

Social support interventions for healthcare workers



About this report

This report forms part of Wellcome's 2020 Workplace Mental Health Commission. The aim of the commission was to understand the existing evidence behind a sample of approaches for supporting anxiety and depression in the workplace, with a focus on younger workers.

You can read a summary of all the findings from Wellcome's 2020 Workplace Mental Health Commission on our website: <https://wellcome.org/reports/understanding-what-works-workplace-mental-health>

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Social support interventions for young healthcare professionals: Insight analyses based on a mixed-methods systematic review & meta-analysis

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Content of report

Content	Page
Title page	1
Executive summary	3
Introduction	5
Extent of mental health problems among healthcare workers	5
Social support and its link with physical and mental health	6
Social support interventions: operational definitions	6
How do social support interventions improve physical and mental health?	7
Objectives of our study	8
Methods	8
Results	12
Major Stakeholders in social support research	12
How effective are social support interventions in improving mental health and young health professionals?	12
What works and in what context: findings from subgroup analyses	16
Summary of insights from meta-synthesis of interviews and focused group discussions	16
Discussion	20
Key learnings	22
Limitations	22
Recommendations	23
Conclusion	24

Executive Summary

Background & rationale

Healthcare occupations are inherently demanding and stressful, exposing healthcare workers to many occupational, psychosocial, and health-related stressors. The COVID-19 pandemic has worsened the impact of these stressors on health professionals' mental health, while serving in constrained healthcare systems. As the havoc brought about by the COVID-19 pandemic diminishes, it would be essential to provide healthcare workers a safe and supportive environment.

Previous studies have shown social support to be a potent factor in improving mental and physical health outcomes among clinical and non-clinical populations. Although human connectedness and stronger bonds among individuals have long been known to improve individual health and give birth to viable communities; research in this domain only gained momentum in the 1980s. It has since been explored in hundreds of epidemiological, experimental, and meta-analytic studies.

This report evaluates the evidence about social support interventions in improving symptoms of anxiety and depression among healthcare professionals, using a systematic approach to facilitate review of existing evidence. We considered all types of social support interventions that offered structural (increase in size of social network), functional (providing emotional, material, or informational support) or enacted support (reassurance and advice) to healthcare professionals.

Major Findings

Out of a total 20,267 bibliographic references, the present meta-analysis included a total of 17 studies, describing 19 trials of psychological and psychosocial therapies with social support as a therapeutic component. In addition, to gain a deeper understanding of these interventions, we also reviewed nine qualitative and mixed-methods studies where young healthcare professionals were interviewed. These studies informed the meta-ethnographic section of the present report. We found several interventions for improving social support that were highly effective in prevention and treatment of anxiety and depression among young healthcare workers. These interventions were found to be effective across different healthcare professions. We found those social support interventions to be particularly effective that were delivered face to face and supervised by a mental health professional. Interventions delivered through internet, social media or through smart phone apps, although effective, can be improved further by promoting interdisciplinary research.

We found that social support interventions were often used as an important strategy in talking therapies such as cognitive behavioral therapy. Interviews with healthcare professionals who had previously received such interventions, indicated its utility at healthcare workplaces. Being part of social support groups promoted mental health and improved soft skills such as empathy and emotional expression. It also promoted peer-mentoring and skill sharing among colleagues. These skills were also found to be important in promotion of diversity at workplaces. It is important to consider power dynamics between delivery agents and intervention recipients, which was an important factor in the success of these programs.

Conclusion

During the COVID-19 pandemic, healthcare workers have reported a rising prevalence of anxiety, depression, and suicidal ideation. There is thus, an urgent need for provision of mental health resources for young healthcare workers. We recommend social support interventions to be a simple yet effective method for improving anxiety and depression among healthcare professionals. However, provision of social support in form of support from peers and mentors, need to be complemented with worker friendly policies from the administration. This support from administration has seldom been explored in social support research in healthcare settings.

Introduction

Healthcare occupations are inherently demanding and stressful, exposing healthcare workers to occupational and psychosocial stressors^{1,2}. Healthcare professions are rewarding but prone to a higher risk of work-related stress due to the involvement of human contact, rapid decision-making, and impact of these decisions on the patients and their families, also complicated by ethical dogma and moral injury³. The demanding professional commitments of healthcare workers training in a Spartan-like environment, combined with their perfectionistic and high-achieving attitudes, puts them at higher risk of mental disorders, especially anxiety, depression, and burnout, as noted in literature from the *pre-COVID-19* era^{4,5}. Healthcare professions are inherently more stress provoking⁶. This profound impact of occupational stress among young healthcare workers has become more pronounced during the COVID-19 pandemic⁷. The practice of medicine during the pandemic has acted as a double-edged sword. The young frontline healthcare workers battle social isolation due to social distancing amid lockdowns while toiling day and night for effective healthcare provision in presently overburdened and exhausted healthcare systems⁷. As the havoc brought about by the COVID-19 pandemic diminishes, it would be essential to provide to the healthcare workers a safe and supportive environment.

Extent of mental health problems among healthcare workers

Before the COVID-19 pandemic, the most recent meta-analytical estimates place the prevalence of depressive symptoms at 27.2% and suicidal ideation at 11.1% globally⁸ among medical students and depressive symptoms at 34% among nurses⁹. It is also noteworthy that physicians with burnout and fatigue symptoms are more likely to report errors in patient management¹⁰, absenteeism, and loss of work productivity in healthcare settings¹¹. Similarly, high levels of anxiety and depressive symptoms have also been reported in frontline allied healthcare workers^{12,13}. During the COVID-19 pandemic, studies worldwide have shown a further increase in anxiety and depression symptoms among healthcare workers¹⁴. Meta-analytic analyses of prevalence of mental disorders among healthcare workers, during viral outbreaks, estimate the prevalence of acute stress disorder at 40%, followed by anxiety (30%), burnout (28%), depression (24%) and post-traumatic stress disorder (13%)¹⁵. Therefore, it is essential to create a supportive environment for medical and allied healthcare professionals, to safeguard their own mental health and ensure optimum functioning, productivity, and error-free healthcare delivery^{10,13,16}.

Social support and its link with physical and mental health

This study aims to provide evidence regarding social support interventions in supporting healthcare workers during the pandemic. Human relationships' nature and quality and the degree of interconnectedness in communities have been associated with positive physical and mental health and vitality¹⁷. From a scientific perspective, the past three decades have seen a significant increase in social support research among different populations (Supplementary figure 1). As a psychosocial factor, it has consistently been linked to positive mental and physical health outcomes such as reduced morbidity and mortality among people with cardiovascular disorders, malignancies, and perinatal and HIV/AIDS populations^{18–20}. This was demonstrated in a meta-analysis of 148 studies by Holt-Lunstad et al., a 50% increased likelihood of survival for participants with stronger social relationships¹⁹. This finding remained consistent across age, sex, initial health status, cause of death, and follow-up periods. It has also been researched extensively in the context of mental health problems, especially anxiety and depression²¹. The epidemiological research linking social support with health problems has given an impetus to many psychosocial interventions. These interventions leverage the identification and utilization of social support resources among populations devoid of it²². These psychosocial interventions have been tested extensively for promotion, prevention, and treatment of common mental health conditions in various general and at-risk populations²².

Social support interventions: operational definitions

An abundance and heterogeneous nature of the scientific inquiry into social support correspond to this construct's richness and complexity. It has also complicated the drive to conceptualize social support in a single paradigm. Terms such as social networks, social support, and social integration are used interchangeably in the scientific literature²². The heterogeneous nature of scientific inquiry led to a heterogeneous conceptualization of social support including but not limited to structural aspects of social networks (e.g., increasing the size of an individual's support circle), functional aspects of social support (e.g., provision of emotional, informational or material support or a sense of acceptance), and enacted support (e.g., supporting an individual through reassurance and advice)^{23–25}. This support can emerge from both naturally occurring social circle e.g., friends and family, and formal support system provided by professionals, peers, and social groups at workplaces, clubs, or religious sites²². Regardless, two types of social support interventions are widely recognized: i) interventions focused on increasing one's network size or perceived support and b) those where building social and communication skills helped facilitate support creation²².

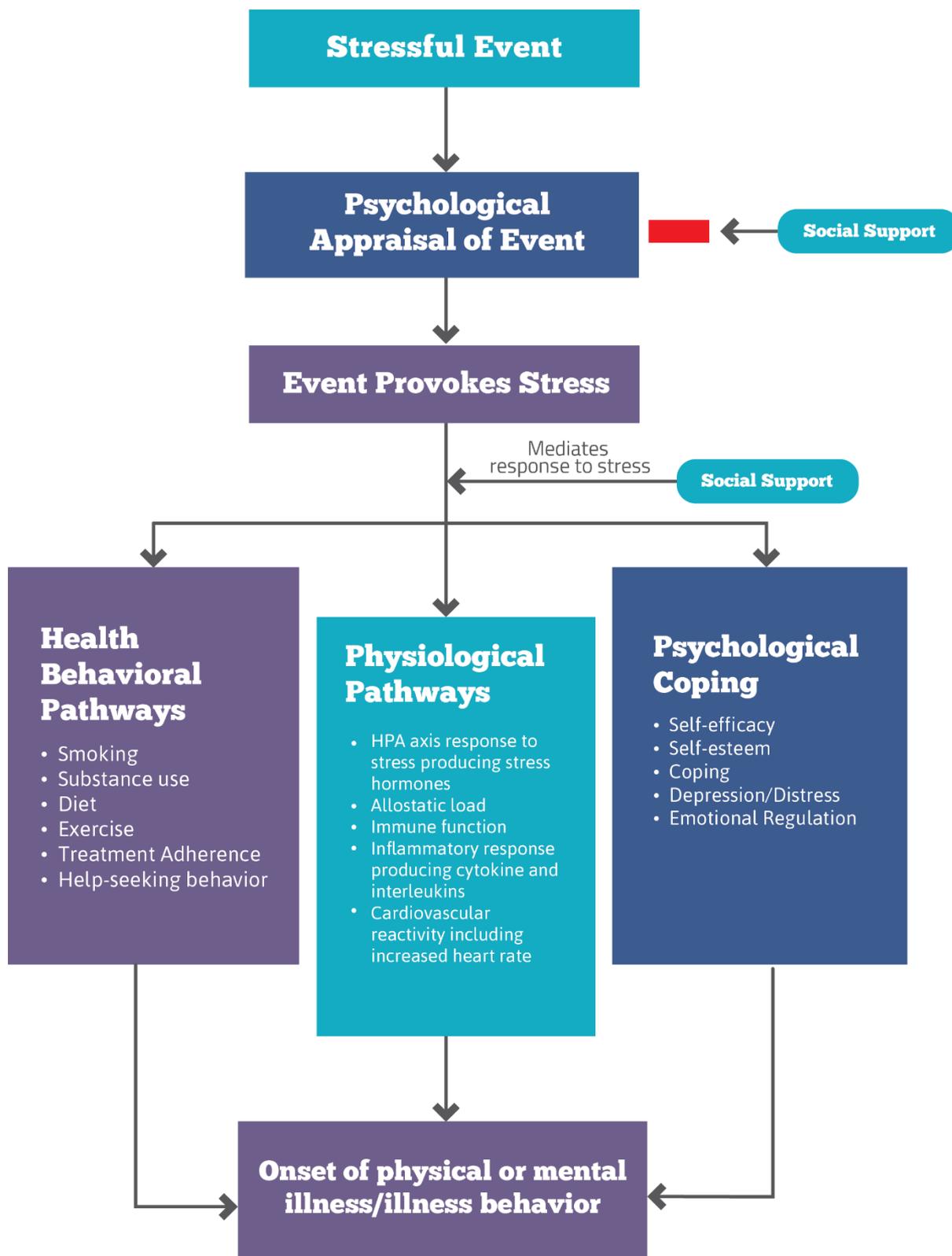
How do social support interventions improve physical and mental health?

One of the earliest empirical works exploring social support mechanisms in improving health was reported by Cohen & Wills (1985), who emphasized the stress-buffering effects of social support²⁶. They posited that social support attenuated a person's response to stressful events (Figure 1). After four decades of social support research, more complex models have been posited and tested empirically in a biopsychosocial paradigm, owing to innovations in multivariate statistical modeling and neurosciences. These complex models emphasize that social support acts not only through psychosocial but also biological pathways^{27–29}.

Lakey and Cohen (2000) explored three mechanistic perspectives on social support research: (1) stress and coping perspective, (2) social constructionist perspective, and (3) relationship perspective³⁰. Stress and coping perspective emphasize that social support improves health by protecting people from the adverse effects of stress³⁰. The social constructionist perspective suggests that social support influences health by improving self-esteem, whereas the relationship perspective views it as a by-product of interpersonal efficacy³⁰. Social support increases interpersonal efficacy, improves self-esteem, enhances coping skills, and reduce occupational stress, and depersonalization³¹.

Social support has also been recognized as a useful strategy for behavioral adaptation in health promotion programs. It has consistently been listed as a useful health promotion strategy in influential taxonomies of behavior change³². One of the most influential theories in this context, the *Social cognitive theory*, posits that the social support and guidance during early periods of personal change and maintenance increase long-term success³³. The impact of social support, however, will depend on its nature. Converging evidence across diverse spheres of functioning reveals that social support has beneficial effects because it raises people's beliefs in their efficacy to manage their life circumstances. If social support is provided in ways that foster dependence, it can undermine coping efficacy³³.

Recently, experimental work in the neurobiology of stress response has improved our understanding of the link between social support and inflammation. It has been consistently demonstrated that social support reduces inflammatory markers such as IL-6 levels, TNF, and fibrinogen across diverse diseases²⁹. These findings have consistently been replicated among different patient groups especially those with malignancies as well as non-clinical populations. For instance, Uchino et al., in their meta-analysis of 41 studies showed that social support–social integration was significantly related to lower levels of inflammation ($Zr = -.073$)²⁹. However, the nature of the relationship between social support and inflammation still warrants further research. Research on biological processes underpinning the impact of social support is still in infancy, these could prove to be useful in the development of novel interventions targeting biological pathways²⁹.

Figure 1: Mechanism of action of social support interventions²⁶⁻²⁹

Objectives of our study

To date, several systematic reviews and meta-analyses have been conducted for appraising evidence on social support for improving physical and mental health outcomes among diverse clinical populations^{34–36}. However, there is a paucity of such endeavors among young healthcare professionals. Therefore, this review aims to address this paucity of evidence synthesis efforts. We aim to provide evidence for simple and complex interventions that leverage the concept of social support, either delivered at the level of individuals, groups, or workplaces. We utilize a mixed-methods approach to provide quantitative evidence on the effectiveness of social support interventions for improving anxiety and depression and qualitative evidence for implementation, acceptability, and feasibility of these interventions.

Methods

This systematic review and meta-analysis were conducted in three phases: a) Scientometric analyses, b) Systematic review and meta-analysis and c) Qualitative synthesis.

In the first phase, we conducted a scoping exercise of overall literature pertaining to social support, to identify stakeholders (regional, funders and institutions) in this domain. For this, we conducted a literature search for bibliographic data pertaining to social support using Web of Science (core database), identifying 15,628 studies. This dataset was analyzed by following a bibliometric and scientometric framework, to identify prevalent themes in social support research, gaps in literature and major stakeholders.

In the second phase, we performed a high-quality mixed-methods systematic review & meta-analysis to critically analyze literature on standalone and complex social support interventions (Table 1). This approach allowed us to appraise how effective social support interventions are in prevention and treatment of anxiety and depression. This mixed-methods systematic review was conducted in accordance with the PRISMA guidelines⁴⁰. Protocol for this review was registered a priori at PROSPERO⁴¹. Detailed methods for this review are described in Appendix 1. For this phase, we conducted a comprehensive search of ten academic databases were searched including, PubMed, Scopus, Cochrane central register and Web of Science (Supplementary table 1), to identify studies to address our research objectives.

Objective 1. To assess the effectiveness of social support-based psychological and psychosocial interventions in preventing and treating anxiety and depression among healthcare workers. We considered

all those interventions that aimed to train the recipients in identification and elicitation of social support by either enhancing existing support networks or improving necessary social and communication skills to do so.

Thereafter, using meta-analytical methods, we calculated the effectiveness of social support interventions^{42,43}, and appraised the quality of previous research studies in order to provide the level of recommendation for these interventions. We also ran subgroup and meta-regression analyses to identify the context in which these social support interventions work the best. For instance, we compared the effectiveness of social support interventions across different healthcare occupational groups, professional level, type of professional conducting the intervention vs. peer-delivered and interventions delivered face to face vs. those delivered through internet.

Objective 2. In this phase, we reviewed the implementation processes which could aid us in the scale-up of these interventions at different workplaces. By synthesizing evidence from the trials, we also critically analyzed the active therapeutic elements in social support interventions, using the distillation and matching framework⁴⁴.

For the third phase, we reviewed qualitative and mixed methods studies where young healthcare professionals were interviewed by researchers. This phase helped us to gather deep insights pertaining to social support interventions, addressing objective 3 of this report:

Objective 3. We analyzed studies that presented interviews and focused group discussions of young healthcare professionals and described their experiences with social support interventions⁴⁵. We also considered studies which presented these details from the perspective of delivery agents/therapists and other stakeholders such as administrative staff and policy makers. This helped us to gauge evidence regarding the acceptability, feasibility, and attitude toward these interventions and detail lived experiences of young health care professionals.

Table 1: Systematic review question in PICOT format

Domain	Details
Population	Young healthcare professionals (doctors, surgeons, postgraduate trainees, nurses, physiotherapists, ambulatory staff, mental health professionals and the healthcare students) aged 18-24 years old.
Intervention	Social support interventions either as standalone or as a component of a complex psychosocial intervention
Comparator	Treatment as usual, enhanced care, placebo, waitlist control
Outcome	Rates and severity of anxiety, depression, burnout and perceived stress assessed either using the clinical criteria for diagnosis of these conditions or clinical rating scales.
Type of Study	<ul style="list-style-type: none"> • Randomized controlled trials for assessing the effectiveness • Protocols and manuals for the distillation of ingredients of interventions • Evaluation and feasibility studies to judge acceptability and implementation processes for scale-up of these interventions • Qualitative studies to assess barriers and facilitators of these interventions

Results

Major Stakeholders in social support research

We found that research on social support saw a rise after the year 1990. Almost all the high quality research was conducted in the Western countries where most of the philosophical and empirical research on social support has been conducted.

We did not find a particular interest among social support researchers to investigate the utility of social support among healthcare workers. When period-wise analyses were conducted we found that before the year 2000, social support was studied more in context of general population as a psychosocial correlate and vulnerability factor in epidemiological studies. It was also studied in clinical context, especially among people with malignancies, alcohol misuse and depression, and general workplace dysfunction. Post-2000, more focus was put on veteran mental health, depression associated with pregnancy and psychological issues among transgender people, and those undergoing HIV treatment and among old people reporting frailty and social isolation (Supplementary figure 1 to 5).

How effective are social support interventions in improving mental health and young health professionals?

The present meta-analysis included a total of 17 studies, describing 19 trials of psychological and psychosocial therapies with social support as a therapeutic component (Supplementary figure 6). At least four modalities of support interventions could be distinguished from literature: (1) professionally led support groups, (2) mutual support groups, (3) support mobilization interventions, and (4) support substitution interventions (Table 2 & 3). Other classifications apparent in the literature were group vs. individual interventions, (2) professionally-led vs. peer-provided treatment, and (3) interventions where an increase of network size or perceived support was the primary target vs. those where building social skills (to facilitate support creation) was the focus (Table 2 & 3).

Six of the interventions were social network interventions for increasing the size or quality of the social circle, while the rest were mutual aid groups at workplaces (n=9). Functionally, seven of the interventions focused on providing informational support & psychoeducation, emotional support (n=8), and instrumental support (n=3). The building of social skills and improving the quality of existing relationships was a focus of 12 interventions. Provision of direct support at workplaces were an important element in 11 interventions, while the others were indirectly focused on improving social support by teaching social and interpersonal skills.

Most frequently used therapeutic strategies, used in tandem with social support, were borrowed from behavioral, cognitive, and psychoeducation domains: stress management (n=10), communication skills training (n=9), identifying thoughts (n=9), cognitive restructuring (n=7), psychoeducation (n=6) and active listening (n=6) and self-awareness (n=6) (Supplementary figure 7).

Table 2. Examples of social support interventions^{23-25,31}

Aspect of social support	Function	Example
Structural	Increasing the size of an individual's support circle	Introduction of buddying schemes and peer-groups at workplaces.
Functional	Emotional	Emotional support from peers and colleagues and friends and family or other social support groups.
	Informational	Psychoeducational seminars on mental health and management of stress at workplaces and development of soft skills such as communication and empathy.
	Material	Financial support in times of distress, providing job cover during sickness, financial rewards for good work ethic/behavior

	Sense of acceptance	Being part of peer groups, respecting diversity at workplaces, supporting immigrants in settling into new workplaces.
Enacted	Reassurance and advice	Access to counselor and therapist for professional advice.

Table 3: Typology of social support interventions available in literature^{23-25,31}

Type	Definition	Example
Professionally led support groups	Support groups which are headed or mediated by a mental health professional	Support groups of colleagues at workplaces receiving counselling services from a mental health professional. In some instances, the mental health professional may only act as a mediator with colleagues leading the direction of the groups.
Mutual support groups	Support groups at workplaces comprising of peers	Peer led support groups at workplaces without the involvement of a therapist. In some mutual support groups, often peers are paired together to aid (emotional, work related and skill sharing) each other. It can also take the form of mentor-mentee support group.
Social mobilization interventions	Interventions aimed to use societal and personal influences to raise awareness or bring about behavior change	Raise awareness and promote use of personal protective equipment during COVID-19 pandemic. Conduct motivational sessions for mental health promotion at healthcare workplaces. Change physical activity by building supportive relationships for behavior change.
Support substitution interventions	Interventions aimed at compensating lack of one resource with another readily available. Substitution can be through adjustments of network size and through higher efficiency of personal ties.	Programs focused at improving diversity at workplaces for international doctors, immigrating from their home countries. Giving financial incentives and providing appreciation to healthcare workers acting as frontline warrior during the COVID-19 pandemic.

Severity of Anxiety

A total of eight studies (randomized controlled trials) reported the effects of social support interventions on anxiety among young healthcare professionals (Supplementary table 2 & 3). There was a substantial heterogeneity in reporting these outcomes due to heterogeneous intervention contents and

different psychometric instruments assessing severity of anxiety symptoms ($I^2= 79.20\%$, $P < 0.001$, $Q= 33.65$). Meta-analysis with random effects revealed that these interventions were highly effective at improving symptoms of anxiety among health care workers. A cumulative sample of 612 participants revealed a moderate to large effect size (Hedges $g= -0.733$, 95% CI: -1.13 to -0.34) (Figure 2 and supplementary figure 9). In all these interventions, data were reported at the end of interventions. No effect sizes on long term follow ups were available, therefore, it is difficult to ascertain if the useful effects of social support interventions on anxiety sustain for long term.

Severity of depression

A total of six studies (randomized controlled trials) reported the severity of depressive symptoms as an outcome, assessed using a variety of validated psychometric instruments (Supplementary table 2 & 3). There was substantial heterogeneity in reporting these outcomes, due to different psychometric instruments and different content of interventions ($I^2= 91.87\%$, $P < 0.001$, $Q= 61.48$).

Meta-analysis with random effects revealed that these interventions were highly effective at improving symptoms of depression among health care workers. A moderate to large treatment effect was seen in a cumulative sample size of 482 participants (Hedges $g= -0.74$, 95% CI: -1.47 to -0.01) (Figure 2 and supplementary figure 9).

Long term benefits of social support interventions in depression were only reported in two studies showing some benefit. However, more research is needed on it.

Burn out

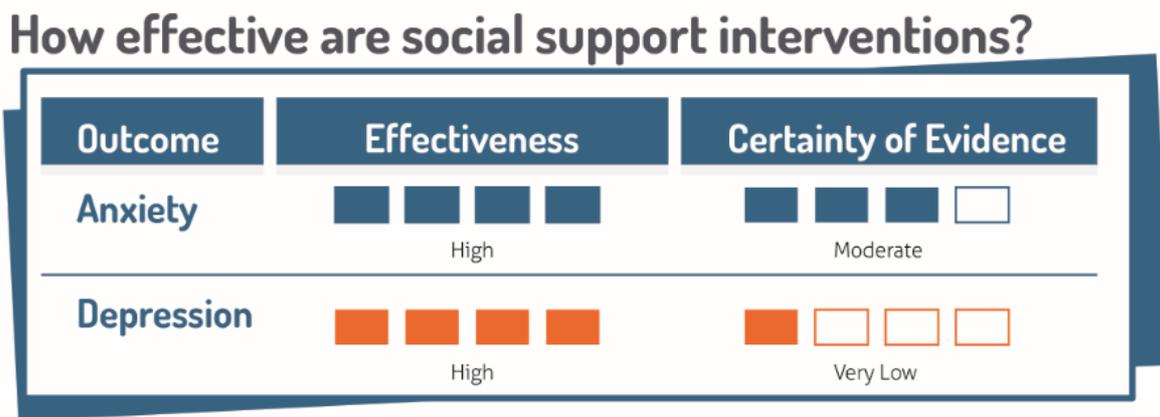
Emotional burnout was reported in three interventions employing the Maslach's burnout inventory. In a study sample of 146 young healthcare professionals, a moderate improvement was seen in burnout among healthcare professionals undergoing social support interventions (Hedges $g= -0.54$, 95% CI: -0.87 to -0.22) (Supplementary figure 9). However, this effect could not be sustained at long term follow ups (Hedges $g= -0.19$, 95% CI: -0.59 to 0.20). However, more research is needed on this because of limited data available.

Perceived Stress

Perceived stress was studied as an outcome in a total of eight studies (randomized controlled trials), with a cumulative sample size of 608 participants. There was an evidence of significant heterogeneity in reporting of this outcome ($I^2= 65.94\%$, $P < 0.001$, $Q= 20.55$). To assess the level of perceived stress, three of these studies used Perceived Stress Questionnaire, followed by Perceived Stress Scale ($n=2$) and Graduate Stress Inventory ($n=2$).

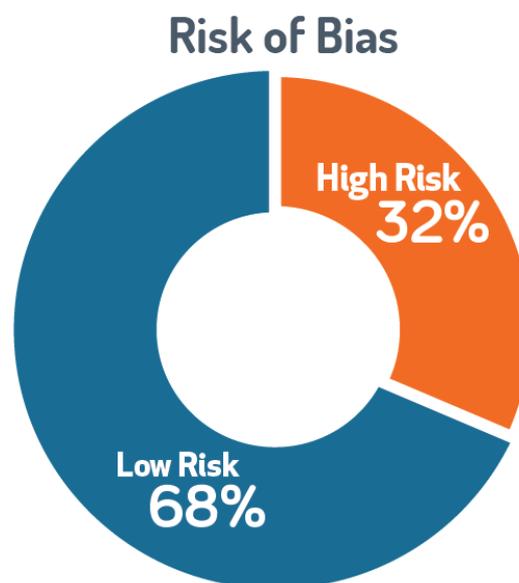
No significant improvements were seen in perceived stress among young healthcare workers even after participating in social support interventions. (Hedges $g = -0.123$, 95% CI: -0.40 to 0.16). These non-significant effect sizes persisted at follow up assessments ($n = 7$, Hedges $g = -0.01$, 95% CI: -0.21 to 0.19) (Figure 2 and supplementary figure 9). This indicated the fact that even if stress at workplaces remains the same, social support interventions can still improve mental health among young health workers.

Figure 2: Effectiveness of social support interventions in anxiety and depression among young healthcare workers



Legend: Social support interventions were found to be highly effective in improving symptoms of anxiety and depression among young healthcare workers. The certainty of evidence for these outcomes was rated according to the GRADE framework. Certainty of evidence for anxiety was rated as moderate due to high risk of bias in randomized controlled trials. While certainty of evidence for depression was rated as very low due to extent of heterogeneity in reporting of this outcome, high risk of bias in several studies and imprecise effect sizes.

Figure 3: Risk of bias in included in randomized controlled trials assessed using Cochrane risk of bias tool



Risk of bias

Among the included RCTs (8/17) reported an overall higher risk of bias with ≥ 3 domains indicating flaws in their study designs (Figure 3, Supplementary figure 8 & 10).

GRADE

For anxiety, the certainty of the evidence was rated as moderate after downgrading for high risk of bias and inconsistency and upgraded by one level for demonstrating a large effect size (Figure 2). For depression, the certainty of the evidence was downgraded to very low due to concerns associated with risk of bias, imprecision, and heterogeneity (Supplementary table 3).

What works and in what context: findings from subgroup analyses

Subgroup analyses revealed several important insights on moderators of interventions targeting anxiety, depression, and perceived stress. It revealed significant variation in effect size of outcomes based on different scales utilized where GAD-7 (tool based on DSM criteria) yielded the lowest effect size than its counterparts.

Interventions with lower risk of bias, social network interventions, and professionals as delivery agents yielded larger effect sizes. For depression, multicomponent interventions yielded lower effect size than social support; however, social support as a standalone component was tested in only one intervention (Supplementary table 4).

A series of multivariate meta-regression models were run to analyze associations between the theoretical orientation of interventions. It revealed that 100% of the heterogeneity variance among studies was explained by different interventions. These analyses did not reveal any additive or synergistic effects according to different numbers and combinations of interventions elements. The largest effect sizes were reported by interventions comprising of social support elements only, followed by social support coupled with exercise, and behavioral elements. In contrast, the lowest effect sizes were reported by interventions comprising of multiple active elements of behavioral, cognitive & psychoeducation & exercise. Therefore, interventions that comprise of a high number of therapeutic strategies, thus, increasing the content of the intervention, do not necessarily yield better improvement in anxiety and depression.

A series of meta-regression analyses were run for indicators of the density of dose of interventions and effect sizes, revealing no significant associations for mental health, explaining only 12% of the variance in the effect sizes (Supplementary table 5). This emphasizes the fact that merely increasing

the dose of intervention by increasing the duration or number of sessions, does not necessarily translate to better interventions. For improvement of mental health, *quality* of interventions is more important than *quantity* of intervention.

Summary of insights from meta-synthesis of interviews and focused group discussions

The meta-synthesis of qualitative studies is described in detail in Appendix-II. A total of nine qualitative studies explored the perspectives and experiences of young healthcare professionals receiving social support interventions. A thematic analysis guided by Noblit & Hare's meta-ethnographic framework⁴⁵ revealed several important insights in designing of these social support interventions⁴⁶⁻⁵⁴.

Overall, these studies revealed these programs to be acceptable at different workplaces. Several factors were cited for high acceptability of these programs including promoting of mental health^{47,51} and improved sense of belongingness^{46,47,51,53} and improved relationship at workplaces^{53,54}. Being part of social support groups promoted mental health, improved soft skills such as empathy and emotional expression, and promoted peer-mentoring among intervention recipients^{47,48,54}. It was important to consider power dynamics between delivery agents and intervention recipients, which was an important factor in success of these programs⁴⁷. Detailed characteristics of these studies are presented in Supplementary table 6 and thematic analysis in Supplementary table 7.

Benefits of social support interventions revealed in meta-synthesis

Several valuable insights on *acceptability, engagement & benefits of social support interventions* were gained from qualitative studies related to these interventions.

- **Excellent acceptability & uptake:** Overall, participants found the interventions helpful and felt a sense of improved personal and professional well-being at the workplace⁴⁶⁻⁵⁴. Two studies used a semi-structured questionnaire to assess the acceptability of social support intervention among the recipients. Most of the students (82%) receiving mental health promotion program designed by Hsieh et al., (2011) enjoyed participating and were particularly helped by group discussions⁴⁶. Sugumar et al., reported a reduction in stigma, promotion of self-care management, and increased confidence in supporting peers struggling with mental health issues among all of the study participants.⁴⁷

"I am glad that I have a more joyful life. The program is wonderfully effective. I'm glad I joined. This would be helpful to ease clinical placement tensions" (Nursing Student 3). (Pei-Lin Hsieh, 2011)

- **Promotion of mental health:** Participants expressed that joining intervention enhanced their understanding of stress and normalized their stress experiences^{47,51}.

"Despite never having any mental health issues it was so important to understand what we all feel in relation to stress, burnout, etc. Very eye-opening (Student 5) (Sugumar et al., 2019)

- **Sense of belongingness:** Most of the Intervention programs utilized a group format, where participants got the opportunity to share their experiences and express emotion. This provided an emotional outlet and validated their feelings and provided a sense of support^{46,47,51,53}.
- **Enhanced coping with stress:** Listening to others' experiences and what had helped them during group discussions was beneficial. Interventions served as a source of informational support and provided participants information about stress and coping strategies. Especially for mutual-aid groups, participants felt an enhanced ability to do day-to-day difficult work when having support from peers⁴⁶⁻⁵⁴.

"A great sense of looking after yourself and looking after each other, um, when you're doing some very difficult work. . .it all feels more possible". (Stockmann et al., 2017)

- **Improved relationships at workplaces:** Participants remarked that these interventions had the potential to make them *a better person, a better partner, better father, and a better friend*^{53,54}.

"I can trust my friends because we are really close to one another. They know my background and feelings, and are much the same as myself. A good friend is someone I can confide in". (Nursing Student 22) (Hsieh, 2011).

- **Empathic Listening & emotional outlet:** Emotional support from friends and emotional expression were considered an important coping mechanism to beat stress at workplaces. In addition, they were better able to recognize and regulate their emotions, which helped them to understand others' emotions^{47,48,54}.

"Close friends are ones who understand me at the same level and who I can share my feelings with. I need a friend. I only need someone to be there is someone to just listen" (Nursing Student 14)

- **Enhanced mentoring at workplaces:** Participants felt better supported at work through skill and knowledge sharing with peers, and an enhanced ability to do day-to-day difficult work⁴⁶⁻⁵⁴.

"I'd never given an intramuscular shot before. XXX (the peer) had done it several times. So I asked xxx (the peer) to go with me and check and introduce me to it so I'd do it right. We

went through it before going in. She was checking me and I felt secure. (9, week 3) We've put in catheters together, we both know how, but hadn't done it for a while, so it was good to have someone there" (2, week 3) (Palsson, 2017).

- **Development of soft skills:** Chiam et al., (2020) evaluated nurses' perceptions of mindfulness-based intervention. Nurses described that the program had equipped them with better communication skills to share their feelings with people at workplaces⁵⁴.

"So as a nurse, like as you address your emotions right, you tend to like understand where they come from, and why the patient is feeling like that."

- **Respecting diversity in the workplace:** Mutual aid groups and social network interventions promoted respect for diversity at workplaces. It enabled people to be less judgmental and be more accepting of different perspectives, appreciate others' feelings, and cultivate feelings of kindness and love for other people^{53,54}.

I've been to conferences where service users are present and I've felt very attacked on a personal level. And, by the end of that week I saw them as a wonderfully charismatic group of a very kind, loving people who had a very strong voice, but important voice that hadn't been there before" (06)

- **Enhanced conflict resolution:** The development of soft skills helped enhanced conflict resolution at workplaces. Participants reported being better equipped to resolve conflict when they were aware of their own emotions while talking to a person^{47,48,54}.

How to improve social support interventions according to intervention recipients?

- **Should social support interventions be given by staff?** Peer-led programs allowed students to be open about their feelings and emotions in a non-judgmental environment, which participants thought could not be possible if content was delivered by teachers or staff.

"NO STAFF should be allowed to run it. Otherwise it wouldn't be as open and have the same bonding effect. (Student 16) (Sugumar et al., 2019)

Facilitators of use of social media and digital platforms for delivering social support interventions

- **Importance of confidentiality:** Social media based interventions were perceived well by participants due to anonymity and confidentiality features.

“Facebook allowed users to access stress management content while remaining anonymous (as long as they did not respond to a post), thereby avoiding “stigmatization” by classmates”. (George et al., 2013)

- **Accessibility:** Ease of access and constant availability was a great feature of social media based intervention.

“I looked at most of the links and videos – it was a nice break from studying” and “I like the fact that a Facebook group is always there, and there were constantly things being posted ... stress-related content was always there for me.” (George et al., 2013)

- **Choice of mobile app for intervention delivery:** There was mixed view about preference of technology-based intervention over conventional mode of delivery.

“...maybe you can convert the handout into a mobile app. ... it's not very practical? To carry this book around?” [K]”. (Chiam et al., 2020)

Barriers to digital health interventions

- **Poor e-health literacy:** However, some participants did not find it feasible as they were not regular users of social media.

“(I) was not a user of Twitter and never took the time to understand it”. (Stephens, 2012)

- **Lack of participation/accessibility & usage:** Some participants did not like social media based interventions due to lack of a human interaction or response from other participants.

“I could not get into the habit to check my account on a regular basis as I am not in the habit of doing so.” (Stephens, 2012)

Discussion

Summary

The present study shows that social support is a widely researched phenomenon in mental and physical health. It has consistently been shown to be effective in improving health outcomes in diverse non-clinical and clinical populations. The increasing complexity of research methods and innovations in statistical modeling has begun to elucidate the multidimensional processes that mediate social support's effects on human health. A plethora of randomized controlled trials has shown social support effectiveness among clinical study samples and general population. In our present meta-analytic investigation, social support interventions showed strong effect sizes in improving anxiety and depression among healthcare professionals.

Intervention development: What, where and how

The present review revealed several important insights in development of social support interventions. Social support either in the form of mutual aid groups or network interventions was rarely used as a standalone ingredient of a therapeutic program, except one study (Guo et al., 2016). Most of the interventions paired social support with strategies borrowed from other psychotherapeutic frameworks, most commonly, behavioral, and cognitive strategies. These combinations of psychotherapeutic ingredients, when appraised statistically, showed that social support interventions performed better paired with behavioral strategies. Furthermore, adding multiple components in addition to these did not make the intervention effect size superior. The inclusion of interventions comprising of psychotherapeutic strategies other than social support render it tough to estimate the extent to which stand-alone social support interventions could be effective.

Moderator analyses for these interventions in the context of anxiety, depression, and stress outcomes revealed several important insights. However, these analyses are usually considered observational in nature and limited in their statistical power. It was found that those interventions that had a professional as a delivery agent were more effective than those delivered by peers. Therefore, we recommend that social support interventions be guided by mental health professionals, even if these are driven by peers in the workplace. These interventions tend to work across different occupational groups in the workplace, albeit higher effectiveness of these interventions was noted when delivered among nurses. Social network interventions improve both anxiety and depression than peer/mutual-aid groups. Therefore, workplaces considering peer-mediated interventions for implementation, should consider training young healthcare professionals in mental health, soft skills, and conflict resolution. We could not find any randomized controlled trials reporting evidence on interventions implemented at the organizational level.

Barriers and facilitators

Intervention recipients across multiple studies endorsed the importance of confidentiality and privacy in these interventions. Mental disorders are often stigmatized in workplaces, which can be detrimental to young healthcare professionals' help-seeking behavior. Most employers consider individuals with mental health illnesses less suitable for jobs than those with physical ailments⁵⁵. Thus, during hiring processes, participants disclosing mental health illnesses to employers are less likely to secure their jobs⁵⁶. This highlights the need to target stigma toward mental health issues in workplaces⁵⁶. Addressing stigma toward mental illnesses and assurance of confidentiality and privacy at workplaces, in general, is important to ensure a supportive environment for workers. Mere implementation of

mental health interventions without ensuring a stigma-free environment at the workplace and confidentiality and privacy may undermine treatment and prevention efforts.

Therefore, it is imperative to ensure confidentiality and privacy to intervention recipients. It is also essential to realize power dynamics among the intervention recipients and delivery agents at workplaces. It was cited to be an important factor in the acceptability of these programs. Among included studies, peer-led programs allowed young healthcare professionals to be open about their feelings and emotions in a non-judgmental environment, which participants thought could not be possible if teachers, supervisors, or staff delivered the content. Social media was preferred to an in-person stress management intervention among young healthcare professionals. However, it is important to gauge e-literacy at workplaces before developing and implementing these interventions at workplaces, which could be a barrier to success of these interventions. It is also to be noted that face to face interventions yielded larger effect sizes than those delivered using social media.

Key learnings

- There is ample evidence that social support elements effectively reduce the severity of anxiety, depression, and burnout among young healthcare professionals. Therefore, these interventions should be implemented at workplaces.
- In addition to promotion, prevention, and treatment of anxiety and depression, these interventions also improve conflict resolution skills and promote empathy, compassion, inclusiveness, love, and kindness.
- Peer mentoring among professionals should be made a focus when implementing these interventions at workplaces.
- Social support, when delivered in tandem with behavioral, psychoeducation and exercise strategies, proves more effective in improving anxiety and depression than other psychotherapeutic strategies.
- Quality of intervention matters more than quantity of interventions. Longer interventions do not necessarily bring about more improvements in mental health.
- Peer-delivered interventions, although require fewer resources, our analyses reveal that social support interventions facilitated by mental health professionals, are more effective.
- Face to face interventions were more effective than digitally delivered interventions.

- Digital health platforms are really useful modalities of social support interventions. However, more interdisciplinary research is required to improve it. And thus, these cannot be considered a substitute for face to face interventions.
- While appointing a facilitator or delivery agent, it is important to consider the power dynamics between the delivery agent and the interventions recipients. Staff members, supervisors and line managers may not be effective delivery agents due to an imbalance of power dynamics.

Limitations of current study

A plethora of factors limit findings from this mixed-methods review. Quantitative evidence in the meta-analysis was limited to few numbers of studies with substantial heterogeneity due to use heterogeneous psychometric tools, and theoretical basis of interventions. We could not find any studies reporting the cost-effectiveness of these interventions. We could not find any randomized controlled trials or qualitative studies reporting data from low and low to middle income countries. Therefore, the authors could not determine their uptake, acceptability, and effectiveness in this context. Our review is limited to three types of interventions: a) peer-groups b) social network interventions (improving quality or size), and c) social skills development. We could not find any randomized controlled trials reporting evidence on interventions implemented at organizational level.

Recommendations for future research

- **Standardization of psychometric tools:** The interventions included in our analyses used different psychometric instruments for the assessment of anxiety and depression. This introduced significant heterogeneity in the reporting of these outcomes. In a recent meta-regression analysis, significant variations in prevalence estimates were reported due to the use of varying psychometric scales. Studies performing diagnostic interviews report a substantially lower prevalence rate (5.22%) than questionnaire based surveys (19.14%)⁵⁷. Besides, some of the scales may not be as sensitive to change in symptom severity and inappropriate for use in trials. Therefore, we recommend that future randomized controlled trials consider semi-structured diagnostic interviews such as the Structured Clinical Interview for DSM Disorders (SCID) or The Mini-International Neuropsychiatric Interview (MINI)^{58,59}. In scenarios where resources are constrained, we recommend using the Patient Health Questionnaire (PHQ-9) and Generalized Anxiety Disorder scale (GAD-7) to assess mental health at workplaces, severity and response to interventions^{60,61}.

- More interventional and implementation research is required in context of low and middle income countries.
- Organizational level interventions, focusing on structural or material support extended by workplaces, need to be developed and tested.
- Most of the available evidence is of poor quality, high quality RCTs should be conducted in future.

Recommendations for future implementation

- It is essential to involve end-consumers in the intervention development process to design a successful intervention. This is important to design interventions that are tailored to a particular setting, as per the wishes of the intervention recipients.
- Although digital interventions have a high uptake, it is essential to gauge e-health literacy levels among intervention recipients before implementing it.
- Moreover, it is also important to develop ethical guidelines for the dissemination of such intervention through e-health interventions.
- While it is important to ensure confidentiality and privacy, mental health stigma continues to be an important deterrent to achieve substantial success. We urge policymakers to prioritize mental health stigma in the workplaces.
- Future studies should also evaluate the cost-effectiveness of these interventions as financial constraints may or may not be a limiting factor in the implementation of these interventions at the workplaces.
- There is also a need for standardized psychometric measures in future studies as varying assessment techniques introduce heterogeneity among studies, obscuring the quality and interpretation of evidence.
- We did not find any trials focusing on structural or material support extended by workplaces. However, recent studies emphasize the healthcare professionals' preference for organizational provision of personal protective equipment over professional help for individual symptoms amid the COVID-19 pandemic⁶². Kiseley et al. (2020) and De Brier et al. (2020) emphasized the importance of clear communication, access to adequate personal protective equipment, adequate rest, practical and psychological support, and a personal sense of control^{63,64}. Therefore, the need for organizational support for the provision of the aforementioned resources is as important as the provision of mental health assistance.

- Consider the power dynamics between the delivery agent and the interventions recipients. Avoid Staff members, supervisors and line managers as delivery agents.
- Ensure confidentiality and privacy as mental health stigma continues to be an important deterrent, especially at workplaces.
- Quality matters more than quantity (dose).

Conclusion

A plethora of epidemiological and experimental evidence have consistently reported social support as an important psychosocial correlate of mental well-being among both the clinical and non-clinical populations. Social support interventions or complex interventions packing social support elements are effectively improve anxiety and depression among young healthcare students and professionals. These interventions improve mental health and promote a culture of respect and improve tolerance and social diversity at workplaces.

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Appendix:

Methods

- Search Strategy
- Detailed methods for meta-analyses; GRADE and meta-synthesis

Results

- Tables: Characteristics of RCT and qualitative studies
- Table: Quotes relevant to social support interventions identified in qualitative investigations arranged according to themes
- Graphs: Forest plot, Risk of bias graphs, Funnel plots
- Analytical tables: Subgroup analyses, Meta-regression table (density of dose), GRADE table
- Scientometric plots: Publication patterns, top collaborative entities divided into regions, countries and funding organizations
- Scientometric keyword figure showing most cited keywords in social support research
- Cluster analyses showing timewise presentation of themes of research in social support

Appendix 1: Methodology

Phase 1: Scientometric analysis

The scientometric analyses were conducted using the CiteSpace software (v 5.7.R1, Drexel University, USA), which allows visualization of bibliometric data, by leveraging the theory of co-citation analyses^{1,2}. Quintessentially, by using reproducible techniques of cluster analysis and co-citation analyses, studies co-cited by source articles were tracked to visualize clusters of homogeneous research sharing a common theme, which were further named using three algorithms: term frequency–inverse document frequency (TFIDF), log-likelihood ratio (LLR) and mutual information (MI)^{1,2}. In resulting visualizations, influential studies and theories (centrality ≥ 0.1) are visualized as: highly cited studies (tree-ring), purple rings (revolutionary concepts bridging two different clusters) and red rings (hotspots showing bursts of citations activity in a short timeframe)^{1,2}. These analyses were conducted by dividing the bibliographic literature into 5 year slices from 1990-2020, with each slice presented with top 50 cited articles. The final analyses included 369 nodes, 465 edges, yielding a high modularity value ($Q=0.84$, Silhouette value= 0.55). To identify influential institutions, funding bodies and top cited keywords in this domain, we divided the bibliographic data from 1990 to 2020 into 1 year slices, yielding 15628 records.

Phase 2: Systematic review & meta-analysis

Study Selection Process

On August 30th, 2020, ten electronic databases were searched using a predefined search strategy including PubMed, Scopus, Web of Science (all databases including core collection, BIOSIS Previews, MEDLINE, KCI-Korean Journal Database, SciELO Citation Index, Russian Science Citation Index, BIOSIS Citation Index and Data Citation Index), PsycINFO (including PsycArticles), Cochrane Central Trial Registry (including EMBASE, ICTRP, CT.gov and CINAHL). There were no restrictions based on age, gender, and publication year during these searches. Search strategy for PubMed is presented as Supplementary table 1.

Inclusion & exclusion criteria

- For effectiveness of interventions, RCTs and controlled before and after studies were included. However, articles assessing acceptability, feasibility, evaluation, and implementation of these interventions in cross-sectional, qualitative, RCTs and mixed method designs were considered.
- Healthcare workers aged 18-24 years, at all levels of training and career levels were considered. Healthcare worker population include but not limit to doctors, nurses, healthcare students, psychologists and allied medical and psychiatric staff.
- Psychological or psychosocial interventions comprising of social support strategies either given standalone or in combination with other psychotherapeutic strategies were reviewed.

Main outcome

- a) Rates of depressive disorder assessed post-intervention.
- b) Rates of anxiety disorder assessed post-intervention.
- c) Severity of depressive symptoms assessed post-intervention.
- d) Severity of anxiety symptoms assessed post-intervention.

Measures of effect

Hedges' g

Selection and coding procedure

Aided by Rayyan software, one reviewer screened titles and abstract of bibliographic records as per our pre-defined inclusion and exclusion criteria. A senior reviewer performed title and abstract screening of 10% of the bibliographic records to compute inter-rater reliability. This was followed by screening of full texts of studies by two independent reviewers to finalize studies eligible for inclusion in the review. Any discrepancies in the inclusion process were resolved by discussion among the reviewers and senior authors. Data extraction was performed across several matrices including characteristics of publications such as author characteristics, characteristics of the population pertaining such as age range, inclusion criteria in studies, background of intervention recipients and setting of intervention.

Elements of interventions related to social support were identified using the distillation and matching method proposed by Chorpita et al (2005)³. Qualitative evaluation outcomes of interest were perspectives of patients, researchers and stakeholders on acceptability and feasibility of these interventions. All data will be extracted by two independent reviewers and then compared for consistency. Any conflicts will be resolved after discussion with the senior authors.

Risk of bias (quality) assessment

Two reviewers assessed the quality of the studies independently using the Cochrane tool for randomized controlled trials, against several matrices including "random sequence generation, allocation concealment, blinding of participants and personnel, blinding of outcome assessment, in-complete outcome data, selective reporting and other bias"⁴. Discrepancies were resolved by discussion and guidance from a senior reviewer. GRADE method were used to grade the certainty of evidence for these interventions both the anxiety and depression outcomes⁵.

Quantitative Data analyses

For quantitative outcomes, post- intervention sample size and mean (SD) for both the intervention and control groups were extracted. If mean (SD) for outcomes are not available, we extracted dichotomous data such as rates of outcomes and sample sizes for both the intervention and control group. Effect sizes (Hedges' g) were calculated for each outcome and then pooled and presented as a forest plot. Random effects were applied throughout the analyses due to expected heterogeneity in the studies⁶. Sensitivity analysis were run to assess contribution of each study especially outlier studies, to the pooled effect size. Publication bias was assessed using Begg's funnel plot and Egger's regression statistics considered significant⁷. If there was evidence for significant publication bias, trim and fill method will be used to estimate Hedges' g after adjusting for publication bias. Subgroup analyses were conducted if specific subgroups were reported in more than 4 studies, to ensure optimum statistical power⁸. Subgroups of interest included type of delivery agents, format of delivery of interventions, and type of social support intervention. Meta-regression analyses were conducted if continuous covariates are reported in more than ten studies. Continuous covariates of interest included dose of interventions. Subgroup analyses will be conducted if specific subgroups are reported in more than 4 studies, to ensure optimum statistical power⁸.

Phase 3: Meta-ethnographic analyses

Study selection process

Qualitative and mixed-methods studies identified during phase II were included in meta-synthesis (*Please see study selection process for details*). We included studies describing delivery agents, intervention recipients and other relevant stakeholders' lived experiences and perspectives on feasibility,

acceptability, barriers and facilitators in the implementation of psychological and psycho-social interventions for healthcare professionals.

Data extraction

Two reviewers independently assessed the eligibility of studies and extracted data. Data extracted included author, year, study design (qualitative or mixed method), publication type (e.g. feasibility, acceptability), sample size, data collection and data analysis method, along with participants 'quotes. Using a pre-tested excel sheet, two reviewers performed extraction of qualitative data from eligible studies. These variables informed categorization of qualitative information into specific themes.

Analysis

Thematic analysis approach by Braun and Clarke (2006) to analyzing qualitative data was used that allowed the thematic identification and summarization of data from included studies. we conducted, all six phases described by Braun and Clarke (1) becoming familiar with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining themes and, (6) the write-up process⁹. All included studies were read multiple times to facilitate understanding of the key concepts in the included studies. All the included studies were read and re-read by two reviewers. Qualitative data (participants 'quotes) were extracted and grouped into broad themes by the reviewers. Broad themes and subthemes were then refined through discussion between both reviewers until consensus was reached. Once the themes had been broadly agreed, one reviewer read through the data in each of the themes checking that the interpretation of the data was correct and suggesting changes based on the original context of the studies.

After categorization of data into themes and sub-themes, one reviewer drew their interpretations and conclusion (second order construct), distilled from primary studies using Noblit & Hare's meta-ethnographic approach¹⁰.

Appendix II: Detailed Results

3.1. Research Trends in social support research

A country-wise analysis of social support research revealed a dominance of the US, the UK, Sweden, Netherlands, Canada, South Africa and France. The US and the UK emerged as the most central collaborative entity in country specific collaborative networks, as well as driving the most innovation in this field. No specific institution emerged as a significant collaborative entity into his domain of research. Only three institutes were recognized as central entities in this domain, including NIH National Heart, Lung, and Blood Institute, University of California and Yale University. Most central funders included the NIMH, MRC, National Cancer Institute (USD), and the National Institute of Child Health & Development. An analysis of keyword revealed several important insights pertaining to the health conditions and populations studied in context of social support (Supplementary figures 1 to 5).

3.2. Effectiveness

The present meta-analysis included a total of 17 studies, describing 19 trials of psychological and psychosocial therapies with social support as a therapeutic component. The qualitative evidence was informed by a total of 9 studies utilizing qualitative or mixed-methods study designs. These studies were identified after scrutinizing a total of 20,267 titles and abstracts (PRISMA flow chart, Supp. Figure 6).

Scales used for assessment of Anxiety: A total of eight studies reported effects of psychosocial interventions on anxiety among young healthcare professionals. There was a substantial heterogeneity in

reporting of these outcomes mainly owing to heterogeneous intervention contents and use of different psychometric instruments assessing severity of anxiety symptoms ($I^2= 79.20\%$, $P < 0.001$, $Q= 33.65$). Three out of four studies utilized Spielberger State-Trait Anxiety Inventory (STAI) for evaluating anxiety, followed by GAD-7 ($n=2$), and Beck Anxiety Inventory, Symptom Checklist-90 items, and Anxiety Sensitivity Questionnaire (one study each).

There was a substantial heterogeneity in reporting these outcomes due to heterogeneous intervention contents and different psychometric instruments assessing severity of anxiety symptoms ($I^2= 79.20\%$, $P < 0.001$, $Q= 33.65$). Meta-analysis with random effects yielded a significant pooled effect size in favor of the intervention group. A cumulative sample of 612 participants revealed a moderate to large effect size (Hedges $g= -0.733$, 95% CI: -1.13 to -0.34) (Figure 2 and supplementary figure 9). These effect sizes were reported post-intervention, and no effect sizes on either short-term or long term follow ups were available.

Scales used for assessment of depression: A total of six studies reported severity of depressive symptoms as an outcome, assessed using a variety of validated psychometric instruments. These tools included Beck Depression Inventory ($n=2$), Center for Epidemiological Studies-Depression ($n=1$), Symptom checklist-90 items ($n=1$), PANAS and Patient Health Questionnaire-9 items ($n=1$). There was a substantial heterogeneity in reporting of these outcomes, mainly because of use of different psychometric instruments and different content of interventions ($I^2= 91.87\%$, $P < 0.001$, $Q= 61.48$).

A total of six studies reported the severity of depressive symptoms as an outcome, assessed using a variety of validated psychometric instruments (Supplementary table 2 & 3). There was substantial heterogeneity in reporting these outcomes, due to different psychometric instruments and different content of interventions ($I^2= 91.87\%$, $P < 0.001$, $Q= 61.48$).

Meta-analysis with random effects yielded a pooled effect size in favor of the intervention group. a moderate to large treatment effect was seen in a cumulative sample size of 482 participants (Hedges $g= -0.74$, 95% CI: -1.47 to -0.01) (Figure 2 and supplementary figure 9).

Meta-analysis for Perceived Stress: Perceived stress was studied as an outcome in a total of eight studies, with a cumulative sample size of 608 participants. There was an evidence of significant heterogeneity in reporting of this outcome ($I^2= 65.94\%$, $P < 0.001$, $Q= 20.55$). To assess the level of perceived stress, three of these studies used Perceived Stress Questionnaire, followed by Perceived Stress Scale ($n=2$) and Graduate Stress Inventory ($n=2$). It yielded a non-significant and weak effect size in favor of the intervention group (Hedges $g= -0.123$, 95% CI: -0.40 to 0.16). These non-significant effect sizes persisted at follow up assessments ($n= 7$, Hedges $g= -0.01$, 95% CI: -0.21 to 0.19). Sensitivity analyses did not reveal any change in significance of effect sizes.

Moderator analyses for stress: For perceived stress, interventions testing mutual aid groups and delivered face to face yielded higher effect sizes.

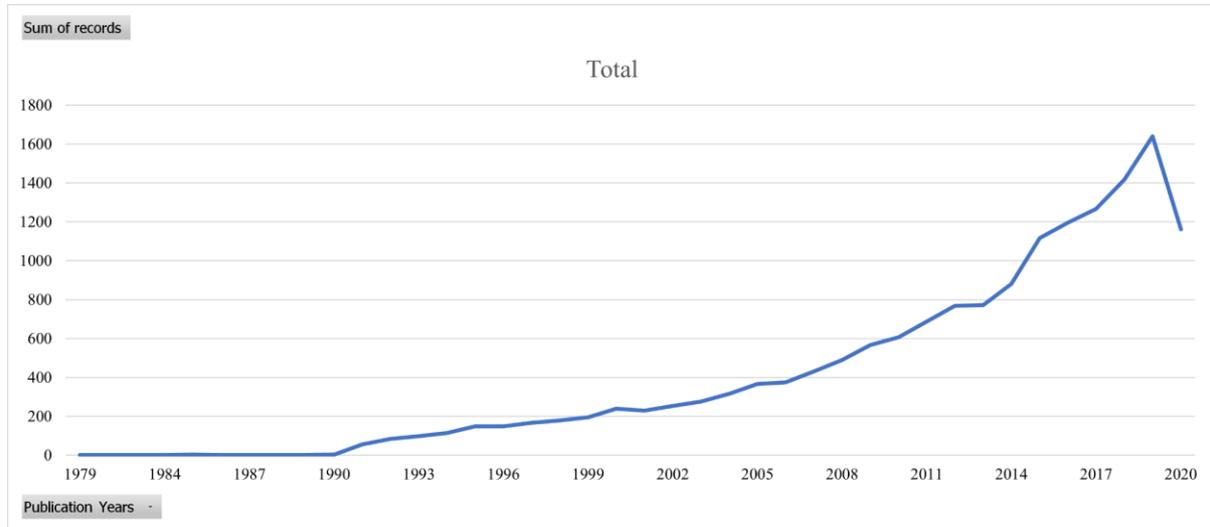
Publication bias

There was no evidence of publication bias in reporting of any of the outcomes (Egger's regression $p > 0.10$) (Supplementary Figure 9 to 11).

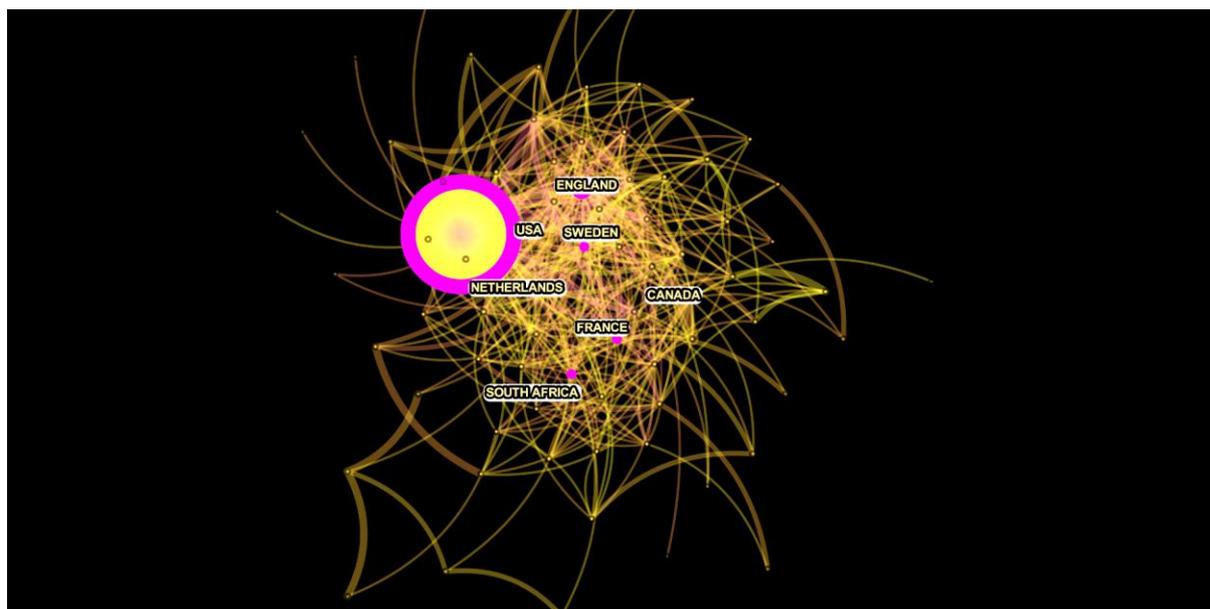
Risk of bias

Among the included RCTs (8/17) reported an overall higher risk of bias with ≥ 3 domains. High or unclear risk of bias was found across: blinding of participants and personnel ($n=7$), random sequence generation ($n=9$), allocation concealment ($n=10$), and blinding of outcome assessors ($n=10$) (Figure 3 and Supplementary figure 8).

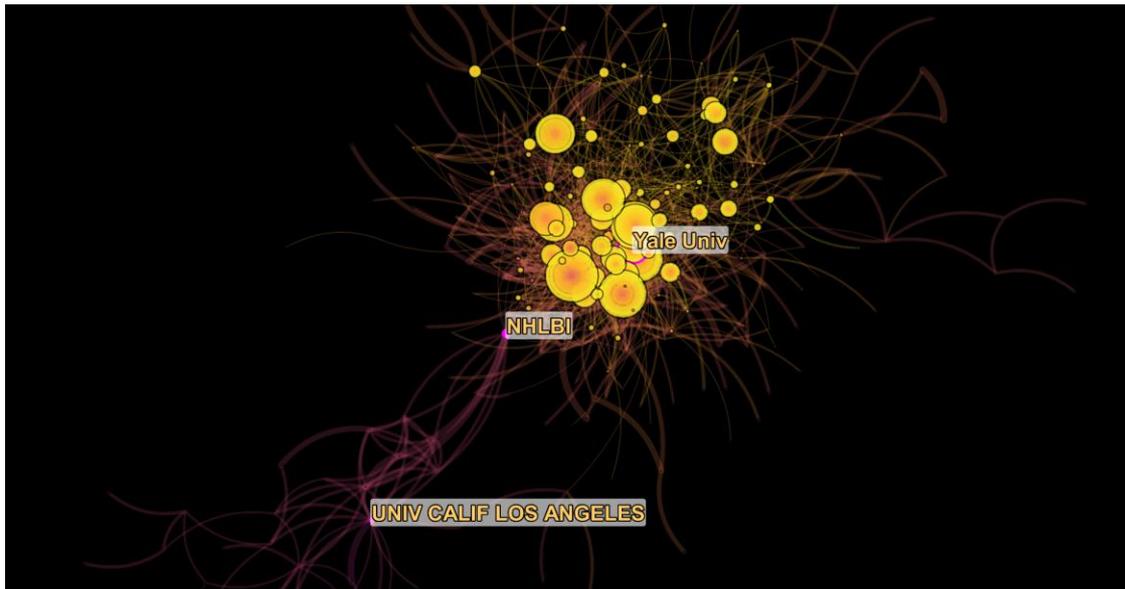
Supplementary figure 1: Publication trends in social support research



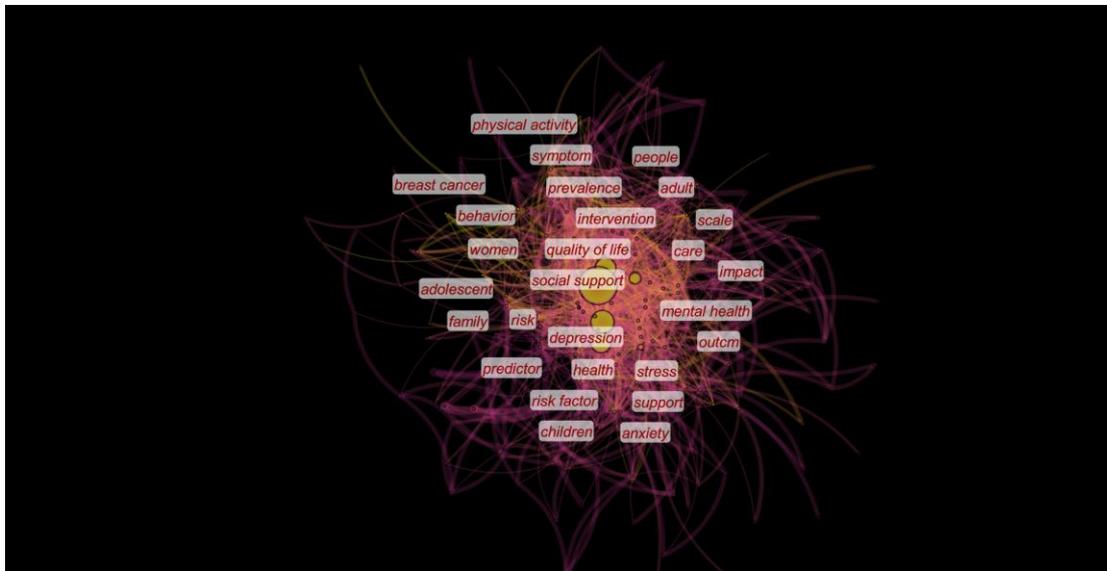
Supplementary figure 2: Regions central to social support research



Supplementary figure 3: Institutes central to social support research



Supplementary figure 4: Top cited keywords in social support research



Supplementary figure 5: Time-period wise clusters of research



Supplementary Table 1: Search strategy adapted for PubMed

("medical student*" [Title/Abstract] OR "nurs*" [Title/Abstract]) OR "healthcare worker*" [Title/Abstract] OR "healthcare professional*" [Title/Abstract] OR "paramedical staff" [Title/Abstract] OR "ambulatory staff" [Title/Abstract] OR "emergency technician*" [Title/Abstract] OR "physician*" [Title/Abstract] OR "surgeon*" [Title/Abstract] OR "physiotherapist*" [Title/Abstract] OR "psychiatrist*" [Title/Abstract] OR "psychologist*" [Title/Abstract] OR "therapist*" [Title/Abstract] OR "social worker*" [Title/Abstract] OR "pharmaceutic*" [Title/Abstract] OR "postgraduate trainee*" [Title/Abstract] OR "hospital staff" [Title/Abstract] OR "allied healthcare worker*" [Title/Abstract] OR "medical staff" [Title/Abstract] OR "clinician*" [Title/Abstract] OR "trainee*" [Title/Abstract] OR "resident*" [Title/Abstract] OR "health worker*" [Title/Abstract] OR "primary care" [Title/Abstract] OR "health professional*" [Title/Abstract] OR "community health worker*" [Title/Abstract] OR "health aide" [Title/Abstract] OR "lay health worker*" [Title/Abstract] OR "midwi*" [Title/Abstract] OR "allied health staff" [Title/Abstract])

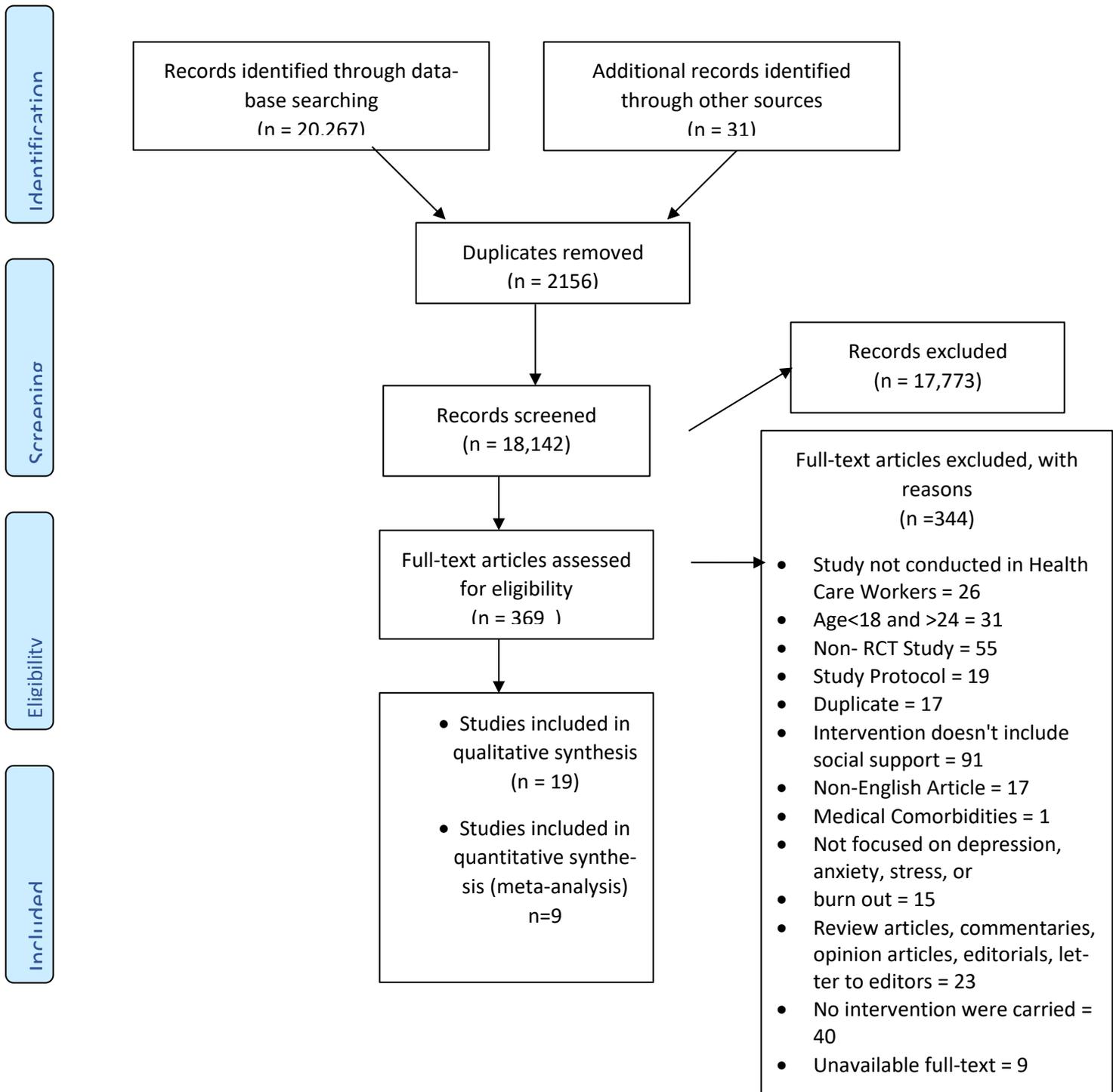
AND ("organizational support" [Text Word] OR "peer support" [Text Word] OR "peer group*" [Text Word] OR "emotional support" [Text Word] OR "social support" [Text Word] OR "support group" [Text Word] OR "social skill*" [Text Word] OR "life skill*" [Text Word] OR "social therapy" [Text Word] OR "instrumental support" [Text Word] OR "interpersonal" [Text Word] OR "family support" [Text Word] OR "mental health support" [Text Word] OR "problem solving" [Text Word] OR "empathy training" [Text Word] OR "compassion training" [Text Word] OR "conflict resolution" [Text Word] OR "peer counsel*" [Text Word] OR "social awareness" [Text Word] OR "assertiveness training" [Text Word] OR "relationship skills" [Text Word] OR "social activities" [Text Word] OR "socialization" [Text Word] OR "initiating conversation" [Text Word] OR "social support training" [Text Word] OR "self-help groups" [Text Word] OR "insight build*" [Text Word] OR "disclosure skills" [Text Word] OR "emotional expression" [Text Word] OR "network building" [Text Word] OR "supportive telephone calls" [Text Word] OR "sharing feelings" [Text Word] OR "sharing experiences" [Text Word] OR "informational support" [Text Word] OR "affirmational support" [Text Word] OR "supportive therapy" [Text Word] OR "supportive psychotherapy" [Text Word] OR "social network*" [Text Word] OR "mutual help group*" [Text Word] OR "structural social support" [Text Word] OR "functional social support" [Text Word] OR "supportive listening" [Text Word] OR "social assistance" [Text Word] OR "group meditation" [Text Word] OR "psychosocial support" [Text Word] OR "community network" [Text Word] OR "social network*" [Text Word] OR "care network*" [Text Word] OR "peer network" [Text Word] OR "friend*" [Text Word] OR "workplace intervention*" [Text Word] OR "social ties" [Text Word] OR "social integration" [Text Word])

AND ("intervention*" [Title/Abstract] OR "RCT" [Title/Abstract]) OR "randomized controlled trial" [Title/Abstract] OR "cluster randomized controlled trial" [Title/Abstract] OR "evaluation" [Title/Abstract] OR "acceptability" [Title/Abstract] OR "stakeholder perspective" [Title/Abstract] OR "implementation" [Title/Abstract] OR "feasibility" [Title/Abstract] OR "trial" [Title/Abstract] OR "barrier*" [Title/Abstract] OR "facilitator*" [Title/Abstract] OR "effectiveness" [Title/Abstract] OR "efficacy" [Title/Abstract] OR "qualitative" [Title/Abstract])

AND ("depress*" [Title/Abstract] OR "anxious" [Title/Abstract] OR "anxiety" [Title/Abstract] OR "distress" [Title/Abstract] OR "stress" [Title/Abstract] OR "burnout" [Title/Abstract] OR "worry" [Title/Abstract] OR "mood" [Title/Abstract] OR "mental health" [Title/Abstract] OR "well-being" [Title/Abstract])

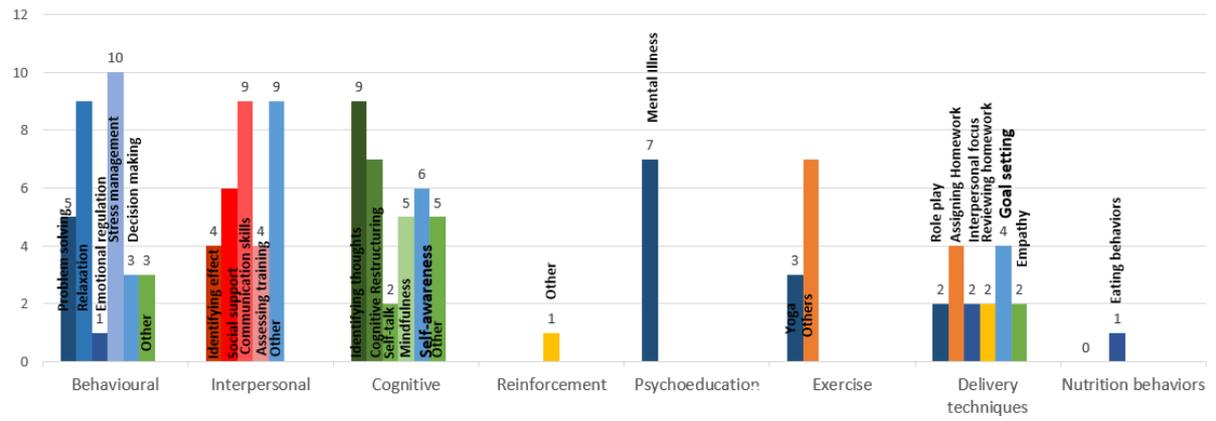
NOT ("Postnatal" [Title] OR "prenatal" [Title] OR "perinatal" [Title] OR "antenatal" [Title] OR "pregnan*" [Title] OR "cancer*" [Title] OR "stroke" [Title] OR "postpartum" [Title] OR "school-going" [Title] OR "nursing home*" [Title] OR "elderly" [Title] OR "parent*" [Title] OR "hypertensi*" [Title] OR "diabet*" [Title] OR "risk factor*" [Title] OR "epidemiological" [Title] OR "predictor*" [Title] OR "correlate*" [Title] OR "systematic-review" [Title] OR "patient*" [Title] OR "cardiac" [Title] OR "coronary" [Title] OR "chronic disease*" [Title] OR "learning disability" [Title] OR "review" [Title] OR "alzheimer*" [Title] OR "dementia" [Title] OR "cardiovascular" [Title] OR "childhood" [Title] OR "longitudinal" [Title] OR "determinant*" [Title] OR "child*" [Title] OR "autism" [Title] OR "schizophrenia" [Title] OR "psychosis" [Title] OR "bipolar" [Title] OR "neoplastic" [Title])

Supplementary figure 6: PRISMA flowchart for selection of studies

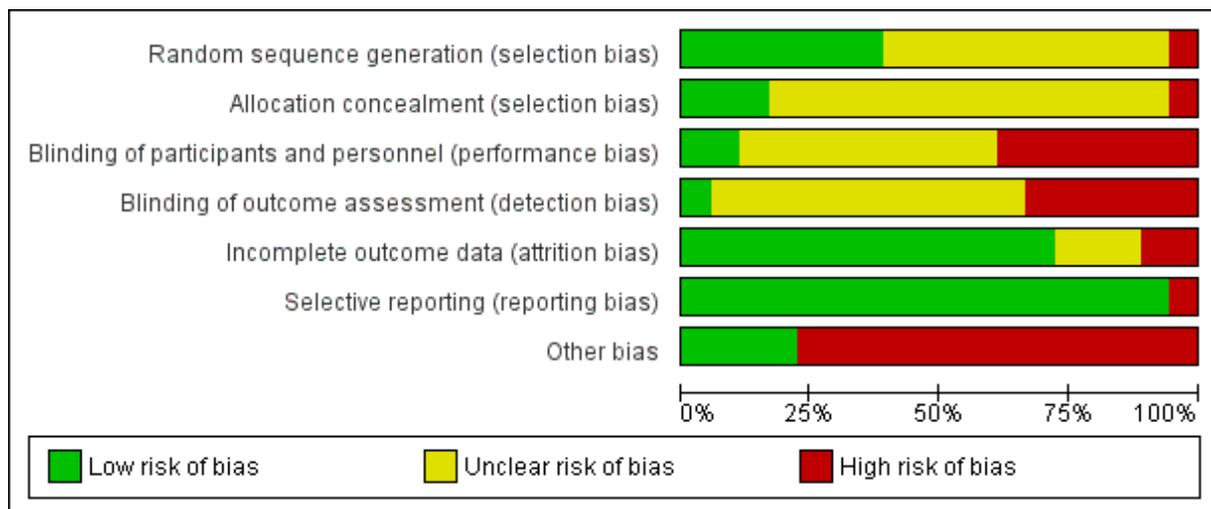


Supplementary figure 7: Active elements in social support interventions

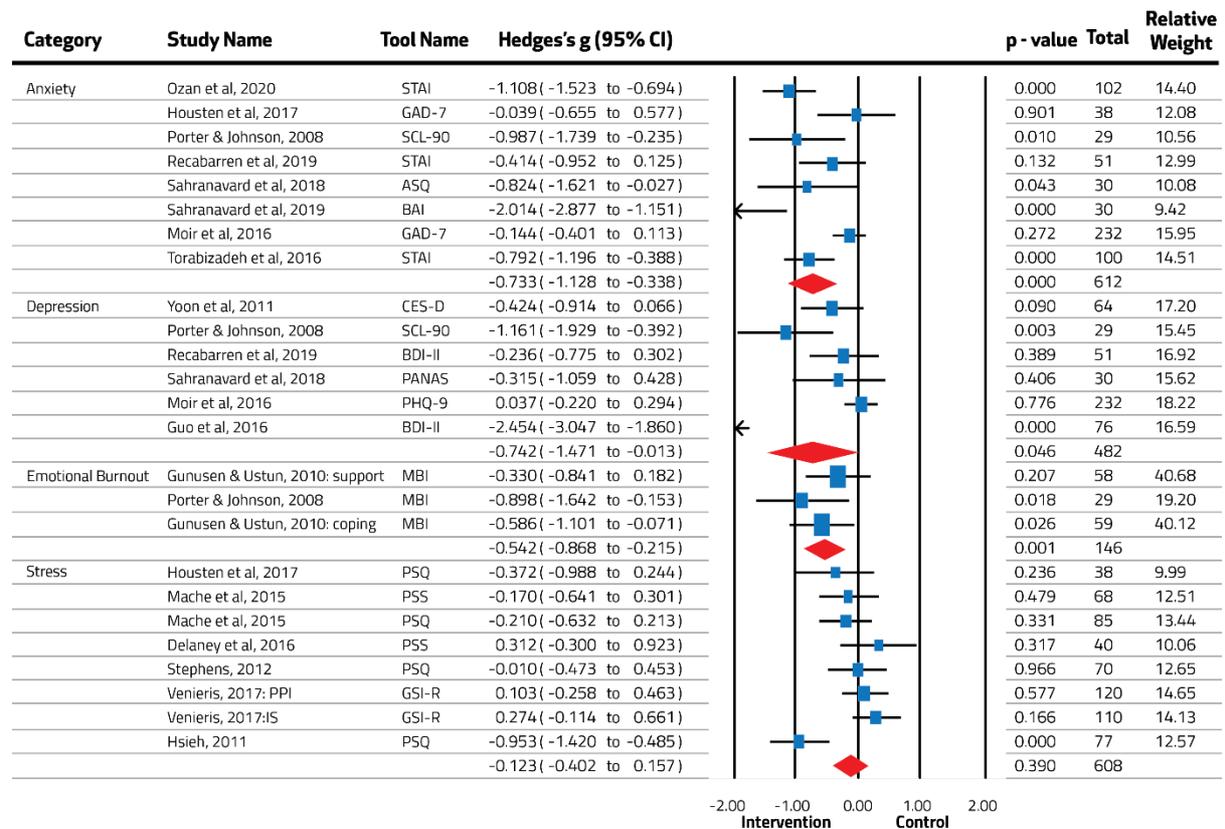
Specific therapeutic ingredients (N=17)



Supplementary Figure 8: Risk of bias graph



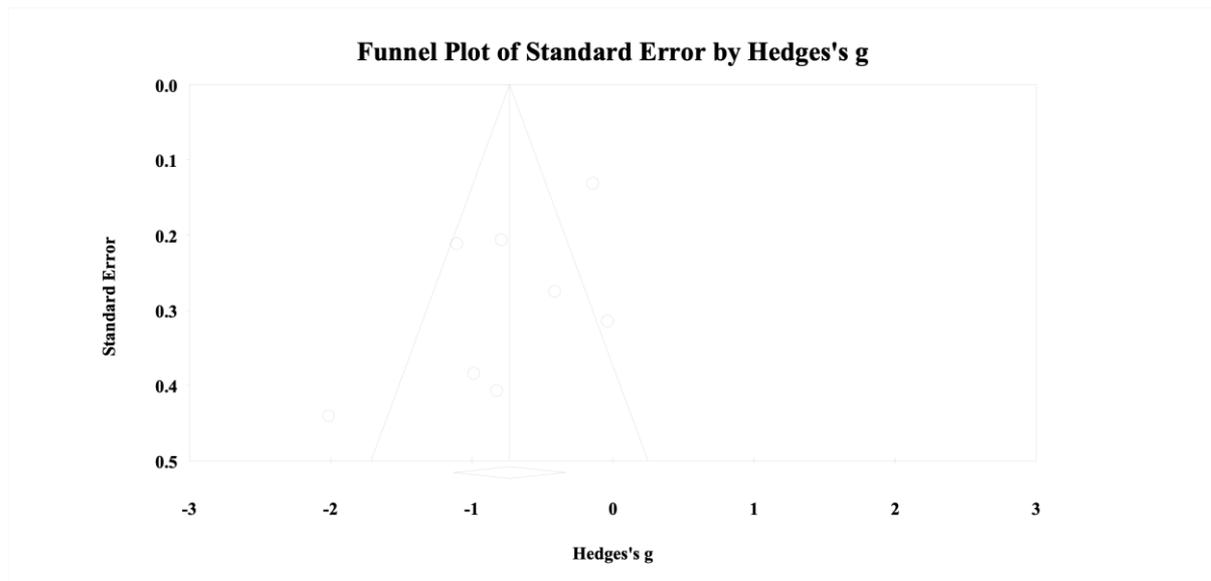
Supplementary figure 9: Forest plot showing effectiveness of social support interventions in improving anxiety, depression, burnout and perceived stress among young healthcare workers.



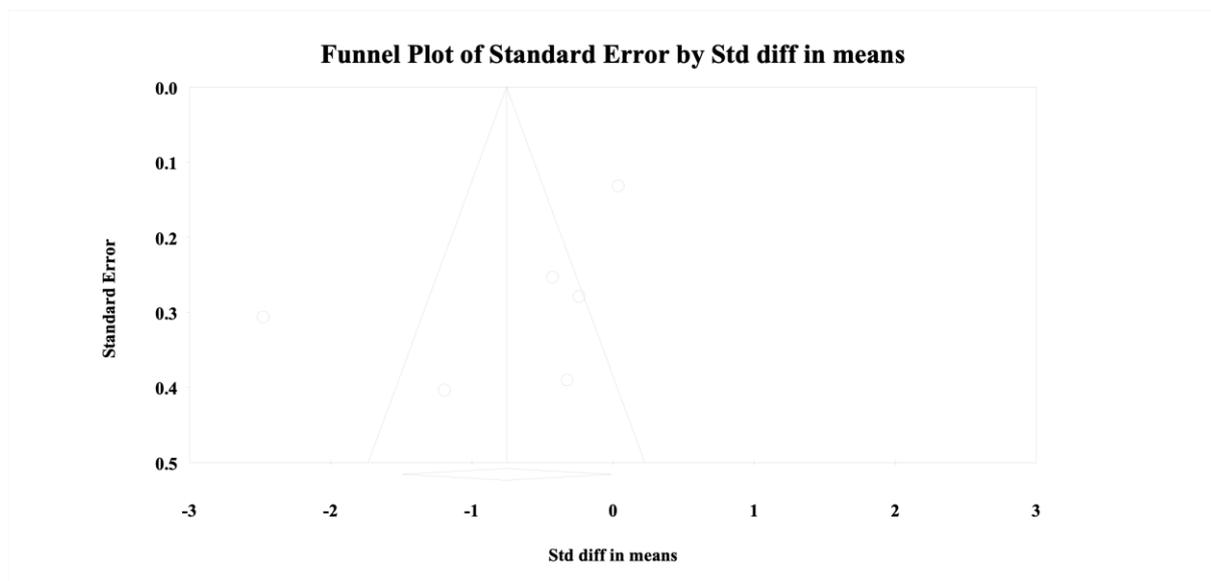
Supplementary figure 10: Risk of bias in included randomized controlled trials

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants and personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Delaney, 2016	?	?	?	+	?	+	-
George, 2013	?	?	?	?	-	+	+
Günüşen, 2010	+	+	-	-	+	+	-
Guo, 2016	?	?	?	?	+	+	-
Houston, 2017	?	?	-	-	+	+	-
Hseih, 2011	?	?	?	?	+	+	-
Mache, 2015 a	?	?	?	?	+	+	-
Mache, 2015 b	+	?	?	?	+	+	-
Mejia-Downs, 2016	?	?	-	-	+	+	-
Ozan, 2020	+	?	+	?	+	+	+
Porter, 2008	?	?	+	?	+	+	-
Recabarren, 2019	+	?	-	-	+	-	+
Sahranavard, 2018	?	?	-	-	?	+	-
Sahranavard, 2019	?	?	-	-	?	+	-
Stephens, 2012	+	+	?	?	+	+	-
Torabizadeh, 2016	+	+	-	?	+	+	+
Venieris, 2017	+	?	?	?	-	+	-
Yoon, 2011	-	-	?	?	+	+	-

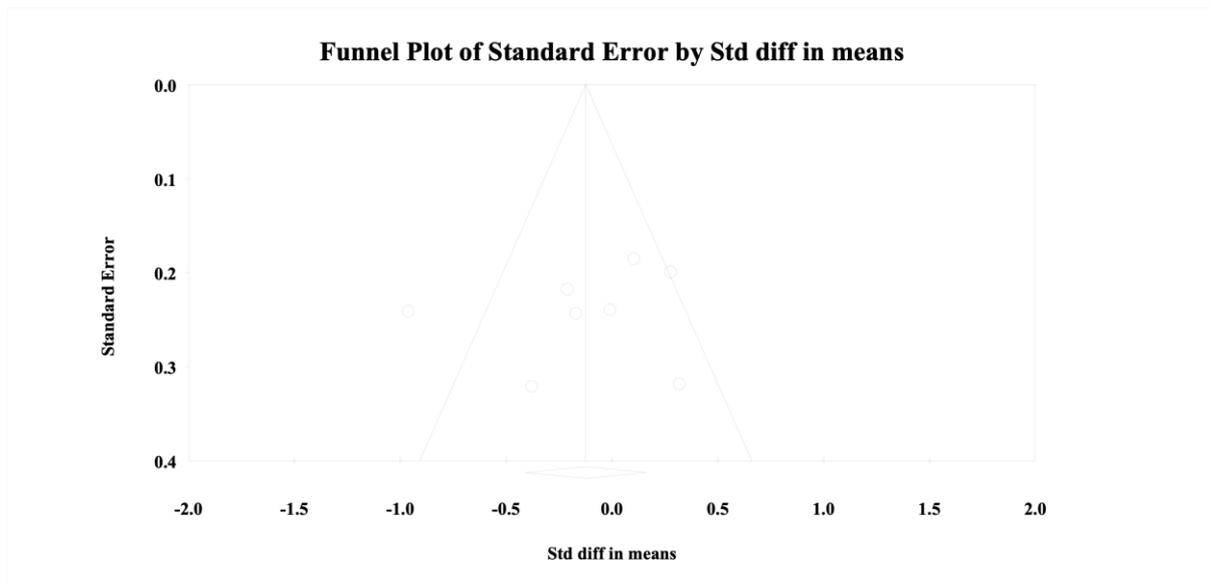
Supplementary Figure 11: Funnel plot for anxiety outcome



Supplementary Figure 12: Funnel plot for depression outcome



Supplementary Figure 13: Funnel plot for stress outcome



Supplementary Table 2: Characteristics of RCTs

Study ID	Format of delivery	Intervention focus	Population focus	Mental health tool	Theoretical orientation	Delivery agent	Number of sessions	Duration of sessions	Duration of programme
Guo, 2016	Group	Treatment	Targeted	Depression; BDI-II	Theory of positive psychology (Seligman et al, 2006)	Instructors	8	1.5 hours	8
Mache, 2015a	Group	Promotion	Universal	PSQ, Copenhagen Psychosocial Questionnaire “Brief Resilient Coping Scale” and “Self-Efficacy, Optimism, and Pessimism.	Cognitive behavioral and solution-focused counseling	Psychologists	12	2 hours	12

Delaney, 2016	Group	Promotion	Universal	PSS, Resilience (Brief resilience scale)	Watson's Human Caring Theory	Instructors	2	2.5 hours	NA
Ozan, 2020	Group	Promotion	Universal	STAI & Ways of coping	Watson's Human Caring Theory	Instructors			12
Hseih, 2011	Group	Promotion	Universal	PSQ	NA	Specialist/researcher	16	30 minutes thrice a week for PA and 2 hours of group discussion in whole program	16 weeks
Torabizadeh, 2016	Group	Treatment	Targeted	STAI	NA	Peers	5	not specified	1 week (5 days)
Moir, 2016	Group	Promotion	Universal	GAD-7; PHQ-9	NA	Peers	19	NA	26
Mejia-Downs, 2016	Group	Promotion	Universal	PSS	Not specified	Not specified	4	2 hours	4 weeks

Sahranavard, 2018	Group	Treatment	Targeted	Anxiety sensitivity - Anxiety sensitivity questionnaire; BAI	Cognitive behavioral theory	Clinical psychologist	6	90 minutes.	3
Sahranavard, 2019	Group	Treatment	Targeted	Anxiety sensitivity - Anxiety sensitivity questionnaire; BAI	Cognitive behavioral theory	Clinical psychologist	6	90 minutes.	3
Yoon, 2011	Group	Treatment	Targeted	Interpersonal relationships; Relationship Change Scale, Rosenberg's (1965) Self-Esteem Scale , CES-D	NA	Psychiatric mental health practitioner with a doctoral degree in psychiatric nursing	10	90 minutes.	10

Mache, 2015b	Group	Promotion	Universal	PSQ	Cognitive behavioral and solution focused approach	Psychologist	12	2 hours	12
Stephens, 2012	Online	Promotion	Universal	PSS	Youth Resilience Framework (Rew & Horner, 2003) & Ahern's Model of Adolescent Resilience (Ahern, 2006).	NA			6 weeks
Gunusen, 2010a	Group	Prevention	At risk	MBI	Not specified	Researcher	7	1.5-2 hours.	7
Gunusen, 2010b	Group	Prevention	At risk	MBI	Gibbs' reflection model	Researcher	7	1.5-2 hours.	7

Houston, 2017	Group	Promotion	Universal	Connor-Davidson Resilience Scale ; BRIEF-COPE	NA	Social worker	3	45 minutes.	3 weeks
Recabarren, 2019	Group	Prevention	Universal	SCL-27, BDI-II, STAI	Components of mindfulness, cognitive, and behavioral strategies and social skills	Clinical psychologist	8	2 hours.	8
Venieris, 2017	Online	Promotion	Universal	PSS	Positive psychology	Online/managed via "Blackboard" platform			3
Porter, 2008	Group	Promotion	Universal	SCL-90	CBT	Counselors	15	Not specified	15

BDI-II: Beck Depression inventory; BAI: Beck Anxiety Inventory; MBI: Maslach Burnout Inventory; SCL-90: Symptom Checklist; PSS: Perceived Stress Scale; PSQ: Perceived Stress Questionnaire; STAI: State-Trait Anxiety Scale; NA: Not available

Supplementary Table 3: GRADE Table

Certainty assessment							Absolute effect size (95% CI)	Certainty
N ^o of studies	Study design	Risk of bias	Inconsistency	Indirectness	Imprecision	Other considerations		
Anxiety (assessed with psychometric scales)								
8	randomised trials	serious ^a	serious ^b	not serious	not serious	strong association	SMD 0.733 SD lower (1.13 lower to 0.34 lower)	⊕⊕⊕○ MODERATE
Depression (assessed with psychometric scales)								
6	randomised trials	very serious ^c	serious ^b	not serious	serious ^d	strong association	SMD 0.74 SD lower (1.47 lower to 0.01 lower)	⊕○○○ VERY LOW

CI: Confidence interval; SMD: Standardised mean difference

Explanations

- a. Six out of eight studies were rated as having an overall higher risk of bias. However, there were no significant differences between the two groups of studies.
- b. There was an evidence of substantial heterogeneity. This heterogeneity was completely explained by heterogeneous additional elements of interventions.
- c. All of the studies reporting this outcome were rated as having a high risk of bias.
- d. Wide confidence intervals

Supplementary Table 4: Moderator analyses

Subgroup	Number of studies	SMD	95% CI		I	Q	df	p
Severity of anxiety								
Tool name								
ASQ	1	-0.82	-1.67	0.02	0.00	20.3 3	4.00	<0.001
BAI	1	-2.01	-2.92	-1.11	0.00			
GAD-7	2	-0.12	-0.45	0.21	0.00			
SCL-90	1	-0.99	-1.79	-0.18	0.00			
STAI	3	-0.81	-1.12	-0.51	50.83			
Typology								
Mutual aid	4	-0.46	-0.94	0.02	72.22	2.51	1.00	0.11
Social network intervention	4	-1.03	-1.54	-0.51	70.84			
Risk of bias								
High	6	-0.63	-1.08	-0.19	77.15	0.57	1.00	0.45
Low	2	-0.95	-1.64	-0.26	12.77			
Peers as mediating delivery agents								
No	6	-0.87	-1.35	-0.40	71.86	0.91	1.00	0.34
Yes	2	-0.46	-1.16	0.25	85.85			
Severity of depression								
Tool name								
BDI-II	2	-1.34	-3.51	0.83	96.60	0.73	4.00	0.95
CES-D	1	-0.42	-3.48	2.64	0.00			
PANAS	1	-0.32	-3.43	2.79	0.00			
PHQ-9	1	0.04	-2.99	3.07	0.00			
SCL-90	1	-1.16	-4.28	1.96	0.00			
Typology								
Mutual aid	3	-1.17	-2.40	0.07	96.71	0.89	1.00	0.35
Social network intervention	3	-0.33	-1.56	0.91	0.00			
Multicomponent								

No	1	-2.45	-3.31	-1.60	0.00	19.97	1.00	<0.001
Yes	5	-0.33	-0.70	0.03	60.50			
Population								
Medical students	2	-0.13	-1.57	1.31	0.00	1.95	3.00	0.58
Mixed	1	-0.24	-2.27	1.80	0.00			
Nursing students	2	-1.42	-2.87	0.02	96.26			
Paramedic students	1	-1.16	-3.27	0.95	0.00			
Scope of intervention								
Promotion	4	-0.39	-1.19	0.41	66.41	2.13	1.00	0.14
Treatment	2	-1.42	-2.54	-0.30	96.26			
Peers as mediating delivery agents								
No	5	-0.92	-1.76	-0.07	89.62	0.88	1.00	0.35
Yes	1	0.04	-1.77	1.84	0.00			

Supplementary Table 5: Meta-regression analysis

Covariate	Coefficient	SE	95% CI		Z-value	P-value
			Lower	Upper		
Intercept	-2.48	0.31	-3.08	-1.88	-8.1	<0.001
Social support typology: Social network intervention	-0.22	0.16	-0.54	0.09	-1.38	0.17
*Therapeutic elements						
Behavioural	1.8	0.36	1.1	2.51	4.99	<0.001
Behavioural & cognitive	2.11	0.34	1.45	2.77	6.27	<0.001
Behavioural, cognitive & exercise	2.37	0.4	1.59	3.15	5.96	<0.001
Behavioural, cognitive & psychoeducation	2.04	0.35	1.36	2.72	5.84	<0.001
Behavioural, cognitive & psychoeducation & exercise	3.02	0.47	2.1	3.94	6.43	<0.001
Cognitive	2.47	0.39	1.71	3.23	6.36	<0.001
Cognitive & exercise	2.88	0.37	2.16	3.61	7.77	<0.001
Cognitive & psychoeducation	2.43	0.32	1.8	3.05	7.58	<0.001
Exercise	1.52	0.39	0.75	2.28	3.89	<0.001
Psychoeducation	1.68	0.37	0.96	2.41	4.54	<0.001

*Reference group: Standalone social support; Set statistics: $Q=104.10$, $df=10$, $p<0.001$
 R^2 analog = 100%

Supplementary Table 6: Characteristics of qualitative studies

Author, year	Publication type	Study design	Intervention type	Country	Settings	Sample size	Data collection method	Analysis method	Research question
Delaney et al., 2016	Feasibility and potential efficacy	Feasibility and potential efficacy	Stress management	USA	University	7	Interviews	Descriptive phenomenology	To explore lived experiences of recipients
George et al., 2013	Feasibility	RCT	Stress management	USA	Medical college	1 FGD, 6 participants	Focus group	Thematic analysis	Participants experiences, helpful/unhelpful aspects, suggestions for improvement, discussion about admitting need for support.
Pei-Lin Hsieh, 2011	Effectiveness	Quasi-experimental design	Social support (and Physical activity)	Taiwan	School	NA	Group discussion using semi structured interview guide	Content analysis	Experience, symptoms, feeling and ways to manage stress, perceptions about program

Chiam et al., 2020	Acceptability	Qualitative	mindfulness	Singapore	University	4 FGDs with 20 participants	FGD using semi structured interview guide	Thematic analysis	to explore recipients' perceptions about program
Sprengel & Job, 2004	Effectiveness, acceptability	Qualitative	Peer mentoring	USA	University		Comments/free responses at the end of clinical evaluation forms	None	None
Stockmann et al., 2017	Acceptability	Qualitative	Peer support	UK	School	26/ 4 FGDs	Interviews	Thematic analysis	To explore recipients' perspective on training and training approach
Sugumar et al., 2019	Feasibility	Qualitative	Peer support		University		Survey	Thematic analysis, word cloud	To explore recipients' experiences
Palsson, 2017	Feasibility	Quasi-experimental with an intervention group only (Use qualitative data only)	Peer support	Sweden	Hospital	12 (6 pairs)	Semi structured interviews	Deductive content analysis	To assess whether the new graduates' descriptions of peer learning were in accordance with the theoretical description of peer learning

Stephens,2012	Effectiveness & acceptability	RCT & qualitative	Resilience intervention	USA	School	8	Survey	Content analysis	Participants experience and perceptions
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FGD: Focused Group Discussions; RCT: Randomized Controlled Trials; NA: Not available

Supplementary Table 7: Themes and corresponding quotes from qualitative studies

Theme		Codes & Representative quotes
<p>Recipients' views on intervention/lived experiences</p>		<p>Most of the studies explored recipients' views and experiences about the intervention. Overall, participants found the interventions helpful and felt a sense of improved personal and professional wellbeing.</p> <p><i>"I am glad that I have a more joyful life. The program is wonderfully effective. I'm glad I joined. This would be helpful to ease clinical placement tensions"</i> (Nursing Student 3). (Pei-Lin Hsieh, 2011)</p> <p><i>"I was very close to being burnt out. I'm in a very different place now. I've got a passion back"</i> . (Stockmann et al., 2017)</p> <p><i>"... when we talk to each other when we're unsure and then you can admit it, no problem because the other person understands completely . . . // Something you've built up stress about because you don't know what to do and then she doesn't either so then, oh good, then I'm not the only one"</i> (1, week 3) (Palsson, 2017)</p> <p>Promotion of mental health</p> <p>Participants expressed that joining intervention enhanced their understanding of stress normalized their stress experiences.</p> <p><i>"Despite never having any mental health issues it was so important to understand what we all feel in relation to stress, burnout, etc. Very eye-opening"</i> (Student 5) (Sugumar et al., 2019)</p> <p><i>"We went over just what the causes of stress are in nursing school. It's demanding, so I guess stress is kind of inevitable, but it's more how you deal with it."</i> (Delaney et al., 2016)</p> <p><i>"So many tasks and things that need to be completed, exams and care plans; seems like it [is] never going to get done"</i> (Delaney et al., 2016)</p>

<p>Social Support</p>		<p><i>Informational support</i></p> <p>Interventions served as a source of informational support and provided participants information about stress and strategies to cope with stress.</p> <p>Stephen (2012) evaluated an intervention to Increase Resilience in Adolescent Nursing Students through twitter. Participants commented;</p> <p><i>“It gave me insight about myself and how I cope with stress”</i>. (Stephens, 2012)</p> <p><i>“It allowed me to think more positively even when I was stressed”</i>. (Stephens, 2012)</p> <p><i>“It made me think more about my life and the stress in it and reminded me to relax, take time for myself, and do things that make me happy”</i>. (Stephens, 2012)</p> <p><i>“They made me take a few minutes to really reflect on who/what makes me happy and helps to relieve my stress”</i> . (Stephens, 2012)</p> <p><i>“It’s taught me to be kinder to myself actually, in a lot of ways. And actually listen to myself and the internal sometimes the battles that go on in my head you know when I’ve had a difficult time, I’ve actually been able to sit with that a little bit more and listen instead of trying to block it out”</i>. (Stockmann et al., 2017)</p> <p><i>Peer support effect on understanding of work life</i></p> <p>Stockmann et al., 2017 implemented a peer support intervention. Participants expressed that intervention has helped them better understand and perform their job, and to build a better connection with their patients.</p> <p><i>‘I like to think that I am not just somebody who just prescribes medication, but that listens and tries to understand people’s experiences. . .It’s been quite humbling actually finding out that there is a whole new, a whole another level to that that I don’t do’</i>. (Stockmann et al., 2017)</p> <p><i>A lot of us have aspired to work or think we’re working this way, and talking is easy and that is part of our jobs and what we do as human beings, but there have been a few occasions when I’ve been with clients that I’ve felt a different connection and I’ve felt a different response, and I’ve felt is it because I’m doing this course’</i>. (Stockmann et al., 2017)</p> <p><i>Peer support and coping with work stress</i></p> <p>Participants felt an enhanced ability to do the day to day difficult work when having support from peers.</p>
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‘‘A great sense of looking after yourself and looking after each other, um, when you’re doing some very difficult work. . .it all feels more possible’’. (Stockmann et al., 2017)

Social support mechanism

Provision of social support (Sense of belongingness)

Most of the Intervention programs utilized a group format, where participants got the opportunity to share their experiences, express emotion. This, not only provided an emotional outlet, but also validated their feelings and provided a sense of support.

“It (group) helped me realise that we are all going through similar things in life and if we can all help each other, it would improve both our own and others’ self-care and mental health” (Student 3). (Stockmann et al., 2017)

“People here really love each other basically, and can share really private things without falling apart cuz they know they have their whole group holding them when they’re talking” (12). (Stockmann et al., 2017)

“I think maybe just being able to talk about stress out in the open and what stresses us out . . . so I think that was good. I liked that . . . we were all able to talk about what stresses us out. It made me feel better because it was all the same things. We were able to relate to each other”. (Delaney et al., 2016)

“I can trust my friends because we are really close to one another. They know my background and feelings, and are much the same as myself. A good friend is someone I can confide in”. (Nursing Student 22) (Hsieh, 2011)

Participants learnt to seek and utilize support from friends and peers.

“I have learnt how to feel positive and think relationally after talking to friends (discussion) and going to the gym. I am more enabled to lead a fulfilling and happy life. This has been a great success for me” (Nursing Student 34) (Hsieh, 2011)

Family as an important source of support

Intervention helped participants understand the importance of existing sources of social support such as family.

“When we talked about how important your family is . . . made me realize how appreciative I was of my family and friends. I know when I go home, my family is always there and making me feel better.” (Delaney et al., 2016)

Improved relationships

‘It can potentially make you a better person, can’t it? Maybe a better partner, better father or whatever, a better friend’’. (Stockmann et al., 2017)

Empathic Listening & emotional outlet

Emotional support from friends and emotional expression were considered an important coping mechanism.

“Close friends are ones who understand me at the same level and who I can share my feelings with. I need a friend. I only need someone to be there is someone to just listen” (Nursing Student 14)

Enhanced coping

Listening to others’ experiences and what had helped them during group discussions, was beneficial for the participants. They learnt new ways to cope with their stress.

"I never knew that other students were experiencing the same difficulties as me, and many friends give me suggestions and taught me how to get through difficult times. I like the teacher because she enabled us to think through coping strategies step by step. It's so useful when I feel stressed" (Hsieh, 2011)

Enhanced skill development in the workplace

Palsson et al (2017). evaluated the feasibility of a peer learning intervention and participants expressed that they felt more secure in applying clinical skills when accompanied by a senior peer.

"I'd never given an intramuscular shot before. XXX (the peer) had done it several times. So I asked xxx (the peer) to go with me and check and introduce me to it so I'd do it right. We went through it before going in. She was checking me and I felt secure. (9, week 3) We've put in catheters together, we both know how, but hadn't done it for a while, so it was good to have someone there" (2, week 3) (Palsson, 2017)

Another participants from Heish (2011) commented

"My classmates help me in difficulties and help me out particularly with clinical placement" (Nursing Student 3) (Hsieh, 2011)

Coping with humor

4. Participants also enjoyed the humors video narrative and peer support was regarded as possibly most effective. ID 75. Half of patients like hearing stories about success and failures of their faculty.ID 75

2nd construct:

3. Participants appreciated non-academic light-hearted exchanged and "fun contest", resulting in friendships. ID 75

Development of soft skills

Chiam et al., (2020) evaluated nurses' perceptions about a mindfulness based intervention. Nurses described that the program has equipped them with better communication skills.

Communication *"And it also helped me to be able to communicate my feelings with erm the person or the people that were involved ..."* [S] *"...ID 159*

In addition, they were better able to recognize and regulate their emotions, that also helped them to understand others emotions.

"The people that receive this emotion and action from like your colleagues or the patients will be affected as

well. So it's a very important point to work on, as nurses as well, yeah." [O] ID 159

"So as a nurse, like as you address your emotions right, you tend to like understand where they come from, and why the patient is feeling like that." ID 159

Respecting diversity in the workplace

"it helps to be a less judgmental person, and to be able to look at things from multiple perspectives?"

[G] "... recognize how the other person is feeling ... rather than just focusing on your emotions alone."

[T] "Cultivate these feelings of peacefulness and loving kindness to other people. ... So I have better tolerance ..." [O] how I would resolve the conflict will be a lot more different? ... I will sit down and talk to the person more. But I have to keep in mind ... to be more aware of my own emotions ..." [P] ID 159

I've been to conferences where service users are present and I've felt very attacked on a personal level.

And, by the end of that week I saw them as a wonderfully charismatic group of a very kind, loving people who had a very strong voice, but important voice that hadn't been there before'' (06) ID 195

<p>Peer support</p>		<p>Peer mentoring</p> <p>Sprengel & Job (2004) implemented a peer mentoring program to reduce anxiety among beginning nursing students. Nursing students very much appreciated the idea of having a senior student and enjoyed their clinical experience.</p> <p><i>“I really enjoyed the experience and felt having another student there was a great idea”.</i> (Sprengel & Job, 2004)</p> <p><i>“The other student was really nice and made me feel more at ease”.</i> (Sprengel & Job, 2004)</p> <p>Freshmen felt hopeful that with time they would learn more about their work and will be able to support their juniors.</p> <p><i>“I hope I can be a mentor next year, and hope I know as much as the sophomore students by then”.</i> (Sprengel & Job, 2004)</p> <p>Senior students felt more confident in their knowledge and skills and felt a sense of accomplishment by working with a freshmen.</p> <p><i>“It was good to work with a freshman because I felt like I have come a long way and it was a good confidence booster for me. Hopefully it also helped to make the freshman a little less nervous about clinical”.</i> (Sprengel & Job, 2004)</p> <p><i>“I think as a freshman, this would have helped me better understand nursing and what the job is actually about”.</i> (Sprengel & Job, 2004)</p> <p><i>“It really, really helped boost my self-confidence”.</i> (Sprengel & Job, 2004)</p> <p><i>“I realized after working with the freshmen how much I have actually learned since I was in that beginning course”.</i> (Sprengel & Job, 2004)</p> <p>Peers as delivery agents</p> <p>Five out of six participants preferred Facebook to an in-person stress management intervention, and one was resolute about not using in-person resources, stating</p> <p>Peer-led programs allowed students to be open about their feelings and emotions in a non-judgmental environment, which participants thought could not be possible if content was delivered by teachers or staff.</p>
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"NO STAFF should be allowed to run it. Otherwise it wouldn't be as open and have the same bonding effect. (Student 16) (Sugumar et al., 2019)

<p>Technology for delivery of intervention</p>	<p>Facilitators</p>	<p>Confidentiality</p> <p>Social media based interventions were perceived well by participants due to anonymity and confidentiality features.</p> <p><i>'' Facebook allowed users to access stress management content while remaining anonymous (as long as they did not respond to a post), thereby avoiding 'stigmatization' by classmates''. (George et al., 2013)</i></p> <p><i>'I would do a Facebook group before I would go to a group [session], hands down.'</i> (George et al., 2013)</p> <p>Accessibility</p> <p>Ease of access and constant availability was a great feature of social media based intervention.</p> <p><i>"I looked at most of the links and videos – it was a nice break from studying" and "I like the fact that a Facebook group is always there, and there were constantly things being posted ... stress-related content was always there for me."</i> (George et al., 2013)</p> <p><i>"I would just pop on and it is on my home screen, and I would see something posted so I would peek at it".</i> (George et al., 2013)</p> <p>Choice of mobile app for intervention delivery</p> <p>There was mixed view about preference of technology-based intervention over conventional mode of delivery.</p> <p><i>"...maybe you can convert the handout into a mobile app. ... it's not very practical? To carry this book around?" [K]".</i> (Chiam et al., 2020)</p> <p>Another participant commented;</p> <p><i>"When I need to relax, I need to shut like the... my phone, and not be with my phone. So personally, I do not prefer videos." [S].</i> (Chiam et al., 2020)</p>
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	Barriers	<p>Poor e-health literacy</p> <p>However some participants did not find it feasible as they were not regular users of social media.</p> <p><i>“(I) was not a user of Twitter and never took the time to understand it”. (Stephens, 2012)</i></p> <p>(Lack of participation/accessibility & usage): Some participants did not like social media based interventions due to lack of a human interaction or response from other participants.</p> <p><i>“No one responded so sometimes I didn’t see the point”. (Stephens, 2012)</i></p> <p><i>“I could not get into the habit to check my account on a regular basis as I am not in the habit of doing so.” (Stephens, 2012)</i></p>
Additional quotes		<p><i>Because we’ve been able to ventilate a bit/how should we fix this? Really, there’s lots of anxiety when you’re new. Can I manage this at all? Having someone to share that feeling with. . . (11, week 1) (Pals-son, 2017)</i></p> <p>Recommendations</p> <p><i>“... having this as part of your module or your curriculum, helps you to err... relieve yourself, from the pressure and stress that is imposed to you in school....” [L] (Chiam et al., 2020)</i></p>