

Feasibility and outcome of an online streamed yoga intervention on stress and wellbeing of people working from home during COVID-19

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Abstract.

BACKGROUND: The outbreak of COVID-19 and its associated measures has resulted in a sizeable working population transitioning to working from home (WFH), bringing additional challenges, and increasing work-related stress. Research has indicated that yoga has promising potential in reducing stress in the workplace. However, there are very few studies exploring the impact of online streamed yoga on stress management for people-WFH.

OBJECTIVE: To investigate the feasibility and outcome of an online streamed yoga intervention on stress and wellbeing of people-WFH during COVID-19.

METHODS: A six-week pilot randomized controlled trial (RCT) yoga intervention was designed with yoga ($n=26$) and a wait-list control group ($n=26$). A mixed two-way ANOVA was used to assess changes in standardised outcome measures at baseline and post-intervention. Likert and open-ended questions assessed enjoyment, acceptability and perceived benefits of the program, which were analysed thematically.

RESULTS: Compared with the control, the yoga group reported significant improvements in perceived stress, mental wellbeing, depression and coping self-efficacy, but not stress and anxiety. Participants experienced physical and mental health benefits and reported high acceptability and enjoyment of the intervention.

CONCLUSIONS: An online yoga intervention can help people WFH manage stress and enhance wellbeing and coping abilities.

Keywords: Web-based, mind-body, mental-health, pandemic, remote-working

1. Introduction

The World Health Organization (WHO) defines work-related stress as “the response people may have when presented with work demands and pressures

that are not matched to their knowledge and abilities and which challenge their ability to cope” [1, p424]. In contrast wellbeing at work is defined as building an atmosphere to foster a state of contentment that enables employees to thrive and to realise their full potential for their own good and for their organisation [2]. Long-standing and unattended stress can have adverse effects on an employee’s mental and physical health along with outcomes related to the organisation such as employee absenteeism, employee

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40 disability claims, and lost productivity [3]. Work-
41 place stress has been consistently associated with
42 cardiovascular disease [4, 5], psychosomatic prob-
43 lems, musculoskeletal disorders [6], mental health
44 problems [7, 8], and non-adaptive HPA axis [9], car-
45 diovascular [10] and immune responses [9].

46 Mental health in the workplace is increasingly a
47 problem, and with 32.5 million people aged 16 to 64
48 in employment in the United Kingdom (UK), 75.3%
49 of its working population [11], the cost to the UK
50 economy is estimated to be up to £99 billion each year
51 [12]. Mental health problems have been deemed as
52 having a more significant impact on people's ability
53 to work in comparison to any other group of disorders
54 [13].

55 In 2020, the American Psychological Association,
56 revealed that 64% of employed adults reported work
57 as a source of stress in the US with serious conse-
58 quences for years to come due to Covid-19 [14].
59 Workplace stress is one of the most significant prob-
60 lems facing the organisations across Europe [15]. In
61 2019/20, 828,000 workers reported suffering from
62 work related stress, depression or anxiety, which con-
63 tributed to a loss of 17.9 million working days in
64 the UK [16]. In the same period, work-related stress,
65 anxiety or depression accounted for 51 per cent of
66 all the cases of work-related ill health in Britain
67 [16]. A survey ($n = 1815$) found that these numbers
68 have exponentially increased, with 79% of British
69 adults in employment commonly experiencing work-
70 related stress in 2020 [17]. One in eight of the current
71 employees in the UK reported having a mental health
72 condition, and 42% of employees felt their health con-
73 dition affected their work a great deal or up to some
74 extent [18].

75 Many non-pharmacological interventions have
76 been tested to address the problem of workplace
77 stress, including mind-body and mindfulness inter-
78 ventions. The literature related to mind-body stress
79 reduction is continuously evolving in the field of
80 workplace wellness and simultaneously in clinical
81 populations. Several recent systematic reviews and
82 meta-analyses have reported beneficial effects of
83 mindfulness-based stress reduction (MBSR) inter-
84 ventions in improving mental health for employees
85 at a workplace setting [19], nurses [21], psycho-
86 logical functioning of employees [20], and reducing
87 stress in physicians and medical students [22]. How-
88 ever, several studies have also reported association
89 of mindfulness/meditation with exacerbated mental
90 health issues such as depression, anxiety, perceived
91 stress and adverse effects like negativity, disorienta-

92 tion, addiction to meditation, worsened relationships,
93 and hypersensitivity [23–25]. MBSR interventions
94 include mindfulness performance of hatha yoga pos-
95 tures as one of the components [26], with yoga
96 demonstrating the most benefit in several populations
97 [27, 28].

98 It is suggested that the practice of yoga is a
99 natural way to engender mindfulness, as atten-
100 tion is focussed on the present moment, in part
101 due to the intensity of the bodily sensations [19].
102 Poses (*asana*) are usually practised with slow con-
103 trolled breathing which activates the parasympathetic
104 response thereby inducing relaxation which helps an
105 individual remain with the experience while simul-
106 taneously inhibiting negative cognitions [20]. It has
107 been demonstrated that yogic breathing techniques
108 (*pranayama*) can facilitate increased vagal tone also
109 activating parasympathetic response [20]. There-
110 fore, *asana* and *pranayama* can support mindfulness
111 through body awareness as well as by strengthen-
112 ing positive neuroplasticity in higher brain structures
113 [21].

114 Yoga is an ancient and comprehensive mind-
115 body practice originating in India, encompassing
116 all facets of the human existence: spirituality, psy-
117 chology, philosophy and physiology [20]. It has
118 gained in popularity mainly because of its therapeutic
119 health benefits, both physical and mental [22–24].
120 Yoga-based practices such as postures, breathing
121 techniques and meditation (*dhyana*) are defined as
122 psychophysiological therapeutic practices that use
123 several of these techniques inspired by a variety of
124 yogic traditions [19]. There is accumulating research
125 vouching for the promising potential of the ther-
126 apeutic application of yoga in health management
127 and mental health care. A few systematic reviews
128 and meta-analyses have revealed positive effect of
129 yoga interventions on mental health conditions [25,
130 26], structures and functions of brain [27], cardio-
131 metabolic health [28], menopausal symptoms [29],
132 osteoarthritis [30], COPD [31], chronic non-specific
133 neck pain [32], among other conditions.

134 The practise of yoga for therapeutic benefits
135 is increasingly gaining popularity in the UK. A
136 cross-sectional survey reported the perception of
137 yoga as having a positive impact on mental and
138 physical health conditions and an association with
139 positive health behaviours [24]. Thus, based on ever-
140 increasing evidence, it is not surprising that research
141 has indicated the potential of yoga in improving
142 workplace stress and wellbeing. The National Insti-
143 tute for Health and Clinical Excellence (NICE) has

recommended an increase in levels of physical activity at the workplace to improve wellbeing [33]. Increased physical activity has been found to have an association with lower job burnout, lower levels of depression [34] and lower physiological stress outside work [35]. A cohort study revealed that chronic workplace stress could lead to an increase in physical inactivity [36]. Moreover, several studies suggest that we have been living in a pandemic of physical inactivity and sedentary behaviour for many years [37–39], with Covid-19 threatening to increase this [40].

Yoga has demonstrated promising potential in combating stress in the workplace and increasing physical activity as evidenced by two recent systematic reviews. Della Valle and colleagues in their recent meta-analysis of six RCTs, found workplace yoga interventions to be more effective in comparison to no intervention in workplace stress management [41]. Puerto Valencia and colleagues in their systematic review of 13 RCTs revealed that yoga had a positive effect on health in the workplace, particularly in reducing stress, with no adverse effects reported [42]. Wolever and colleagues found that both mindfulness-based, and therapeutic yoga programs could provide effective interventions in alleviating stress in employees [43]. A review of 56 studies found that workplace stress can also lead to musculoskeletal symptoms especially of back, neck and shoulders [44] and yoga can help deal with stress-induced musculoskeletal symptoms of the neck [45], back [46], and shoulders [47], among other symptoms.

The outbreak of COVID-19 and associated social distancing measures has resulted in a sizeable working population transitioning to working from home whilst concurrently managing family life, which can increase daytime stress, anxiety and depression levels, and also disrupt sleep [48]. A recent survey found additional challenges, such as lack of social contact, issues with work-life balance, and difficulty focusing; and for people with children younger than twelve the biggest challenges were increased household and care responsibilities [49]. Workplace stress ‘pre-COVID-19’ had already been identified as one of the major causes of low job performance, lack of motivation, low morale, low output and organisational sabotage [50]. Current circumstances have further accentuated this situation with new challenges like zoom fatigue (emotional and physical exhaustion caused by video conferencing), inability to unplug after office hours, difficulties communicating with colleagues, increased stress, and decreased mental health [48, 51–54].

The culture of homeworking was on gradual, although slow, rise even before lockdown in the UK. It tripled from 1.5% in 1981 to 4.7% in 2019, but rose substantially during the lockdown with an eightfold rise from 5.7% in January / February 2020 to 43.1% in April 2020 and even though there was decline by June 2020, it continues to remain high at 36.5% [55]. A survey from the British Council of Offices discovered that pandemic has changed working patterns for good with almost half of the employees (46%) eager to split their time between homes and workplaces in future [56]. Another survey by the Institute of Directors revealed that three quarters of the directors predicted increased homeworking and more than half are planning to decrease their long-term use of workplaces [57]. One study also suggested that more than 40% of jobs can be performed at home in the UK [58]. Therefore, in the future, due to unpredictable circumstances of COVID-19 and inclination of both employers and employees toward a balanced approach, we may have a ‘mixed’ workforce working both ‘on-site’ and from home leading to long-term changes to working practices.

A yoga-based lifestyle has been recommended by the Government of India and various yoga organisations worldwide to help people remain healthy and promote optimal immune functions during the COVID-19 pandemic [59, 60]. In the wake of COVID-19 imposed social distancing measures, most of the fitness industry has moved to the online delivery of their programs, the popular virtual workouts app ‘Mindbody’ revealed yoga as the most popular virtual class booked with 32% of virtual bookings with an average of nearly 22,000 yoga bookings per day [61]. The delivery of mind-body programs online can help overcome barriers to participation because these programs can be accessed at convenient times, participants can work through recordings at their own pace, and maintain privacy [62]. Web-based interventions also offer benefits of cost-effectiveness for both participants and instructors related to traveling, high scalability and ease of access [63]. Nonetheless, there are some limitations of online yoga such as the lack of opportunities for instructors to adjust participants, lack of social connection, technical issues and difficulty in following the instructor [64].

There are, however, very few studies exploring the impact of the online mode of delivery or comparison with face-to-face (ftf) delivery. Research on online yoga is scant, more so on its potential to alleviate stress among people working from home. However, online mind-body interventions have been found

to show promising potential in alleviating stress and enhancing wellbeing among various population groups. In a review and meta-analysis of 15 RCTs, Spijkerman and colleagues indicated the promising potential of online mind-body interventions in improving mental health outcomes, particularly stress in various population groups including employees [65]. Several other studies point to the benefits of online yoga interventions, including stress reduction and improved coping skills among nurse-midwives [66], a reduction of depression and grief in mothers who experienced stillbirth [64], improved physical and mental wellbeing in university students [67], and improved psychological outcomes in adults with cancer [68]. These studies also indicated the potential of the online mode of delivery to increase access, being convenient in terms of time and portability of devices e.g., smartphones, laptops or tablets and the opportunity to practise in privacy if desired.

Existing studies comparing ftf and online yoga / mindfulness interventions have found no differences in effectiveness or acceptability [43, 69]. Barak et al. (2008) in their comprehensive review and meta-analysis of internet-based psycho-therapeutic interventions, showed that there is no difference in effectiveness when compared to ftf interventions and in some cases internet-based interventions has been rated as superior by clients [70]. However, more research is needed to explore the acceptability and benefits of online yoga / mindfulness interventions in the context of working individuals. In the current circumstances of continued, changeable social distancing measures, it is pertinent to look at remote delivery of yoga interventions for people working from home.

One major limitation in evaluating yoga studies' impact on any physiological or psychological condition is non-consensus on dosage of intervention to achieve desired outcomes i.e., number of days and hours per week and duration of the intervention [71]. Wolever and Hartfiel in their separate workplace studies for stress reduction delivered a yoga intervention for 50 to 60 minutes weekly or twice weekly for eight to twelve weeks [43, 72]. Sherman (2012) reported a trend of classes in western studies lasting between 60 to 90 minutes – weekly or twice weekly [71]. However, a survey of 24 yoga teachers with expertise in applying yoga to address mental health conditions revealed that practice should consist of five 30–40 minutes sessions per week for at least six weeks for improving anxiety [73]. Traditional Yogic texts and scriptures also allude to the benefits of practice for

longer durations and its regularity [74]. Therefore, it is possible that longer interventions with higher frequencies of classes per week could be beneficial for alleviating mental health conditions.

In summary, there are limitations in the current literature which this pilot study aims to address. The extant literature measuring the effects of online mode of delivery scarcely consider the workplace. Furthermore, all existing studies were conducted with nurses, students or patients rather than the general working population, with an inadequate explanation of yogic components (e.g., poses, breathing techniques, and meditation), their techniques (how they were performed?), and rationale (why they were performed?).

This study investigated whether an online streamed yoga intervention reduces stress and increases mental wellbeing in people working from home. It was hypothesized that online streamed yoga would lead to increase in mental wellbeing and coping self-efficacy and decreases in perceived stress, anxiety and depression compared with a control group. We also explored qualitatively yoga group participants' experiences of the intervention and the acceptability of an online synchronous program.

2. Methods

2.1. Study design

This pilot study used a randomized wait-list control design comparing pre-and post-(six-weeks) intervention scores between and within groups on validated outcome measures. Thematic analysis was performed on open ended questions to analyse prominent themes about participants' experiences and acceptability of the program.

2.2. Participant recruitment

The study received ethical approval from the University of Westminster (ETH1920-0764).

During May and June 2020, employees aged 18 and over, working from home were self-selected via emails sent out during weekly employee communication by corporate organizations and academic institutions based in London. Participant inclusion criteria were: 18 years or older, currently employed, speak and understand English and, not currently practising yoga. Participant exclusion criteria were: a physical/medical condition that would make practising

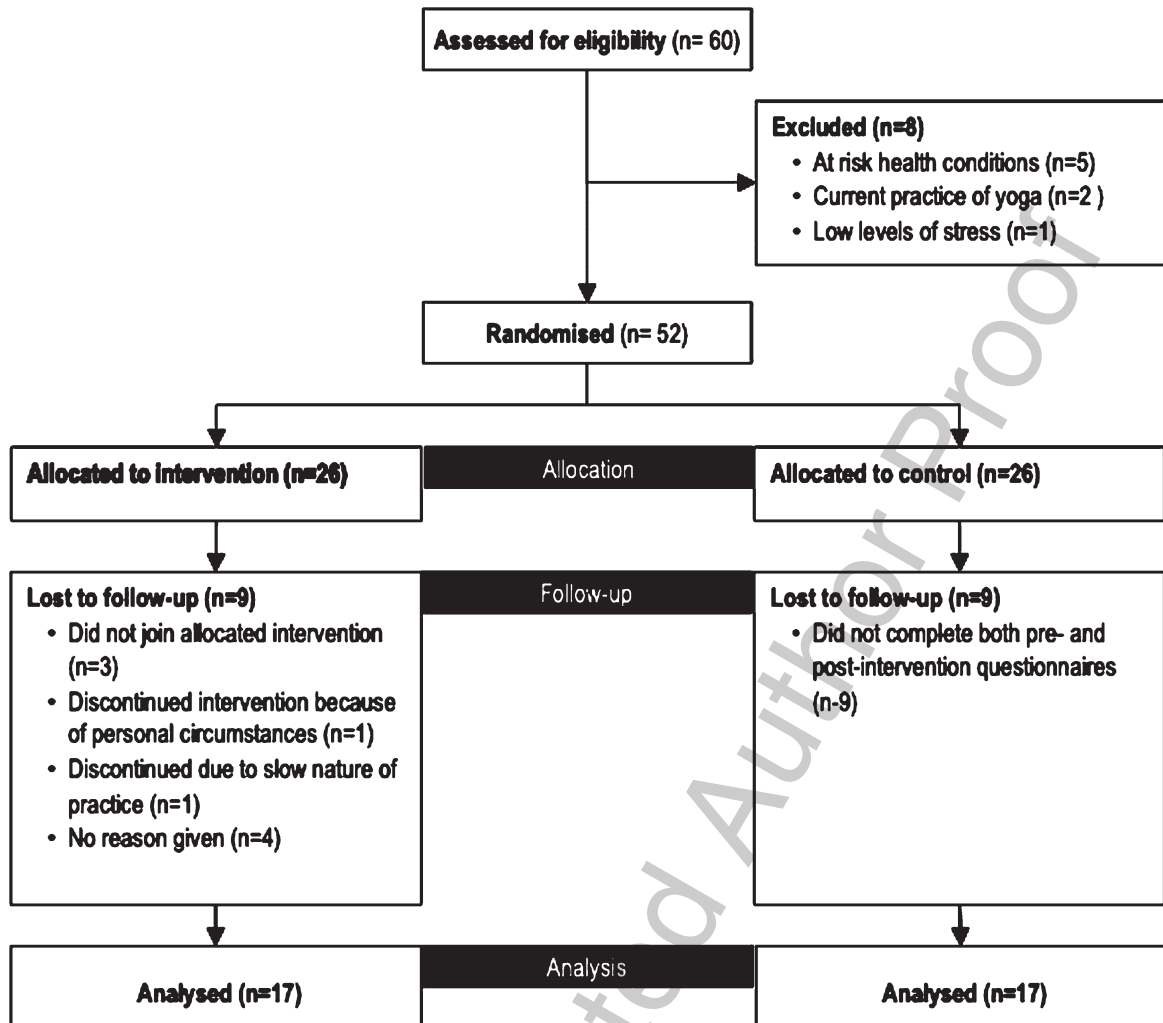


Fig. 1. Recruitment Flow Chart.

345 yoga unsafe or not possible, plans to take leave from
 346 work during the study and, current mental health diag-
 347 nosis.

348 Interested employees were emailed a participant
 349 information sheet (PIS) which explained the purpose
 350 of the study, and a link to an online screening ques-
 351 tionnaire. This invited participants to identify any
 352 health concerns from a list of 19 common condi-
 353 tions (e.g., arthritis, asthma, back pain, depression,
 354 anxiety, stress, heart conditions, etc.). Completed
 355 questionnaires were then assessed by the researcher,
 356 an experienced yoga practitioner. The questionnaire
 357 also asked participants to rate their self-identified
 358 stress levels on the scale of 1 to10 and to indicate
 359 if they currently practice yoga or yoga-related activi-
 360 ties. Participants who already practised yoga or yoga

related activities were excluded from the study to
 prevent bias.

361 A total of 60 participants signed up for the study
 362 and 52 were electronically randomised into the
 363 yoga intervention ($n = 26$) or wait-list control group
 364 ($n = 26$) – Fig. 1. After randomisation, the inter-
 365 vention group was informed by email of class timings,
 366 Zoom meeting links and the nature of the sessions;
 367 the control group was informed of post-study Zoom
 368 meeting links and class timings by email and were
 369 asked not to practice yoga during the six-week period.
 370 Upon completion of the study, the control group
 371 received five yoga classes and a video of the program.
 372 Group membership was not blinded, and all classes
 373 were free of charge to participants. Outcome variables
 374 were measured at the beginning (baseline) and the
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377 end of the program (six weeks later). Informed con-
 378 sent was taken through the consent forms embedded
 379 with the baseline questionnaires through the Qualtrics
 380 link.

381 2.3. Program delivery and attendance 382 requirements

383 This pilot study was conducted online through the
 384 Zoom online meeting platform with employees work-
 385 ing for various organisations from home. Zoom is a
 386 video conferencing software that allows two or more
 387 people in different locations to communicate using
 388 audio and video imaging in real-time [75].

389 The 26 participants in the yoga intervention group
 390 were asked to attend a minimum of two and a max-
 391 imum of three 50-minutes classes each week for six
 392 weeks (June/July 2020) led by the researcher who is
 393 a registered yoga teacher with eight years of experi-
 394 ence. Participants could choose from any of the six
 395 classes scheduled per week via Zoom – three in the
 396 morning at 8 AM (Monday, Wednesday, and Friday)
 397 and three in the evening at 6 PM (Tuesday, Thurs-
 398 day, and Saturday). These timings were agreed after
 399 surveying eligible participants. Each participant also
 400 received a YouTube video link to a video recording
 401 and an instruction manual of the program to practice
 402 on their own, after the first week, to make up for any
 403 missed classes.

404 2.4. Intervention design

405 The Yoga program was informed by the tradition of
 406 Hatha Yoga and consisted of simplified and modified
 407 versions of various components such as poses, breath-
 408 ing techniques and relaxation/meditation techniques
 409 to suit the needs of the participants assessed using
 410 yoga screening questionnaire. The poses, breathing
 411 and relaxation components were selected on the basis
 412 of current research evidence in stress management
 413 and from yoga scriptures.

414 The inherent spiritual element of yoga was an
 415 important part of the intervention design. Taught
 416 yoga classes in modern western societies primar-
 417 ily focussed on potential physical and mental health
 418 benefits [71]; however, many scholars concur that
 419 decontextualization deconstructs the heart and spirit
 420 of yoga [76]. Authenticity was an important consid-
 421 eration in the design of the intervention and was in part,
 422 delivered through the chanting of Sanskrit prayers of
 423 togetherness in the beginning and fullness at the end.
 424 It was further enhanced by encouraging participants

to find stillness and patience in the poses (*asana*) by
 holding them and focussing on the muscles engaged,
 pace of breath and thoughts arising in the mind. The
 scriptural origins and current scientific evidence sup-
 porting the selection of all program components is
 available on request.

2.5. Class format

The format of each class followed a consistent pat-
 tern: setting the mood, chanting (*mantra-uchharan*),
 joint movements (*pawanmuktasana samuh*), seated
 postures, standing postures, lying (supine) pos-
 tures, breathing practices (*pranayama*) and relaxation
 through a short-guided meditation (*dhyana*) (see
 Table 1)

An instruction manual with a detailed explanation
 of each component was made available to participants
 and is available on request. A few minor modifica-
 tions of the poses were introduced in week four to
 maintain the interest of the participants. There was a
 gradual progression from simpler version of poses to
 the actual poses. Alternate nostril breathing was intro-
 duced in the second week after participants learned
 right and left nostril breathing techniques. There was
 a progression throughout the program in gradually
 increasing the duration of each pose and introduction
 of minor variations.

2.6. Measures

Nine outcome measures were selected to assess
 baseline and post-intervention stress and wellbeing:
 Perceived stress (Perceived Stress Scale-14 items;
 PSS-14), Mental wellbeing (The Warwick-Edinburgh
 Mental Wellbeing Scale; WEMWBS), Coping self-
 efficacy (Coping Self-Efficacy Scale; CSES-26)
 and its three subscales - Problem focused coping,
 Stopping unpleasant thoughts & emotions, Getting
 support from family & friends, DASS (Depression,
 Anxiety & Stress scale; DASS-21).

All four scales (PSS, WEMWBS, CSES and
 DASS), have demonstrated a substantial degree of
 concurrent validity and internal reliability [77–80].

The PSS is a 14-item scale, commonly used as a
 psychological instrument to measure the perception
 of stress, with seven positive items and seven nega-
 tive items. It measures the extent to which a person
 perceives life situations as stressful. Participants are
 asked how often they experienced stress in the last
 month on a five-point Likert scale from 0 ‘never’

Table 1
The Hatha Yoga Intervention

Setting the mood (<i>Aarambh</i>)	Mental preparation, focussing on the breath, Om chanting and peace mantra (<i>Shanti mantra</i>).
Joint movement exercises (<i>Pawanmuktasana samuh</i>)	Foot, knee, pelvis, wrists, shoulders and neck movements aimed at enhancing circulation, releasing tension and preparing the body for movement.
Postures (<i>Asana</i>)	Ten postures (<i>asana</i>): Butterfly pose (<i>bhadrasana</i>) Seated spinal twists (<i>tiryak sukhasana</i>) Cat pose (<i>marjari asana</i>) Palm-tree pose (<i>tadasana</i>) Cobra pose (<i>bhujangasana</i>) Crocodile pose (<i>makarasana</i>) Lying spinal twists (<i>sansar asana</i>) Corpse pose (<i>shavasana</i>) Seated forward fold (<i>paschimottanasana</i>) Seated extended legs spinal twists (<i>parshav dandasana</i>) All postures were performed slowly, with breath coordination, awareness of muscles engaged and thoughts in mind.
Breathing practices (<i>Pranayama</i>)	Four yogic breathing techniques (<i>pranayama</i>): Right nostril breathing Left nostril breathing Alternate nostril breathing Bumble bee breath All breathing practices were performed slowly, deeply and with long inhalations and exhalations through the nose.
Relaxation – 1 (<i>Sithilikaran</i>)	Guided relaxation in corpse pose with an awareness of letting go of tensions from the body through scanning from head to toes, followed by slow and gentle abdominal breathing.
Relaxation – 2 (<i>Sithilikaran</i>)	A guided relaxation sequence in easy pose (<i>sukhasana</i>), observing bodily sensations and breath.
Closing (<i>Samapati</i>)	Easy pose (<i>sukhasana</i>) chanting of om three times and peace mantra (<i>shanti mantra</i>).

to 4 ‘very often’ e.g. “*In the last month, how often have you felt that you were unable to control important things in your life?*” Higher total scores indicate higher stress with possible scores ranging from 0 to 56 [81].

The WEMWBS is a 14-item scale used as a measure of mental wellbeing, focusing entirely on positive aspects of mental health [82]. It covers the broad picture of wellbeing, including affective-emotional aspects, cognitive, evaluative dimensions and psychological functioning. The questionnaire collects data about the experiences of participants over the previous two weeks on 14 questions each answered on a five-point Likert scale from 1 ‘none of the time’ to 5 ‘All of the time’ Likert scale e.g. “*I’ve been feeling optimistic about the future*”. Higher total scores indicate higher levels of mental wellbeing with possible scores ranging from 14 to 70.

The CSES is a 26-item scale used as a measure of an individual’s confidence in performing coping behaviours when faced with life challenges. It analyses coping self-efficacy through three subscales: use of problem-focused coping, stopping unpleas-

ant emotions and thoughts and getting support from friends and family. Participants were asked, “when things aren’t going well for you, or when you’re having problems, how confident or certain are you that you can do the following?” The instrument collects data at any given point in time on an 11-point rating scale – 0 to 10 with anchor points on the scale at 0 – ‘cannot do at all’; 5 – ‘moderately certain can do’ and 10 – ‘certainly can do’ e.g. “look for something good in a negative situation” [77].

The DASS-21 is a shorter version of the DASS 42-item scale used as a measure of negative affect in adults (depression, anxiety and stress); seven items measure each factor. The instrument asks questions about physiological arousal, subjective awareness, low positive effect, along with a few other symptoms. It collects data on depression, anxiety and stress during the last week answered, ranging from 0 “Did not apply to me at all” to 4 “Applied to me very much or most of the time” e.g. I couldn’t seem to experience any positive feelings at all [79]. The cut-off points for severity of each of the categories are described in Table 2:

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Table 2
DASS cut-off points

Level / Disorder	Depression	Anxiety	Stress
Normal	0 – 4	0 – 3	0 – 7
Mild	5 – 6	4 – 5	8 – 9
Moderate	7 – 10	6 – 7	10 – 12
Severe	11 – 13	8 – 9	13 – 16
Extremely severe	≥14	≥10	≥17

518 All four scales and their subscales demonstrated
519 acceptable levels of internal consistency in our sam-
520 ple as determined by Cronbach's alpha levels (α)
521 ranging from 0.70 to 0.97.

522 Four open ended questions were asked to assess the
523 overall experiences of the participants in taking part
524 in the program such as perceived benefits, challenges,
525 motivation to attend and acceptability of the online
526 yoga program.

527 3. Analysis

528 3.1. Quantitative analysis

529 Quantitative analysis was performed using the
530 IBM Statistical Package in the Social Sciences ver-
531 sion 26. The data were checked for homogeneity of
532 variances using Levene's test for equality of variances
533 ($p > 0.05$), for outliers by boxplot, for normal distri-
534 bution by Shapiro-Wilk's test of normality ($p > 0.05$)
535 and for covariances by Box's M test ($p > 0.001$). Pre-
536 and post-intervention data were compared using a 2
537 (Group) x 2 (Time) mixed-model ANOVA for PSS-
538 14, WEMWBS, all three domains of CSES and on
539 all three domains of DASS-21. An independent t -
540 test was performed to check baseline differences in
541 yoga and control groups on the four outcome mea-
542 sures (PSS-14, WEMWBS, CSES and DASS-21).
543 Only the CSES had any missing responses, where
544 means were calculated providing at least 80% of
545 questions were answered, following author guide-
546 lines [77, p424]. Significance was assessed at $p < 0.05$
547 and false discovery rate (FDR) approach ($Q < 0.05$)
548 was used to adjust the impact of yoga intervention
549 on all domains, FDR is considered better alternative
550 than traditional Bonferroni method [83].

551 3.2. Qualitative analysis

552 Responses were analysed inductively using
553 thematic analysis based on an essential/realist epis-
554 temology [84]. A list of core themes was developed

Table 3
Characteristics of study participants

Demographic information	Yoga group ($n = 17$)	Control group ($n = 17$)
Mean age (SD)	42.7 yrs. (10.94)	42.2 yrs. (10.20)
Gender		
Women	17	14
Men	0	3
Occupation		
Teaching	7	6
Corporate employees	5	5
Administration	2	1
Other	3	5

555 after reading answers to open-ended questions several
556 times and coding them. One author (VW) appraised
557 all responses and developed a list of codes and
558 broader themes representing recurrent patterns in the
559 data. Next, a senior qualitative researcher (TC), read
560 through the data, reviewed all codes and broader
561 themes. In the final stage, both researchers discussed
562 each theme and subtheme, debating any discrepancies
563 to agree on a final thematic structure. Two overarching
564 themes were identified.

565 4. Results

566 4.1. Quantitative analysis

567 A total of 26 participants were randomised into
568 the yoga and control groups. In the control group
569 nine participants did not complete both the pre- and
570 post-intervention questionnaires and were therefore
571 excluded, leaving 17 participants for analysis. Of
572 the 26 participants in the yoga intervention group,
573 nine dropped out leaving 17 participants for analy-
574 sis. Thirty-four participants were therefore included
575 in the final analysis (see Fig. 1).

576 The mean age of the 34 participants was 42.5
577 years, 91% were women, 38% were teaching staff,
578 29% were corporate employees, 9% were employed
579 in administrative roles and the remainder worked in
580 other fields (see Table 3). The majority of participants
581 worked full time ($M = 37.2$ hours, $SD = 4.2$).

582 All 17 participants in the yoga intervention group
583 attended the minimum number of 12 recommended
584 sessions during the six-week intervention period. The
585 overall average attendance was 16.6 classes (live
586 streamed classes plus home practice from video) over
587 the six-week program; 2.7 classes per week. Ten par-
588 ticipants (59%) completed 18 classes, an average of
589 three classes per week and seven participants (41%)
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Table 4

Mean scores, F-ratios, Interaction *P*-values and Q-values from two-way mixed ANOVA analysis of PSS, WEMWBS, CSES and DASS

Domain	Yoga intervention (<i>n</i> = 17)		Control (<i>n</i> = 17)		F-ratio Mean	Interaction (Group x Time)	
	Pre-intervention Mean (SD)	Post-intervention Mean (SD)	Pre-intervention Mean (SD)	Post-intervention Mean (SD)		<i>p</i> -value (unadjusted)	Q Values (adjusted)
Perceived stress (PSS)	32.29 (8.37)	23.47 (8.56)	29.41 (8.03)	28.12 (7.66)	10.30	0.003	<0.01
Mental wellbeing (WEMWBS)	41.59 (7.18)	49.76 (6.55)	42.76 (7.06)	44.24 (7.32)	9.84	0.004	<0.02
Coping self-efficacy (CSES)	122.24 (39.90)	167.29 (48.12)	147.47 (44.89)	139.76 (45.35)	10.63	0.003	<0.01
Problem focused coping	57.18 (19.48)	80.65 (20.33)	72.35 (19.05)	68.35 (19.48)	14.38	0.001	<0.005
Stopping unpleasant thoughts & emotions	42.06 (14.38)	54.94 (20.12)	47.00 (18.53)	44.82 (17.81)	5.22	0.029	<0.03
Getting support from family & friends	23.00 (9.95)	31.71 (11.37)	28.12 (11.23)	26.59 (10.81)	6.54	0.015	<0.02
Depression, anxiety & stress (DASS)							
Depression	6.53 (2.98)	3.06 (2.81)	6.35 (3.85)	5.71 (3.80)	5.44	0.026	<0.03
Anxiety	4.47 (2.98)	2.53 (2.37)	4.06 (2.79)	3.76 (2.77)	3.09	NS	NS
Stress	10.18 (4.09)	6.47 (2.42)	9.59 (3.60)	8.06 (3.63)	3.12	NS	NS

Significance values were determined after calculating FDR corrections for each domain [89].

590 completed more than 12 classes, an average of 2.4
591 classes per week.

592 An analysis of pre-intervention variable scores
593 revealed no significant differences between the yoga
594 and control groups as assessed by independent *t*-
595 tests. Non-completers differed from completers on
596 the demographic variable of age ($t=2.04$, $df=24$,
597 $p=0.05$): the mean age of completers was 42.7 years
598 compared with 34.3 years for non-completers. There
599 was no significant difference between completers and
600 non-completers on any of the nine baseline outcome
601 variables.

602 A significant interaction was obtained for all out-
603 come measures with $p<0.05$ except for ‘anxiety’
604 and ‘stress’ (subscales of DASS). Analysis of mean
605 scores also revealed significant improvements in
606 seven outcome measures. This indicates that there
607 were significant improvements in seven of the nine
608 outcome measures for the yoga group compared to
609 the control group from pre- to post-intervention (see
610 Table 4).

611 A 2 (Group) x 2 (Time) mixed-model ANOVA
612 revealed that the main effect of time was signifi-
613 cant for seven of the nine outcome measures; it was
614 not significant for ‘stopping unpleasant thoughts and
615 emotions’ and ‘seeking help from family and friends’
616 (subscales of coping self-efficacy scale (CSES) which
617 indicates improvements in outcome measures in both
618 groups over time but more pronounced in the yoga
619 group. The main effect of Group was non-significant
620 for all outcome measures (see Table 5).

Table 5
Main effect *p*-values for PSS, WEMWBS, CSES and DASS

	Group main effect <i>p</i> -value	Time main effect <i>p</i> -value
Perceived stress (PSS)	NS	0.001
Mental wellbeing (WEMWBS)	NS	0.001
Coping self-efficacy (CSES)	NS	0.028
Problem focused coping	NS	0.011
Stopping unpleasant thoughts & emotions	NS	NS
Getting support from family & friends	NS	NS
Depression, anxiety & stress (DASS)		
Depression	NS	0.002
Anxiety	NS	0.023
Stress	NS	0.001

621 In summary, the two-way mixed ANOVA showed
622 that in comparison to the control group, the yoga
623 group reported significant reductions in perceived
624 stress (PSS); depression; a significant improvement
625 in mental wellbeing (WEMWBS); and coping self-
626 efficacy (CSES); (see Figs. 2-5). An analysis of
627 the individual domains within the CSES showed
628 that the yoga group in comparison to the control
629 group reported significant improvements in problem
630 focussed coping, stopping unpleasant thoughts and
631 emotions and in getting support from family and
632 friends. Although non-significant, the yoga group
633 also demonstrated feeling less stressed and anxious
634 on DASS scale in comparison to the control group
635 (see Table 4).

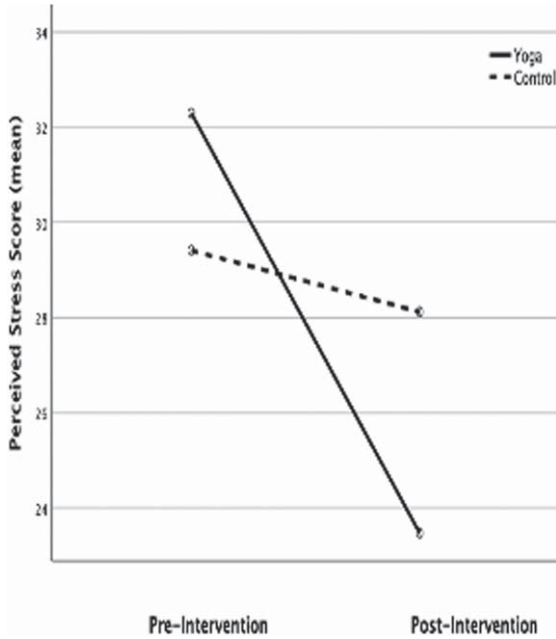


Fig. 2. Mean PSS Scores. Pre-and post-intervention.

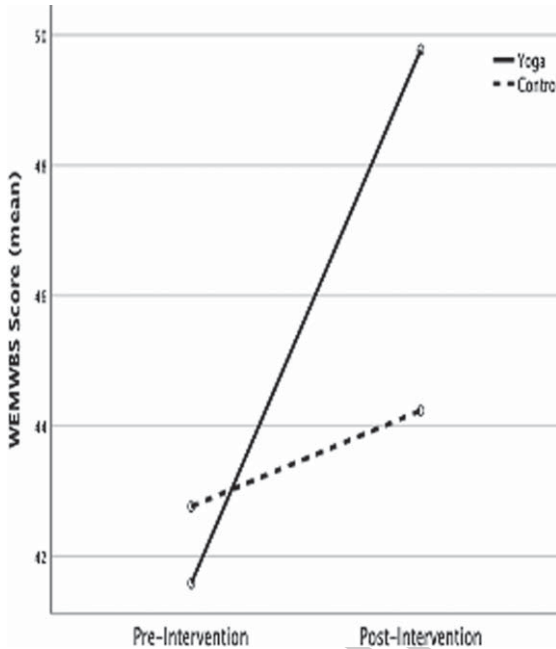


Fig. 3. Mean WEMWBS Scores. Pre-and post-intervention.

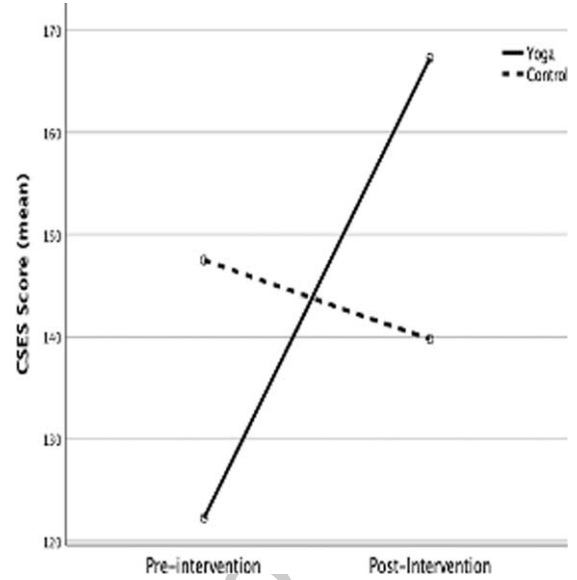


Fig. 4. Mean CSES Scores. Pre-and post-intervention.

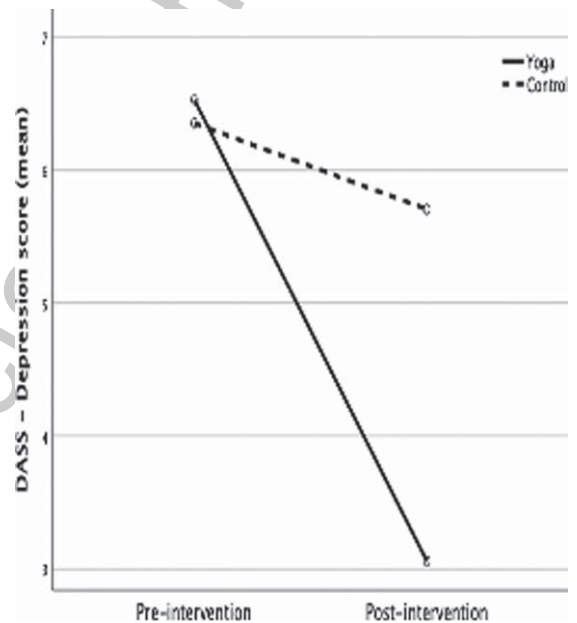


Fig. 5. Mean DASS Scores. Pre-and post-intervention.

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An analysis of DASS cut-off scores revealed that at baseline only 17% of the participants had ‘normal’ levels of depression in the yoga group but this increased to 70% post-intervention. In contrast, in the control group, the percentage of participants

with ‘normal’ levels of depression only increased from 29% to 35%. ‘Normal level’ anxiety scores in the yoga group increased from 35% of participants at baseline to 70% post-intervention. However, for the control group, ‘normal level’ anxiety scores declined from 52% to 47% of participants. ‘Normal level’ stress scores in the yoga group improved from 35% of participants at baseline to 64% (+29%)

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649 post-intervention. For the control group, 'normal
650 level' stress scores also increased, from 23% to
651 47% (+24%) of participants. Mental wellbeing mean
652 scores increased from 41.59 to 49.76 (+8.17) for
653 yoga participants. In comparison control group par-
654 ticipants only showed an increase of 1.48 from 42.76
655 to 44.24.

656 4.2. Perceptions of yoga program

657 Participants were asked several Likert-scale ques-
658 tions to assess the 'difficulty' and 'enjoyability' of
659 the program, their 'willingness to continue' after the
660 study and 'perceived improvements' in physical and
661 mental health. Regarding 'difficulty' 10 of the 17 par-
662 ticipants (59%) found the program not at all difficult
663 whereas 3 participants scored it 'a little difficult'.
664 Regarding 'enjoyability', 94% ($n = 16$) said that the
665 program was 'extremely' or 'moderately' enjoyable.
666 Regarding 'willingness to continue', 88% ($n = 15$)
667 said they were 'extremely' or 'moderately' likely to
668 continue the practice. Regarding perceived improve-
669 ments in physical and mental health, 76% ($n = 13$)
670 strongly or somewhat agreed that their physical health
671 had improved; all 17 participants 'strongly or some-
672 what agreed' that their stress level had improved; and
673 88% ($n = 15$) 'strongly or somewhat agreed' that their
674 overall mental health had improved after the program.
675 Seven participants (41%) 'strongly' or somewhat
676 agreed' that they had changed their lifestyle as a result
677 of this yoga program.

678 4.3. Thematic analysis of participants' 679 experiences

680 Participants were asked four open-ended questions
681 to assess their experiences of participation in the yoga
682 program, from which two themes were identified:

- 683 1. Perceived impact of the program
- 684 2. Experiences of the program

685 **Perceived impact of the program** (see Table 6).
686 Participants described a range of benefits they expe-
687 rienced as a result of participating in the program
688 including physical health benefits (increased flexibil-
689 ity, improvements in existing pain, muscular stiffness
690 and posture); stress-regulation (feeling less stressed,
691 and discovering strategies to deal with stress); finding
692 a personal oasis (time to stop and focus on oneself;
693 regularity and stability to weekly/daily routine); a
694 sense of calm and relaxation (feeling calmer, relaxed
695 and emotionally balanced); self and body awareness

(a sense of connection with oneself and sentience of
696 areas of stiffness and positions in a deeper way). 697

Experiences of the program (see Table 7). Par-
698 ticipants reported both general enjoyment of the
699 program and specific components that they particu-
700 larly enjoyed such as being led through relaxation
701 and breathing practices. They also reflected upon
702 the importance of the teacher to both motivate and
703 encourage by creating a safe and supportive space
704 to practice. Participants welcomed the convenience
705 of the program being delivered online: the benef-
706 its of not having to travel and to practice from the
707 comfort of their home; online links being straight-
708 forward to access and their surprise at being able
709 to accommodate several classes each week. Partic-
710 ipants also appreciated the flexibility of the class
711 schedule that was offered throughout the week which
712 facilitated attendance of the recommended number of
713 classes. 714

715 Several participants commented upon the style and
716 nature of the program. The majority reported an
717 appropriate level of program progression and diffi-
718 culty. Some reflected on their experience of a gentle
719 form of yoga emphasizing slow and repetitive move-
720 ments, which helped them experience the poses more
721 deeply. Participants reported a range of challenges,
722 including personal (difficulty in keeping eyes closed),
723 program-specific (slow-repetitive movements being
724 frustrating), technology-related (internet and con-
725 nection problems) and platform-specific challenges
726 (limitation of not being adjusted in poses or missing
727 a sense of social connection due to online mode of
728 delivery).

729 5. Discussion

730 To our knowledge, this is the first study that has
731 explored the impact of an online streamed yoga inter-
732 vention on stress and wellbeing of people working
733 from home during COVID-19. It found that partic-
734 ipants in the yoga intervention group reported
735 significant reductions in perceived stress, depression
736 and increases in mental wellbeing, coping self-
737 efficacy and its three subscales: problem focussed
738 coping, stopping unpleasant thoughts and emotions,
739 and seeking help from family and friends, after
740 the intervention. Although non-significant, scores on
741 measures of stress and anxiety also reduced after the
742 yoga intervention. In comparison, the waitlist control
743 group did not show a significant improvement in any
744 of the measures after six weeks. As ascertained by

Table 6
Themes and sample quotes Perceived impact of the program

Sub-theme	Number of participants with quotes falling under the theme	Example quotes
Physical health benefits	11 participants, all positive	<p><i>“My lower back pain and shoulder pain is gone. My digestion is better, and I am less bloated.”</i></p> <p><i>“Practicing yoga has made me more supple, has relaxed my normally hunched shoulders . . . ”</i></p> <p><i>“I can see changes already in my physical flexibility . . . ”</i></p> <p><i>“Remarkably within almost 3 weeks of doing the breathing yoga I hardly experienced the unexpected coughs and I could finally after 4 months lie down on my back without coughing”.</i></p>
Stress regulation	11 participants, all positive	<p><i>“I also feel that I can face stressful situation with more assertiveness.”</i></p> <p><i>“I have felt less overwhelmed and mentally over stimulated.”</i></p> <p><i>“I have been less stressed and a lot calmer”.</i></p> <p><i>“I think this way of practising yoga has taught me some strategies to relax, particularly through breathing techniques”.</i></p> <p><i>“If I feel stressed, I practice the breathing techniques”.</i></p>
A personal oasis	9 participants; all positive	<p><i>“It was good to put time aside to focus on myself and take myself away from everything else.”</i></p> <p><i>“I loved having an hour of time devoted to myself and my well-being, where I knew I could relax and re-set.”</i></p> <p><i>“The thing I enjoyed most was the stability it brought to my weekly routine.”</i></p> <p><i>“I found a new routine for my week, which enabled me to focus on me . . . ”</i></p>
Sense of calm and relaxation	12 participants; all positive	<p><i>“I feel much calmer.”</i></p> <p><i>“I enjoyed the exercises and the sense of relaxation . . . ”</i></p> <p><i>“I have felt a sense of peace and calmer emotional balance throughout the day.”</i></p> <p><i>“Through practicing the various breathing techniques, I really enjoyed the sense of calm that ran through my body.”</i></p>
Self and body awareness	10 participants, all positive	<p><i>“I really enjoyed the feeling of connecting with myself.”</i></p> <p><i>“The yoga practice helped me to be more in tune with my feelings of stress.”</i></p> <p><i>“I became aware of some areas of stiffness (in my neck).”</i></p> <p><i>“I liked to experience the positions in a deeper way, with a deeper sensation of what is going on in my body.”</i></p>

745 the thematic analysis of participants’ experiences, the
746 convenience of the online mode of delivery and high
747 adherence to the program demonstrated the promis-
748 ing potential, acceptability and feasibility of an online

streamed yoga intervention for stress alleviation of
people working from home.

These findings are consistent with studies reporting
the effects of ftf yoga interventions. In two separate

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Table 7
Themes and sample quotes Experiences of the program

Theme	Number of participants with quotes falling under the theme	Example quotes
Enjoyment	14 participants, all positive	<p><i>"I have enjoyed every session"</i></p> <p><i>"I really enjoyed the gradual difficulty of the course; just right"</i></p> <p><i>"I enjoyed the more "intense" stretching exercises the best such as laying down spinal twist and the folding forward while legs were straight".</i></p> <p><i>"I enjoyed the breathing techniques most, I notice a difference after them".</i></p> <p><i>"I liked being led through the relaxation of different areas of the body and found the reminder to relax parts of it that I wouldn't think of (like facial muscles, shoulders, etc.) really valuable."</i></p>
Supportive teacher	10 participants; all positive	<p><i>"I really enjoyed him as a teacher – he was very kind and welcoming and I felt I could reach out to him if I had questions."</i></p> <p><i>"He was a great and engaging teacher"</i></p> <p><i>"Teacher was amazing to listen to and easy to follow".</i></p> <p><i>"He has created a very enjoyable and safe space for us all to be able to relax and completely surrender to the class".</i></p>
Convenient and flexible platform/program	15 participants, all positive	<p><i>"It was convenient in terms of already being at home, so not having to get anywhere to participate, I would have been far less likely to attend three classes a week had it been at a studio".</i></p> <p><i>"The set up was perfect and always easy to connect and set up the contact to stream classes online together".</i></p> <p><i>"The time of the session worked very well with my schedule and there were ample opportunity to switch timings if needed."</i></p> <p><i>"I found online sessions very flexible and extremely convenient."</i></p>
Style and nature of the yoga program	9 participants, one negative	<p><i>"So far I practiced a more dynamic kind of yoga, so I liked to experience the positions in a deeper way, with deeper sensation of what is going on in my body"</i></p> <p><i>"the course was about my mind and trying to create a calmer state of mind, which the repetitive nature of the classes helped"</i></p> <p><i>"the progression throughout the session from stillness to movement was perfectly set out"</i></p> <p><i>"The slowness of this practice has been challenging at time because I was used to practising more dynamic yoga practices"</i></p>
Challenges	14 participants, all negative	<p><i>"For some reason I always struggled holding the seating twists and had to lessen the twist in order to stay for the full time but that was just a personal thing".</i></p> <p><i>"It felt difficult not being able to be adjusted by teacher if need be."</i></p> <p><i>"The only challenges I faced came from my technology – weak internet connections, computer updates, and so on that interrupted my practice."</i></p> <p><i>"I am a very sociable persona and like social interaction which is hard to achieve in an online environment."</i></p> <p><i>"I realized that I have a difficult time being in the moment and switching my brain off."</i></p>

753 studies, Hartfiel and colleagues found improvements
754 in mood, resilience, psychological wellbeing, per-
755 ceived stress and back-pain following a ftf yoga
756 workplace intervention [72, 85]. Similarly, a recent
757 systematic review of 13 RCTs found positive men-
758 tal health and stress reduction benefits of ftf yoga
759 interventions, with nine of them using self-reported
760 measures [42]. Our findings that coping self-efficacy
761 increased after the intervention supported a previ-
762 ous pilot study of an online yoga intervention which
763 improved coping skills and reduced stress in nurse-
764 midwives [66]. Several studies have found an asso-
765 ciation between increased coping and: better stress
766 management, healthier employees [86], reduction in
767 negative effects of job insecurity [87], high levels of
768 buoyancy, wellbeing and engagement [88] and ‘bet-
769 ter’ productivity [89]. These outcomes, along with
770 those of the current study, are particularly salient for
771 wellbeing officers and leaders of organizations in the
772 current context of the volatile pandemic environment.

773 Several studies have demonstrated that ftf and
774 online mind-body interventions are similar in terms
775 of acceptance, effect and convenience [43, 69], with
776 online interventions rated as superior in some cases
777 [70]. Together with the current findings, this sup-
778 ports the potential value of online interventions for
779 organisations who support hybrid working (i.e. on-
780 site *and* from home). The qualitative findings from
781 this study provide a deeper understanding of partici-
782 pant perceptions of an online program. The majority
783 of participants responded positively to the style and
784 nature of the yoga program by describing experiences
785 of program being of the right style, level and progres-
786 sion. All participants found an online streamed yoga
787 intervention highly convenient, flexible, enjoyable,
788 creating a personal oasis, sense of calm and relax-
789 ation with self and body awareness and helpful in
790 stress management as evidenced by both scales (PSS
791 and WEMWBS) and thematic analysis.

792 These findings are consistent with previous yoga
793 research where participants reported benefits such as
794 mind-body awareness [90, 91], stress reduction [41,
795 42], and increased mental wellbeing [25]. Partici-
796 pants also noted the benefits of not having to travel
797 and ease of access which is consistent with the find-
798 ings of Heber and colleagues who found web-based
799 interventions to be cost-effective in terms of travel-
800 related costs for both participants and instructor, high
801 in scalability and easily accessible [63]. Therefore,
802 there is promising potential for an online yoga inter-
803 vention to offer a cost-effective and convenient tool
804 for workplace managers to improve employee health

805 and productivity, both during the current pandemic
806 [92] and beyond.

807 The three limitations of an online yoga intervention
808 identified in this research were technology-related
809 (connectivity) problems, lack of social connection
810 (two participants only), and the absence of physical
811 adjustment by the instructor, consistent with previous
812 findings [64]. Our program endeavoured to overcome
813 this latter limitation by incorporating the same series
814 of simple poses to develop self-efficacy in partici-
815 pants; with many reflecting how this enabled them
816 to engage more deeply with the practice. Perceptions
817 of social connection were mixed, with some partici-
818 pants reporting a sense of community, whilst others
819 missed the opportunity to interact, consistent with
820 findings from an international survey exploring the
821 acceptability of online yoga during COVID-19 [93].

822 Adherence to the program was high, which could
823 be due to a several factors. Participants were sent
824 weekly emails to explain what they would experi-
825 ence and the purpose and philosophy of slow and
826 gentle movements which may have contributed to
827 high attendance and retention. Participants were also
828 given the option to choose from a mix of evening
829 and morning sessions delivered six times each week.
830 However, this has cost implications if replicated in a
831 larger trial. Qualitative findings suggest other poten-
832 tial motivating factors, such as providing a sense of
833 stability to routine, enjoyment, feelings of being sup-
834 ported and held in a safe space, the convenience of
835 using an online platform and experience of tangible
836 benefits. Our findings are consistent with previous
837 research which has found enjoyment, social support,
838 the satisfaction experienced from physical activity,
839 the convenience of access and routine as important
840 factors enhancing adherence and thus increasing the
841 potential for health benefit in women [94–96].

842 The majority of participants discussed the use of
843 breathing techniques in managing stress outside of
844 the class and found them helpful. This is consistent
845 with previous research where participants reported
846 using breathing techniques to cope with stressful
847 situations beyond the intervention [97, 98]. This
848 ongoing uptake of breathing practices can help main-
849 tain the effects of yoga. Breathing techniques were
850 reported as being both enjoyable and having the most
851 notable impact on stress reduction and inducing a
852 calmer state. Indeed, yogic breathing techniques have
853 been found to show promising potential in manag-
854 ing stress [99–102]. Research has demonstrated that
855 yoga breathing can modulate autonomic nervous sys-
856 tem (ANS) function, stress responses, cardiac vagal

857 tone, heart rate variability (HRV), central nervous
858 system excitation, vigilance, attention, chemoreflex
859 and baroreflex sensitivity, and neuroendocrine func-
860 tions [103]. For most adults, slow breathing has
861 been shown to optimally regulate the sympatho-
862 vagal stress response [104–107]. An intervention
863 solely focussed on *pranayama* (breathing) compo-
864 nents of yoga could be beneficial for people with
865 self-image issues who may be hesitant to engage
866 in a postural class. A pranayama-only intervention
867 could be delivered in a relatively shorter duration for
868 stress management and represents an area for further
869 research.

870 In addition to physiological mechanisms, psy-
871 chological processes include increased mindful-
872 ness, interoceptive awareness, self-compassion,
873 self-control and spiritual well-being [108]. These
874 proposed mechanisms are concordant with our find-
875 ings where participants described their perceptions
876 of the program impact as increasing self and body
877 awareness, finding a personal oasis, and a sense
878 of calm and relaxation. Some researchers have
879 suggested that yoga practice enhances coping mecha-
880 nisms that allow practitioners to deal with stress more
881 effectively, thereby reducing stress [109, 110]. This
882 hypothesis is consistent with our finding of a signifi-
883 cant increase in coping self-efficacy of yoga group
884 participants in comparison to the control group after
885 six weeks.

886 In this study, the sample was predominantly female
887 (91%) with no men in the yoga group, similar to Hart-
888 fiel et al.'s study (90% female) on yoga for workplace
889 stress and back pain [46]. This reflects national survey
890 data on yoga practice which consistently finds yoga
891 practitioners are predominantly female [24]. How-
892 ever, a contrasting trend was observed in a survey
893 in India, where practitioners were more likely to be
894 men, perhaps due to cultural factors and the Indian
895 origins of the discipline [111]. A similar trend was
896 observed in Puerto Valencia et al.'s systematic review
897 where the female majority studies were conducted
898 in the west whilst male majority studies were con-
899 ducted in India [42]. Given the potential benefits for
900 health and wellbeing, it is important to identify ways
901 to attract men to participate in mind-body interven-
902 tions. Further research should be undertaken to better
903 understand the perception of men toward yoga, ways
904 to increase engagement and thereby increase uptake
905 by men in future studies.

906 As with any study, there are limitations to this
907 research which merit attention. This was a pilot study
908 with small sample size; thus, it can only be considered

909 preliminary work and warrants more extensive study.
910 The sample was recruited through self-selection;
911 therefore, it was representative of employees who
912 were interested in online yoga for workplace stress
913 management. The Hawthorne or placebo effects on
914 the outcomes in the yoga group cannot be ruled out
915 due to the waitlist nature of the control. There was no
916 measurement of stressors affecting individuals during
917 the intervention period – the control group showed a
918 decrease in coping self-efficacy, which could have
919 been due to stressors during pandemic uncertainty.
920 This study only addressed short term impact of an
921 online yoga program; it would be valuable to evalu-
922 ate whether these changes could be maintained over a
923 longer period of time and should be the focus of future
924 research. 'Dosage' is an important factor that needs
925 consideration. Sherman pointed at the non-consensus
926 on optimum dosage for desired outcomes [71]. Fur-
927 ther research could explore the optimum dosage
928 for working populations who lack time to commit
929 to longer interventions and/or a high frequency of
930 weekly attendance. A long-term study could assess
931 the continuing acceptability of attendance three times
932 a week. A combination of subjective and objective
933 measures such as heart rate variability (HRV), heart
934 rate, blood pressure, and salivary cortisol should be
935 used in future research to triangulate subjective and
936 objective outcome measures.

937 Despite these limitations, the hypothesis that a
938 six-week online yoga program will assist people
939 working from home during COVID-19 in managing
940 stress, improving mental wellbeing and enhancing
941 coping self-efficacy was supported, and the findings
942 are promising in terms of providing employers with
943 a low-cost means to support the wellbeing of their
944 employees who work from home. Furthermore, these
945 findings are in no way restricted to people work-
946 ing from home – the intervention could be readily
947 extended to employees working onsite and indeed,
948 other population groups.

949 6. Conclusion

950 This study demonstrated not only the effectiveness
951 but also the acceptability, feasibility and viability of a
952 six week online streamed yoga intervention for stress
953 reduction (of women) when working from home. Par-
954 ticipants reported a wide range of benefits to health,
955 wellbeing and stress-management from engaging in
956 a yoga intervention delivered online in the stressful
957 and unprecedented times of COVID-19.

Acknowledgments

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Conflict of Interest

None to declare.

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