Eight studies did not recommend a specific intervention to manage and/or prevent stress and burn-out. Influences of contextual factors such as having same interventions trial among different populations was prominent issue that led to the lack of consensus.[55 61–64 69 75 76] Since healthcare professionals work in different settings and encounter different types of workload, it makes their experiences of stress and challenges unique to the individual.[61 76] Three studies reported that the lack of focused measurements including intensity, duration, mode of delivery and outcome measures created a gap in determining the effectiveness of interventions.[61 64 77] Li *et al* proposed that rather, both subjective and objective data of the intervention should be considered to fully understand the mechanisms of why and how an intervention works and produce an outcome.[77]

### DISCUSSION

This umbrella realist review provided guidance to key stakeholders on the types of interventions that are effective to improve well-being and decrease burn-out among healthcare professionals. It provided practical guidance by showing the importance of contextual factors exemplified by healthcare professionals to achieve well-being beyond the simple acquisition of interventions. The realist approach enabled the understanding of what is effective, how, and under what conditions as presented in online supplemental file 9.

### Tailoring interventions

Tailoring the intervention can cater to contextual factors and mechanisms (TP1). This can be done by addressing the individual's characteristics such as goals, personality factors, preferences, needs and resources, and tailor one or a combination of interventions to suit the individual.[78] For example, Conrod *et al* identified personality traits as a risk factor for alcohol abuse among adolescents.[79] Personality-focused interventions such as psychoeducation and behavioural/cognitive coping skills training were then used to target specific personality dimensions.[79] Tailoring adds meaning into the intervention through integrating unique characteristics of the individual—based on data collected about the individual.[80] Likewise in digital media, tailoring of content is used by collecting the user's personal information and/or behaviour and thereafter personalising the content based on the user's interest—for example, greeting users by name at login.[81] Tailoring and customisation is viewed by computer scientists as a way to close the gap between user and computer by increasing personal relevance and prioritises the user's control and involvement.[81 82] Essentially, the same technique can be considered when designing a tailored or customised intervention for well-being and burn-out.[81 82] Perhaps, efforts to tailor, customise and personalise interventions have been initiated, but there remains a gap in determining the 'right' and most effective process/framework to uniformly design the intervention to ensure consistency of intervention design, duration, intensity and mode of delivery (TP6).

Intervention-engagement is the time actively used in participating in the intervention (TP3).[83] The extent of intervention-engagement is influenced by contextual factors such as personality traits, interests and whether interventions are tailored to the individual.[83] Ruiter *et al* found in a randomised controlled trial that individually tailored health messages received more attention than non-tailored counterparts.[84] Essentially, recipients of the tailored message felt higher personal relevance, which led to an increase in engagement to the intervention.[84] There is a positive linear relationship between engagement and intervention effectiveness, where highly engaged individuals will experience greater treatment effects in comparison with lower engagement.[83]

### Learning process

A key concept when designing the intervention is to integrate a structured education programme (TP2) as it not only increases knowledge on the subject matter, but also develops reasoning, problem-solving skills and awareness of one's emotions and others such as emotional intelligence.[85] Education is often used subconsciously within well-being and burn-out interventions.[86] For example, clinical debriefing in critical care, operating theatres and resuscitation was found to improve learning/education, staff performance, patient outcomes and team efficiency and dynamic.[86] Mindfulness interventions also use structured experiential learning to train attitudes and awareness.[87] Learning may have its drawbacks due to contextual factors of the learning environment. van Vendeloo *et al* demonstrated that complex constructs such as formal and

informal aspects of training programmes, atmosphere and organisational factors play a key role in the type of education received.[88] In fact, the learning environment may be a crucial component of burn-out.[88] Contextual factors such as 'hidden curriculum' is also widely known to take place outside the clinical setting, which fosters competitiveness and performance above collaboration.[89] Hidden curriculums erode professional behaviour and decreases compassion, empathy and increases cynicism and burn-out among healthcare professionals.[89–91] Essentially, authors can hypothesise the reason (mechanism) to why this review's findings suggests using emotional intelligence components, such as awareness (TP4), to structure the learning process.[59]

### Application to CCHPs

This review was unable to analyse what interventions work, under what circumstances, to achieve what outcomes for CCHP. However, authors were able to extract contextual factors that may be beneficial for future research. Interventions for CCHP focused on cognitive–behavioural therapy, mindfulness, massage, yoga and aromatherapy.[59] Alkhawaldeh *et al* suggested that cognitive–behavioural therapy and mindfulness interventions were effective for occupational stress, anxiety and depression.[59] These interventions teaches individuals to develop cognitive flexibility and reframe experiences or perspectives, which facilitates the development of resilience and improved well-being.[92] Resilience lowers levels of neuroticism by instilling protective factors such as emotional stability, openness, agreeableness, extraversion and conscientiousness.[93] This is necessary for CCHP as working environments can amplify emotional impact by perpetuating feelings of isolation.[38] Systems to support collaboration within critical care workplace are limited, where practices primarily occur within silos.[38] Although the Critical Care team provide care through a diverse interprofessional team, the absence of a community affects the ability to manage emotions (ie, managing symptoms of psychological stress).[38] Costa and Moss suggest individual interventions should thus focus on self-care, self-awareness and mindfulness for CCHP.[38]

Similar contextual factors between findings from general healthcare professionals and CCHP include customisation of interventions (ie, on-the-job mindfulness) and education using emotional intelligence components.[59] Interventions also targeted lifestyle improvements, such as stress management education programme that uses physical coping methods and practices.[59] Essentially, negative coping techniques such as escape-avoidance behaviours often develop sedentary lifestyles.[94 95] Jordan *et al* suggest that the combination of having high self-efficacy and social support can facilitate healthier coping behaviours and lifestyle for employees within highly stressful professions.[94]

### FUTURE DIRECTIONS

This paper was able to expand the search to include both critical care and general healthcare professionals; and

although contextual factors such as work environment and experiences are different between the two groups, there is a similarity in the experiences of burn-out which provides an estimated picture of the CMOs that CCHPs may experience. Moreover, the combination of contextual factors and inconsistent outcome measures and intervention measures (ie, intensity, duration) made it difficult to conduct a meta-analysis of interventions. Instead, using the realist approach was beneficial for this review as it facilitated a platform to showcase the complexity of interventions using TPs and PT. Based on the realist approach, findings suggested that tailoring of individual-interventions and the integration of structured education led to effective intervention outcomes for healthcare professionals. The Positive Emotion, Engagement, Relationships, Meaning, Accomplishment theory components are recommended criteria for interventions–interventions that do not meet these criteria should be reconsidered. Contextual factors such as personal and organisational influences should also be considered when tailoring an intervention. As previously discussed, examples such as personality traits, ethnicity, workload and work schedule influence the interaction between the individual and intervention.[6–8] Specifically CCHP, the balance between self-care, social support, awareness/mindfulness and self-efficacy may also be prime components to improve emotional intelligence and resilience—which are essential components to improve well-being and decrease burn-out.[38] Future research, such as seeking validation through expert opinion, would help to further understand hidden contextual factors, mechanisms and their interactions to provide a greater depth of knowledge ready for application with the critical care population. Understanding contextual factors and mechanisms should facilitate the development of interventions that are catered for CCHP, providing realistic and reliable reporting of outcomes that can be easily implemented within the 'real-world' setting.

**ORCID iD**
Nurul Bahirah Binte Adnan http://orcid.org/0000-0001-6946-2308

## REFERENCES

1 World Health Organization. Who remains firmly committed to the principles set out in the preamble to the constitution 2021. Available: https://www.who.int/about/governance/constitution [Accessed 1 Aug 2021].
2 Dodge R, Daly A, Huyton J, *et al*. The challenge of defining wellbeing. *Intnl. J. Wellbeing* 2012;2:222–35.
3 Slade M. Mental illness and well-being: the central importance of positive psychology and recovery approaches. *BMC Health Serv Res* 2010;10:1–14.
4 Saeri AK, Cruwys T, Barlow FK, *et al*. Social connectedness improves public mental health: investigating bidirectional relationships in the New Zealand attitudes and values survey. *Aust N Z J Psychiatry* 2018;52:365–74.
5 Galderisi S, Heinz A, Kastrup M, *et al*. Toward a new definition of mental health. *World Psychiatry* 2015;14:231–3.
6 World Health Organization. Mental health: strengthening our response 2018. Available: https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response [Accessed 13 Sep 2021].
7 Shi J, Yao Y, Zhan C, *et al*. The relationship between big five personality traits and psychotic experience in a large non-clinical youth sample: the mediating role of emotion regulation. *Front Psychiatry* 2018;9:648.
8 Habibi Z, Sadeghi H, Haghrangbar F, *et al*. The study of personality characteristics and mental health in addicts. *Procedia Soc Behav Sci* 2013;84:509–13.
9 Harnois G, Gabriel P. *Mental health and work: impact, issues and good practices*. Geneva: Mental Health Policy and Service Development, Department of Mental Health and Substance Dependence, Noncommunicable Diseases and Mental Health, 2000.
10 Yeshaw Y, Mossie A. Depression, anxiety, stress, and their associated factors among Jimma university staff, Jimma, Southwest Ethiopia, 2016: a cross-sectional study. *Neuropsychiatr Dis Treat* 2017;13:2803.
11 Singh J, Karanika-Murray M, Baguley T, *et al*. A systematic review of job demands and resources associated with compassion fatigue in mental health professionals. *Int J Environ Res Public Health* 2020;17. doi:10.3390/ijerph17196987. [Epub ahead of print: 24 09 2020].
12 Lindert J, Bain PA, Kubzansky LD, *et al*. Well-being measurement and the WHO health policy health 2010: systematic review of measurement scales. *Eur J Public Health* 2015;25:731–40.
13 Ryan RM, Frederick C. On energy, personality, and health: subjective vitality as a dynamic reflection of well-being. *J Pers* 1997;65:529–65.
14 de Jonge J, Peeters MC. *The vital worker: towards sustainable performance at work: multidisciplinary digital publishing Institute*, 2019.
15 Neto M. Educational motivation meets Maslow: Self-actualisation as contextual driver. *J Student Engagement: Education Matters* 2015;5:18–27.
16 Dorenbosch L, vitality Mby. *Examining the 'active well-being'and performance outcomes of high performance work practices at the work unit level [proefschrift]*. Tilburg: Universiteit van Tilburg, 2009.
17 van Mol M, de Veer M, de Pagter A, *et al*. Vitality, resilience and the need for support among hospital employees during the COVID-19 pandemic: study protocol of a mixed-methods study. *BMJ Open* 2021;11:e049090.
18 Maslach C, Jackson SE, Leiter MP. Maslach Burnout Inventory Manual. In: Park M, ed. 4th. California: Mind Garden Inc, 2016.
19 Rotenstein LS, Torre M, Ramos MA, *et al*. Prevalence of burnout among physicians: a systematic review. *JAMA* 2018;320:1131–50.
20 Maslach C, Jackson S, Leiter M. *Maslach burnout inventory manual 4 th edition. mind garden*. Menlo Park: CA, 2016.
21 Maslach C, Jackson SE, Leiter MP. *Maslach burnout inventory: Scarecrow education*, 1997.
22 Lizano EL. Examining the impact of job burnout on the health and well-being of human service workers: a systematic review and synthesis. *Hum Serv Organ Manag Leadersh Gov* 2015;39:167–81.
23 Hall LH, Johnson J, Watt I, *et al*. Healthcare staff wellbeing, burnout, and patient safety: a systematic review. *PLoS One* 2016;11:e0159015.
24 Wong A, Olusanya O, Parulekar P. Staff wellbeing in times of COVID-19. *J Intensive Care Society* 2020.
25 RNDK M, Senkubuge F, Hongoro C. Determinants of happiness among healthcare professionals between 2009 and 2019: a systematic review. *Humanit Soc Sci Commun* 2020;7:1–14
26 The Importance of Well-Being in the Health Care Workforce. A design thinking, systems approach to well-being within education and practice: proceedings of a workshop. US National Academies Press; 2018.
27 Saravanabavan L, Sivakumar MN, Hisham M. Stress and burnout among intensive care unit healthcare professionals in an Indian tertiary care hospital. *Indian J Crit Care Med* 2019;23:462.
28 Moss M, Good VS, Gozal D, *et al*. A critical care societies collaborative statement: burnout syndrome in critical care health-care professionals. A call for action. *Am J Respir Crit Care Med* 2016;194:106–13.
29 Epp K. Burnout in critical care nurses: a literature review. *Dynamics* 2012;23:25–31.
30 Gomez S, Anderson BJ, Yu H, *et al*. Benchmarking critical care well-being: before and after the coronavirus disease 2019 pandemic. *Crit Care Explor* 2020;2:e0233.
31 Stocchetti N, Segre G, Zanier ER, *et al*. Burnout in intensive care unit workers during the second wave of the covid-19 pandemic: a single center cross-sectional Italian study. *Int J Environ Res Public Health* 2021;18:6102.
32 Azoulay E, De Waele J, Ferrer R, *et al*. Symptoms of burnout in intensive care unit specialists facing the COVID-19 outbreak. *Ann Intensive Care* 2020;10:1–8.
33 Embriaco N, Papazian L, Kentish-Barnes N, *et al*. Burnout syndrome among critical care healthcare workers. *Curr Opin Crit Care* 2007;13:482–8.
34 Poncet MC, Toullic P, Papazian L, *et al*. Burnout syndrome in critical care nursing staff. *Am J Respir Crit Care Med* 2007;175:698–704.
35 Mealer M, Burnham EL, Goode CJ, *et al*. The prevalence and impact of post traumatic stress disorder and burnout syndrome in nurses. *Depress Anxiety* 2009;26:1118–26.
36 Mealer M, Jones J, Newman J, *et al*. The presence of resilience is associated with a healthier psychological profile in intensive care unit (ICU) nurses: results of a national survey. *Int J Nurs Stud* 2012;49:292–9.
37 Patrick K, Lavery JF. Burnout in nursing. *Aust J Adv Nurs* 2007;24:43.
38 Costa DK, Moss M. The cost of caring: emotion, burnout, and psychological distress in critical care clinicians. *Ann Am Thorac Soc* 2018;15:787–90.
39 Montero-Marin J, Prado-Abril J, Piva Demarzo MM, *et al*. Coping with stress and types of burnout: explanatory power of different coping strategies. *PLoS One* 2014;9:e89090.
40 Di Fabio A, Palazzeschi L. Hedonic and eudaimonic well-being: the role of resilience beyond fluid intelligence and personality traits. *Front Psychol* 2015;6:1367.
41 Jagosh J. Realist synthesis for public health: building an ontologically deep understanding of how programs work, for whom, and in which contexts. *Annu Rev Public Health* 2019;40:361–72.
42 Weetman K, Wong G, Scott E, *et al*. Improving best practice for patients receiving hospital discharge letters: a realist review. *BMJ Open* 2019;9:e027588.
43 EndNote [program]. Endnote X9 version. Philadelphia PA: Clarivate; 2013.
44 Kellermeyer L, Harnke B, Knight S. Covidence and Rayyan. *Jmla* 2018;106:580.
45 Fairfield CJ, Harrison EM, Wigmore SJ. Duplicate publication bias weakens the validity of meta-analysis of immunosuppression after transplantation. *World J Gastroenterol* 2017;23:7198.
46 World Health organization. *Classifying health workers: mapping occpations to the International standard classification*. Geneva, 2008.
47 Royal Australian College of General Practitioners.. *Self-Care and mental health resources for general practitioners*. Australia, n.d: 1–4.

48 Australian Institute of Professional Counsellors. Burnout and self-care strategies Australia: Australian Institute of professional counsellors, 2020. Available: https://www.aipc.net.au/articles/burnout-and-self-care-strategies/ [Accessed 13 Oct 2020].

49 Brady KJS, Trockel MT, Khan CT, *et al*. What do we mean by physician wellness? A systematic review of its definition and measurement. *Acad Psychiatry* 2018;42:94–108.

50 Chatterjee S, Jethwani J. A study of the relationship between mindful self-care and subjective well-being among college students and working professionals. *Int J Innov Res Technol* 2020;7.

51 Lall MD, Gaeta TJ, Chung AS, *et al*. Assessment of physician well-being, part one: burnout and other negative states. *West J Emerg Med* 2019;20:278.

52 Keyes CLM, Annas J. Feeling good and functioning well: distinctive concepts in ancient philosophy and contemporary science. *J Posit Psychol* 2009;4:197–201.

53 Pawson R, Greenhalgh T, Harvey G, *et al*. Realist review--a new method of systematic review designed for complex policy interventions. *J Health Serv Res Policy* 2005;10 Suppl 1:21–34.

54 Shea BJ, Hamel C, Wells GA, *et al*. AMSTAR is a reliable and valid measurement tool to assess the methodological quality of systematic reviews. *J Clin Epidemiol* 2009;62:1013–20.

55 Stanulewicz N, Knox E, Narayanasamy M, *et al*. Effectiveness of lifestyle health promotion interventions for nurses: a systematic review. *Int J Environ Res Public Health* 2020;17:17.

56 Shearn K, Allmark P, Piercy H, *et al*. Building realist program theory for large complex and messy interventions. *Int J Qual Methods* 2017; 16:1609406917741796:160940691774179.

57 Shamseer L, Moher D, Clarke M, *et al*. Preferred reporting items for systematic review and meta-analysis protocols (PRISMA-P) 2015: elaboration and explanation. *BMJ* 2015;349:g7647.

58 Mogre V, Scherpbier AJJA, Stevens F, *et al*. Realist synthesis of educational interventions to improve nutrition care competencies and delivery by doctors and other healthcare professionals. *BMJ Open* 2016;6:e010084.

59 Alkhawaldeh Ja'far Mohammad Aqeel, Soh KL, Mukhtar FBM, *et al*. Stress management interventions for intensive and critical care nurses: a systematic review. *Nurs Crit Care* 2020;25:84–92.

60 Wong G, Westhorp G, Manzano A, *et al*. RAMESES II reporting standards for realist evaluations. *BMC Med* 2016;14:96.

61 Ghawadra SF, Abdullah KL, Choo WY, *et al*. Mindfulness-based stress reduction for psychological distress among nurses: a systematic review. *J Clin Nurs* 2019;28:3747–58.

62 Clough BA, March S, Chan RJ, *et al*. Psychosocial interventions for managing occupational stress and burnout among medical doctors: a systematic review. *Syst Rev* 2017;6:144.

63 Lomas T, Medina JC, Ivtzan I, *et al*. A systematic review and meta-analysis of the impact of mindfulness-based interventions on the well-being of healthcare professionals. *Mindfulness* 2019;10:1193–216.

64 Chesak SS, Cutshall SM, Bowe CL, *et al*. Stress management interventions for nurses: critical literature review. *J Holist Nurs* 2019;37:288–95.

65 Venegas CL, Nkangu MN, Duffy MC, *et al*. Interventions to improve resilience in physicians who have completed training: a systematic review. *PLoS One* 2019;14:e0210512.

66 Phillips CS, Becker H. Systematic review: expressive arts interventions to address psychosocial stress in healthcare workers. *J Adv Nurs* 2019;75:2285–98. doi:10.1111/jan.14043

67 Lee H-F, Kuo C-C, Chien T-W, *et al*. A meta-analysis of the effects of coping strategies on reducing nurse burnout. *Appl Nurs Res* 2016;31:100–10.

68 Rudaz M, Twohig MP, Ong CW, *et al*. Mindfulness and acceptance-based trainings for fostering self-care and reducing stress in mental health professionals: a systematic review. *J Contextual Behav Sci* 2017;6:380–90.

69 Hunter L. Making time and space: the impact of mindfulness training on nursing and midwifery practice. A critical interpretative synthesis. *J Clin Nurs* 2016;25:918–29.

70 Ravalier JM, Wegrzynek P, Lawton S. Systematic review: complementary therapies and employee well-being. *Occup Med* 2016;66:428–36. doi:10.1093/occmed/kqw047

71 Bischoff LL, Otto A-K, Hold C, *et al*. The effect of physical activity interventions on occupational stress for health personnel: a systematic review. *Int J Nurs Stud* 2019;97:94–104. doi:10.1016/j.ijnurstu.2019.06.002

72 Lamothe M, Rondeau Émélie, Malboeuf-Hurtubise C, *et al*. Outcomes of MBSR or MBSR-based interventions in health care providers: a systematic review with a focus on empathy and emotional competencies. *Complement Ther Med* 2016;24:19–28.

73 Hunter SC, Kim B, Mudge A, *et al*. Experiences of using the i-PARIHS framework: a co-designed case study of four multi-site implementation projects. *BMC Health Serv Res* 2020;20:1–14.

74 Lomas T, Medina JC, Ivtzan I, *et al*. A systematic review of the impact of mindfulness on the well-being of healthcare professionals. *J Clin Psychol* 2018;74:319–55.

75 Murray M, Murray L, Donnelly M. Systematic review of interventions to improve the psychological well-being of general practitioners. *BMC Fam Pract* 2016;17:36.

76 Fox S, Lydon S, Byrne D, *et al*. A systematic review of interventions to foster physician resilience. *Postgrad Med J* 2018;94:162–70.

77 Li H, Zhao M, Shi Y, *et al*. The effectiveness of aromatherapy and massage on stress management in nurses: a systematic review. *J Clin Nurs* 2019;28:372–85.

78 Beck C, McSweeney JC, Richards KC, *et al*. Challenges in tailored intervention research. *Nurs Outlook* 2010;58:104–10.

79 Conrod PJ, Stewart SH, Comeau N, *et al*. Efficacy of cognitive-behavioral interventions targeting personality risk factors for youth alcohol misuse. *J Clin Child Adolesc Psychol* 2006;35:550–63.

80 Lavrakas PJ. Encyclopedia of survey research methods: Sage publications; 2008.

81 Sundar SS, Marathe SS. Personalization versus customization: the importance of agency, privacy, and power usage. *Hum Commun Res* 2010;36:298–322.

82 Fan H, Poole MS. What is personalization? Perspectives on the design and implementation of personalization in information systems. *J. of Organizational Comp. & Elec. Commerce* 2006;16:179–202.

83 Richert J, Lippke S, Ziegelmann JP. Intervention-engagement and its role in the effectiveness of stage-matched interventions promoting physical exercise. *Res Sports Med* 2011;19:145–61.

84 Ruiter RAC, Kessels LTE, Jansma BM, *et al*. Increased attention for computer-tailored health communications: an event-related potential study. *Health Psychol* 2006;25:300.

85 Hahn RA, Truman BI. Education improves public health and promotes health equity. *Int J Health Serv* 2015;45:657–78.

86 Diaz-Navarro C, León-Castelao E, Hadfield A. Clinical Debriefing: TALK© to learn and improve together in healthcare environments. *Curr Anaesth Crit Care* 2021.

87 Emerson L-M, de Diaz NN, Sherwood A, *et al*. Mindfulness interventions in schools: integrity and feasibility of implementation. *Int J Behav Dev* 2020;44:62–75.

88 van Vendeloo SN, Godderis L, Brand PLP, *et al*. Resident burnout: evaluating the role of the learning environment. *BMC Med Educ* 2018;18:1–8.

89 Montgomery A. The inevitability of physician burnout: implications for interventions. *Burn Res* 2014;1:50–6.

90 Billings ME, Lazarus ME, Wenrich M, *et al*. The effect of the hidden curriculum on resident burnout and cynicism. *J Grad Med Educ* 2011;3:503–10.

91 Laughey WF, Atkinson J, Craig AM, *et al*. Empathy in Medical Education: Its Nature and Nurture - a Qualitative Study of the Views of Students and Tutors. *Med Sci Educ* 2021;31:1–10.

92 Mealer M, Boeldt D, Cochran K, *et al*. A Mindfulness-Based cognitive therapy (MBCT) intervention to improve resilience and mitigate symptoms of burnout syndrome in critical care nurses: results of a randomized trial. *Open J Nurs* 2021;11:653–67.

93 Oshio A, Taku K, Hirano M, *et al*. Resilience and big five personality traits: a meta-analysis. *Pers Individ Dif* 2018;127:54–60.

94 Jordan TR, Khubchandani J, Wiblishauser M. The impact of perceived stress and coping adequacy on the health of nurses: a pilot investigation. *Nurs Res Pract* 2016;2016:5843256.

95 Isa KQ, Ibrahim MA, Abdul-Manan H-H, *et al*. Strategies used to cope with stress by emergency and critical care nurses. *Br J Nurs* 2019;28:38–42.

96 Every Nurse. Critical care nurse United States of America: EveryNurse, LLC.; n.d. Available: https://everynurse.org/careers/critical-care-nurse/ [Accessed 12 Oct 2020].

97 Bakker AB, de Vries JD. Job Demands-Resources theory and self-regulation: new explanations and remedies for job burnout. *Anxiety Stress Coping* 2021;34:1–21.