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Improvements in Psychological Health Following a Residential Yoga-Based Program for Frontline Professionals

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Objective: The purpose of this pilot study was to examine the effects of a residential yoga-based program on psychological health and health behaviors in frontline professionals. **Methods:** Frontline professionals from education, health care, human services, and corrections participated in the RISE (Resilience, Integration, Self-awareness, Engagement) program and completed questionnaires at baseline, post-program, and 2 months following RISE. **Results:** Paired samples *t* tests revealed improvements in mindfulness, stress, resilience, affect, and sleep quality from baseline to post-program (all *P*s < 0.001, *N* = 55), which were sustained at the 2-month follow-up (all *P*s < 0.01, *N* = 40). Participants also reported increases in exercise, fruit, and vegetable consumption post-program (all *P*s < 0.001), all of which persisted at the 2-month follow-up (all *P*s < 0.01) except exercise. **Conclusion:** These findings suggest that RISE improved indices of psychological health and healthy behaviors that remained 2 months following RISE.

Keywords: frontline professionals, mindfulness, resilience, stress, yoga

Workplace stress is a growing concern, with over 70% of working people reporting that their occupation is a main source of stress.¹ Chronic occupational stress negatively impacts many aspects of psychological and physical health,² including decreased immune function and increased risk of disease and mortality.³ Stress is also a main contributing factor to workplace absenteeism and loss of productivity, with 60% of workers reporting loss of productivity due to stress over the previous month⁴ and an estimated 1 million workers in the U.S. are absent each day due to stress.⁴ Frontline professionals work closely with at-risk, vulnerable, or dangerous populations in a specialized area such as education, health care, or law enforcement, and are exposed to a considerable level of stress, burnout, and compassion fatigue, which puts them at a greater risk for developing health complications.⁵ Therefore, frontline professionals would seem to be an ideal population to benefit from practical skills and techniques to regulate stress to prevent psychological and physical health problems.

Resilience is a positive adaptation to otherwise stressful situations whereby mental health is maintained or recovered despite experiencing adversity.⁶ Fostering resilience can help reduce stress, improve positive affect, reduce negative affect, increase a sense of empowerment or self-efficacy, and increase or maintain healthy behaviors such as physical exercise and a healthy diet.^{7–12} In occupational populations, higher resilience is associated with higher job satisfaction and workplace happiness.¹³ Indeed, resilience-training programs, some of which include aspects of mindfulness, compassion, self-regulation of stress, and cognitive behavioral techniques, have been shown to improve psychological and physical wellbeing and job performance.^{14,15} Practical and cost-effective techniques that increase resilience may benefit organizations by saving costs related to loss of productivity and absenteeism.

Mind–body interventions such as mindfulness-based stress reduction (MBSR) and yoga are accessible, highly adaptable, practical approaches that can build resilience to stress. The scientific evidence for the psychological and physical health benefits of mindfulness and yoga continues to accumulate^{16,17} and the use of yoga in the United States is on the rise, with approximately 10% of US adults having practiced yoga in 2012.^{18,19} Recent reviews and meta-analyses of mind–body interventions in professional populations have shown improvements in stress, resilience, mindfulness, and affect.^{20–22} A meta-analysis of 19 studies indicated that brief (eg, 4-week) mindfulness interventions were as effective as longer (eg, 8-week) interventions for improving psychological health, including stress, affect, mood, anxiety, depression, job satisfaction, and sleep quality.²² Therefore, programs that teach mindfulness practices over a shorter period of time may be a more practical and cost-effective approach to organizational programs. Importantly, recent evidence suggests that the yoga component of MBSR may be the critical element necessary for improving psychological wellbeing—even more than the mindfulness meditation or body scan components.^{23,24}

Yoga is a multicomponent system of mind-body practices, including physical postures and exercises, breathing exercises, deep relaxation techniques, as well as meditation/mindfulness practices. Systematic research reviews support the use of yoga for promoting psychological health.^{25–27} There is burgeoning evidence that yoga is effective for promoting psychological health in frontline professionals. For instance, a Kripalu yoga program administered across a noncontinuous 4-week period improved measures of stress, mood, fatigue, and tension in police officer trainees.²⁸ A randomized controlled trial (RCT) of a 12-week yoga program compared with control showed improved self-care and mindfulness and some indicators of burnout in nurses.²⁹ Another RCT of a 12-week yoga program resulted in reduced work-related stress in mental health professionals.³⁰ A more recent single-arm study of a 12-week yoga program resulted in improved anger, anxiety, and sleep quality in Canadian armed forces members.³¹ Most recently, an 8-week Kripalu yoga-based stress management program resulted in improvements in a wide range of psychological health measures in mental health care professionals, including depression, stress, mindfulness, and aspects of self-compassion.³² The previously described yoga interventions were administered in the workplace over a period between 6 and 12 weeks. Therefore, before the current study, the effect of a short, residential yoga program for frontline professionals had yet to be

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JD was a paid consultant for Kripalu Center for Yoga & Health.

MM and EP are employees of Kripalu Center for Yoga & Health and administered the program.

The yoga program being evaluated was developed by, funded, owned, and administered by Kripalu Center for Yoga & Health.

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Results from this study were presented at the International Congress on Integrative Medicine and Health in Las Vegas, NV, on May 18, 2016, Symposium for Yoga Research in Stockbridge MA on September 20, 2016, and the World Congress on Integrative Medicine and Health in Berlin Germany on May 3, 2017.

The authors report no conflicts of interest.

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investigated. Thus, the purpose of this single-arm study was to conduct preliminary effectiveness research examining the impact of an established 5-day residential yoga-based program on psychological health and healthy behaviors in frontline professionals from education, healthcare, human services, and corrections.

The Kripalu Center for Yoga & Health is a nonprofit educational organization in western Massachusetts focused on yoga, health, and holistic living that hosts over 50,000 participants per year in its facility's programs, making it particularly amenable to research. Kripalu yoga programs have been delivered to many types of populations, including youth in schools, musicians, police officers, obese populations, and health care staff, and have demonstrably improved psychological and physical health indicators.^{28,32–40} This is the first scientific investigation of Kripalu's RISE (Resilience, Integration, Self-awareness, Engagement) program, a comprehensive program of yoga-based practices, skills, and techniques including yoga postures, a variety of meditation formats (loving kindness, concentrative), body scan, mindful communication, and a focus on healthy behaviors concerning physical activity, nutrition, and sleep. Our primary objective was to examine the effect of the RISE program on psychological health and healthy behaviors in frontline professionals. We hypothesized that relative to their baseline responses, participants of the RISE program would report significant improvements in self-reported measures of stress, resilience, sleep quality, positive and negative affect, mindfulness, empowerment, vitality, compassion, self-compassion, and in healthy behaviors including exercise and diet.

METHODS

Participants

Seventy-five frontline professionals attending a 5-day residential RISE program in 2015 and 2016 were recruited to participate in the study. Attendees of the RISE program were invited by Kripalu through their partnerships with local organizations. Attendees were sent an email containing information about the study approximately 2 weeks before the start of the program and were sent a link to the survey 10 days before the start of the program. The professionals were sent three reminder emails if they did not respond to the survey, and one text message reminder if they did not respond to the survey invitation by email. Once the attendees arrived at Kripalu Center for Yoga & Health for the RISE program, they were provided with a final opportunity to participate in the study and were provided with the surveys in paper form. Of those recruited, 64 program attendees agreed to be in the research study and completed the baseline survey (85.3% of attendees). The Institutional Review Board at Brigham and Women's Hospital approved all aspects of this research.

Intervention

The RISE program was delivered as a 5-day residential immersion program at Kripalu Center for Yoga & Health in Stockbridge, Massachusetts. Attendees were housed on site at Kripalu and, in most cases, stayed in multi-guest rooms with a shared bathroom. The program included approximately 5 hours of daily structured sessions of yoga postures, sitting meditation, mindfulness practices, breathing techniques, and education about mindful communication, mindful sleep preparation, and mindful eating. The Kripalu style of yoga is based on a classical Hatha yoga style whereby yoga postures are held for a period of time. Postures include forward bends, back bends, lateral stretches, and standing, sitting, and supine postures; breathing techniques include three-part breath, sun breath, and letting go breath, and meditation techniques include concentrative meditation on the breath and mindful listening. The Kripalu Yoga delivered in the RISE program is accessible, trauma informed, secular, and focuses on mindfulness and breath. Because many RISE participants are new to yoga and/or working with a variety of incapacities, RISE uses a gentle and accessible

approach to on-the-mat practice. Awareness of the breath and mindfulness create the foundation of the practice, and cultivating proper alignment, strength, and/or flexibility is secondary. RISE works from a limited list of postures that have been tested for accessibility. Some participants have occupations that involve crisis intervention and may suffer from secondary trauma. Therefore, a trauma-informed approach to yoga is implemented with no physical assists. RISE also includes yoga practices consistent with the Essential Properties of Yoga Questionnaire.⁴¹ For the current study, the time allocation of the RISE program each day was approximately 2 hours of yoga instruction and/or practice, 90 minutes didactic (eg, introduction to stress resilience and introduction to mindfulness), and 90 minutes experiential (eg, group discussion on stressors in the workplace, creating a personal plan for implementing tools at home, mindful listening sessions to integrate didactic material). The program consisted of six modules, the modules and their descriptions are (1) Riding the Wave: engaging the breath and observing intense and stressful experiences with compassionate self-awareness; (2) Embodying Calm, an Introduction to Stress Resilience: use of yoga tools for stress resilience, including breathing exercises (letting go breath, sun breath), yoga-based movement (six movements of the spine and joint rotations for flexibility), body scan, and body tapping; (3) Food Choices to Manage Mood and Energy: promoting mindful eating and food choices to make beneficial shifts in mental and physical wellbeing; (4) Cultivating Clarity, an Introduction to Mindfulness: the theory and practice of mindfulness with two core mindfulness practices—sitting meditation and mindful listening; (5) Deepening Connection: maintaining resilience in the face of professional stress and performance demands with the practices of cultivating gratitude and expressing well-wishing for themselves and others; and (6) Centering Others: identifying work situations in which specific yoga tools can be useful and to feel comfortable sharing yoga tools/breaks with others. A typical day consists of morning Kripalu yoga classes at 6:30 AM, breakfast, a module (eg, Riding the Wave) at 9:00 AM, lunch, a second module (eg, Embodying Calm) at 1:45 PM, Kripalu yoga classes at 4:15 PM, and dinner at 5:30 PM. During the remainder of the day, additional Kripalu activities (eg, hiking, dance, and cooking demonstrations) were also available to participants when RISE was not in session. The RISE program was developed and administered by highly experienced, certified yoga teachers with at least 200-hour Yoga Alliance training. Finally, during RISE, study participants were provided with all of their meals, which were largely organic meals prepared by expert chefs. All meals were taken in the Kripalu Center dining room with all of the Kripalu Center guests.

Data Collection

Surveys were administered online using the Partners Health-Care version of the software platform REDcap. Questionnaires were administered to participants at three time points: baseline (1 to 10 days pre-program), post-program (1 to 10 days following RISE), and follow-up (2-month post-RISE). Participants were also invited to participate in a 20 minutes telephone interview 3 months following the program and those qualitative data will be published elsewhere.

Measures

Demographics

Participants completed a demographic questionnaire, which included age, gender, race, ethnicity, and education.

Psychological Health and Wellbeing

Stress

The Perceived Stress Scale (PSS) is the most widely used psychological instrument for measuring the perception of stress.

Items were designed to tap how unpredictable, uncontrollable, and overloaded respondents find their lives. Participants are asked to respond to each item on a scale ranging from 0 (never) to 4 (very often) using the 10-item version of the scale.⁴² The PSS displays adequate levels of reliability and validity.^{42,43}

Resilience

The Resilience Scale (RS) measures an individual's level of resilience, which is considered a positive personality characteristic that enhances individual adaptation. All 15 items are scored on a 7-point scale from 0 (disagree) to 7 (agree). All items are worded positively and reflect the verbatim statements made by participants in an initial study on resilience conducted by Wagnild and Young.⁴⁴ The RS displays high levels of reliability and validity.⁴⁵

Positive/Negative Affect

Positive and Negative Affect Schedule (PANAS) is a commonly used measure of positive and negative mood composed of 10 positive mood terms (ie, interested, enthusiastic, proud), and 10 negative mood terms (ie, distressed, guilty, hostile). Individuals are asked to indicate to what extent they have experienced each item by rating it on a scale ranging from 1 (very slightly or not at all) to 5 (extremely). Both subscales of the PANAS display good internal consistency, test-retest reliability, convergent, and discriminant validity.⁴⁶

Mindfulness

The Five Facet Mindfulness Questionnaire (FFMQ) is a well-validated, reliable 39-item scale for the assessment of mindfulness.⁴⁷ The FFMQ assesses five distinct facets of mindfulness: observing, describing, awareness, nonjudgment of experience, and nonreactivity to inner experience.⁴⁷ Each item is answered on a scale ranging from 1 (never or very rarely true) to 5 (very often or always true). The questionnaire provides a total mindfulness score as well as scores on each of the five subscales.

Empowerment

The Psychological Empowerment Scale (PES) is a 12-item scale based on the original questionnaire developed by Spreitzer⁴⁸ and then modified by Shellman⁴⁹ to measure participants' psychological empowerment. The PES measures the extent to which individuals experience a sense of meaning, competence, self-determination, and impact in their lives. Each question is rated on a scale of 1 (not like me) to 7 (a lot like me). The PES displays acceptable levels of reliability and validity.^{48,49}

Vitality

Subjective Vitality Scale (SVS) is a seven-item measure of an individual's experience of feeling energetic and alive. Those high in subjective vitality report being alert, energized, and vital. Individuals rate each item on a scale ranging from 0 (not at all true) to 7 (very true). The SVS displays adequate reliability and validity.⁵⁰

Compassion

The Santa Clara Brief Compassion Scale (SCBCS) is a brief, well-validated shortened version of the Compassionate Love Scale.⁵¹ It includes five items that measure compassion toward others, with items rated on a scale from 1 (not at all true of me) to 7 (very true of me). It has been reported to have high internal consistency reliability, with a Cronbach alpha of 0.90.⁵² We included the SCBCS halfway through data collection; therefore, the sample size for this questionnaire is lower than the other measures of psychological health and wellbeing.

Self-Compassion

The Self-Compassion Scale–Short Form (SCS-SF)⁵³ is a brief, well-validated version of the SCS.⁵⁴ The SCS-SF includes

12 items that measure self-compassion along six factors: mindfulness, overidentification (reversed), self-kindness, self-judgment (reversed), common humanity, isolation (reversed). Items are rated on a scale from 1 (almost never) to 5 (almost always). The internal consistency reliability of the SCS-SF is high, with a Cronbach alpha of 0.87.⁵³ Like the SCBCS, we also included the SCS-SF halfway through data collection.

Healthy Behaviors and Sleep Quality

The Lifestyle Questionnaire (LQ) is a self-report assessment of healthy behaviors and sleep quality that was developed by combining questions from other well-validated lifestyle behavior questionnaires, including measures of patient health behaviors created by Glasgow et al⁵⁵ and the Pittsburgh Sleep Quality Index.⁵⁶ The five-item LQ assessed participants' average minutes per day of exercise (typed response), vegetable and fruit intake (0, 1, 2, 3, 4 or more), and sleep quality, rated from 1 (very good) to 4 (very bad).

Program Impact

The Strategic Impact Questionnaire was created by the authors to assess the qualitative impact of the RISE program on a variety of outcomes related to feasibility, perception, and benefits of the program, as well as participants continued use of the skills and practices learned in the program. Immediately following RISE (post-program), participants were asked to indicate how prepared they felt to apply various yoga-based practices, skills, and concepts (eg, yoga postures, mindful eating) in their lifestyle on a 5-point Likert scale from 1 (not at all prepared) to 5 (extremely prepared). They were asked to select which (if any) aspects of the experience at Kripalu served as a catalyst to change how they think, and/or feel, and/or behave; whether they created a plan or set an intention to integrate yoga-based practices, skills, and concepts learned at RISE into their daily lifestyle (yes or no). Participants were also asked to rate the following two questions on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree): *I felt safe to freely express my emotions and thoughts with others in my Kripalu program;* and *meeting and interacting with others was an important part of the Kripalu program.* Participants were asked to briefly describe how they think they benefited from the experience of visiting Kripalu and attending the program. They were asked to rate the following question on a scale from 1 (not at all likely) to 5 (extremely likely): *How likely are you to share what you learned at Kripalu with others?* Lastly, they were then asked to briefly describe how they might share what they learned with others.

At the 2-month follow-up, participants were asked whether they have been practicing yoga-based practices or techniques since participation in the RISE program (yes or no); and if yes, approximately how many days per week on average they have practiced yoga-based practices or techniques, whether in a group setting or on their own over the past 2 months; and approximately how long each practice session was on average, in minutes. Thereafter, participants were asked to indicate how frequently and to what extent they have been using the various yoga-based practices and skills (eg, yoga postures, mindful eating) in their lives, rated on a visual analogue scale (VAS) from 0 (not at all) to 100 (very much so). Participants were asked to rate the following three questions on a VAS from 0 (not at all) to 100 (very much so): (1) *how familiar were you with the skills or practices you learned at Kripalu before the Kripalu program?* (2) *Have any of the skills or practices you learned at the Kripalu program become a new area of interest for you or increased your interest in them?* (3) *Have the skills or practices you learned at the Kripalu program increased the degree to which you plan on practicing them in the future?* With respect to practicing outside of the program, the following two questions were asked: (1) *have you signed up for new or additional yoga classes somewhere since the program?* (2) *Have you taken any additional personal or*

professional development courses or workshops, read or viewed materials that have reinforced what you learned at the Kripalu program? (yes or no). With respect to their workplace, participants were also asked if they noticed any changes in their workplace experience or dynamics as a result of taking the Kripalu program (yes or no). If yes, they were asked to describe what had changed. Lastly, they were asked whether they have used any of the skills or practices they learned at the Kripalu program in the course of their professional work using the same VAS described above.

Program Expectation

The Credibility Expectancy Questionnaire (CEQ) is a two-item scale modified for the current study, which measures the degree to which an individual feels that a particular treatment or program will be beneficial. Revised Item 1 reads: *At this point, how much do you really feel that the Kripalu program will help enhance your quality of life?* Participants rate this item on a scale from 1 (not at all) to 9 (very much). Revised Item 2 reads: *By the end of the Kripalu program, how much improvement in your quality of life do you really feel will occur?* Participants rate this item from 0% to 100%. The original CEQ displays adequate levels of reliability and validity.⁵⁷

Readiness to Change

The University of Rhode Island Change Assessment (URICA) was used to assess participant's readiness to change and changes in their psychological health and wellbeing. The URICA is a well-validated measure that includes four subscales measuring the following stages of change: pre-contemplation, contemplation, Action, and Maintenance.⁵⁸ Responses are given on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). For the current study, the URICA was shortened to include 1 item representing each of the four stages of change (four items total). These items were selected on the basis of the original factor analysis.⁵⁸

Data Analysis

Paired samples *t* tests were performed to compare differences in questionnaires between all three time points. Pearson correlations were performed between questionnaires' change scores. For questionnaires that were only administered at one time point, descriptive data are presented. The alpha level was set to 0.05 for all analyses. No adjustments were made for multiple outcome measures (eg, Bonferroni corrections to reduce type I error) based on the relatively small sample size and preliminary nature of this study. All quantitative data were analyzed using IBM SPSS version 24.0 (IBM Corp, Armonk, NY).

RESULTS

Participants

The final sample consisted of 55 participants (85.9% of participants enrolled) who completed the quantitative assessments at baseline and post-program. Of the 55 participants, 40 participants also completed the follow-up assessment (62.5% of participants recruited) (see the CONSORT diagram in Fig. 1). The sample consisted of 45 (81.8%) females and 10 (18.2%) males, with a mean age of 42.7 years (range 23 to 65). With respect to race and ethnicity, 89.1% identified as White, 7.3% identified as Black, and 3.6% identified as multi-racial; 1.9% of participants identified as Hispanic. With respect to education, 21.8% reported some college/ an associate's degree, 21.8% completed a college degree, and 56.4% attended or completed graduate school.

A one-way analysis of variance (ANOVA) revealed no significant baseline differences between individuals who completed only the baseline surveys (ie, noncompleters), participants who completed baseline and postintervention surveys (ie, partial

completers), and participants who completed all time points (ie, full completers) (all $P > 0.05$). A one-way ANOVA revealed no significant differences between partial completers and full completers at post except for perceived stress (PSS), whereby the partial completers ($M = 14.07$, $SD = 7.98$) scored higher than the full completers ($M = 9.54$, $SD = 5.69$), $F(1, 52) = 5.36$; $P = 0.024$. With respect to demographic differences, there were significant overall group difference in gender, $F(2, 62) = 5.03$, $P < 0.01$ and education, $F(2, 62) = 3.53$, $P < 0.05$. Least square differences (LSD) tests revealed that more males and less educated participants were more likely to complete only the baseline measures (incompleters) compared with those who completed measures at all three time points (full completers); gender $P < 0.01$, education $P < 0.05$. A comparison of survey administration method (online vs paper surveys) revealed no significant differences between these two administration modes for any of the outcome measures.

Psychological Health and Wellbeing

Change score means and standard deviations of all three time points for empowerment, mindfulness, vitality, resilience, affect, perceived stress, stages of change, compassion, and self-compassion are displayed in Table 1. There were statistically significant improvements in perceived stress $t(54) = -6.73$, $P < 0.001$; resilience, $t(52) = 4.98$, $P < 0.001$; positive affect $t(52) = 6.63$, $P < 0.001$; negative affect $t(51) = -6.25$, $P < 0.001$; mindfulness $t(48) = 5.90$, $P < 0.001$; empowerment $t(52) = 5.06$, $P < 0.001$; and vitality $t(54) = 6.60$, $P < 0.001$ and from baseline to post. There were no significant changes in self-compassion $t(28) = 1.56$, $P > 0.05$ or compassion $t(29) = -1.84$, $P > 0.05$ from baseline to post.

At the 2-month follow-up, significant improvements were maintained compared with baseline for perceived stress $t(39) = -4.17$, $P < 0.001$; resilience, $t(39) = 5.60$, $P < 0.001$; positive affect, $t(37) = 3.50$, $P < 0.01$; negative affect $t(36) = -2.99$, $P < 0.01$; mindfulness $t(38) = 7.35$, $P < 0.001$; empowerment $t(39) = 4.87$, $P < 0.001$; and vitality, $t(39) = -5.13$, $P < 0.001$. Significant improvements in self-compassion were observed at the 2-month follow-up compared with baseline, $t(21) = 2.25$, $P < 0.05$. There were also significant differences between post-program and the 2-month follow-up for positive affect, $t(39) = -2.41$, $P < 0.05$; negative affect, $t(37) = 3.13$, $P < 0.01$; and perceived stress $t(39) = 2.72$, $P < 0.05$, indicating some reduction in improvement since post-program. The means and standard deviations at each time point for measures that improved are displayed in Fig. 2. Pearson correlations between stress, resilience, affect, mindfulness, empowerment, and vitality change scores are displayed in Table 2.

Healthy Behaviors and Sleep Quality

On the LQ, participants reported significant increase from baseline to post-program in duration of exercise (average minutes per day) (baseline, $M = 36.6$, $SD = 29.67$; post-program, $M = 70.5$, $SD = 51.96$), $t(42) = 3.87$, $P < 0.001$; vegetable intake (baseline $M = 1.72$, $SD = 0.93$, post-program $M = 2.3$, $SD = 1.01$), $t(52) = 4.58$, $P < 0.001$; fruit intake (baseline $M = 2.5$, $SD = 0.93$, post-program $M = 3.0$, $SD = 0.98$), $t(53) = 4.26$, $P < 0.001$; and sleep quality (baseline, $M = 2.3$, $SD = 0.66$, post-program, $M = 1.9$, $SD = 0.68$), $t(54) = -3.83$, $P < 0.001$.

At the 2-month follow-up, participants' vegetable intake ($M = 2.3$, $SD = 1.14$), $t(37) = 3.86$, $P < 0.001$; fruit intake ($M = 3.0$, $SD = 0.95$), $t(38) = 4.67$, $P < 0.001$, and sleep quality ($M = 1.90$, $SD = 0.54$), $t(39) = 2.31$, $P < 0.01$ remained significantly higher than baseline. Participants' duration of exercise at the 2-month follow-up ($M = 46.6$, $SD = 37.63$) was not significantly different compared with baseline levels, $t(30) = 1.34$, $P > 0.05$, and was significantly reduced compared with post-program, $t(30) = -3.52$, $P < 0.01$.

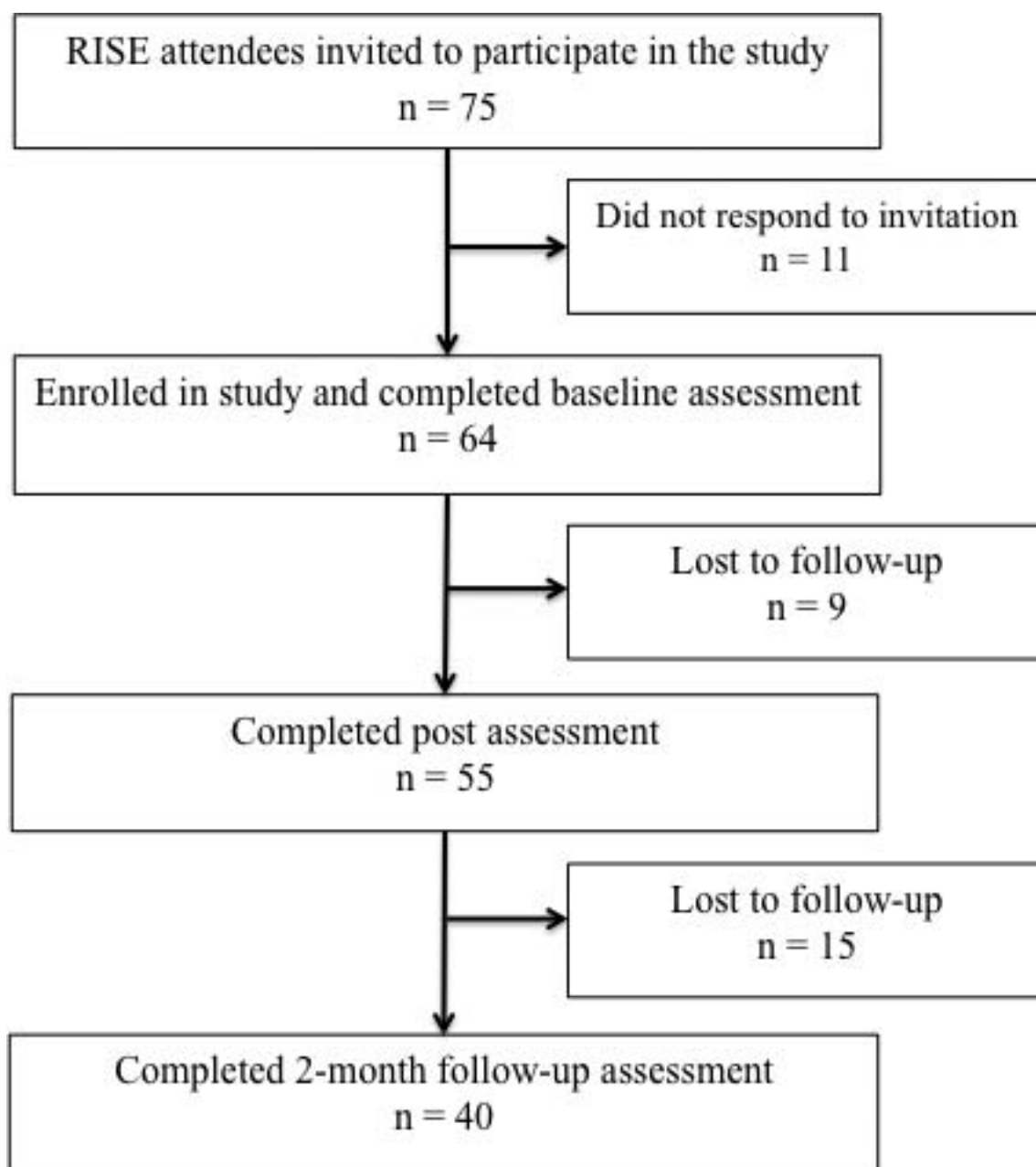


FIGURE 1. Participant flow chart.

RISE Program Expectation

Pearson correlations between participants' expected benefit of the RISE program on quality of life and questionnaire change scores revealed a significant negative relationship between Item 1, *At this point, how much do you really feel that the Kripalu program will help enhance your quality of life?* and changes in positive affect from post to follow-up; $r = -0.35$, $P < 0.05$. Further, significant correlations were revealed between Item 2, *By the end of the Kripalu program, how much improvement in your quality of life do you really feel will occur?* and changes in vitality from baseline to follow-up; $r = 0.33$, $P < 0.05$.

Readiness to Change

Paired samples t tests indicated that participants' raw readiness to change scores did not significantly change across any time

point (all $P > 0.05$). Participants were categorized into their stage of readiness to change based on their scores on the URICA: Pre-contemplation stage ($n = 17$), contemplation stage ($n = 20$), and action stage ($n = 8$). A one-way ANOVA revealed a significant difference between participants' stage of change at baseline and changes in empowerment from baseline to post, $F(2, 44) = 3.41$, $P = 0.043$, $n = 45$. LSDs posthoc analysis revealed that participants in the action stage showed greater improvement in empowerment from baseline to post than those in the pre-contemplation ($P = 0.013$) and contemplation stages ($P = 0.049$). No significant differences were found on the basis of participants' stage of change at baseline.

A significant difference was found between participants' stage of change at post-program and their changes in perceived stress from baseline to post, $F(2, 44) = 3.48$, $P = 0.040$; and from

TABLE 1. Change Score Means and Standard Deviations Between Baseline, Post-Program, and the 2-Month Follow-Up

Variable	Δ Baseline – Post				Δ Post – Follow-Up				Δ Baseline – Follow-Up			
	Mean	SD	n	P	Mean	SD	n	P	Mean	SD	n	P
PSS	−7.40	8.15	54	0.001	2.85	6.64	40	0.010	−4.40	6.67	40	0.001
RS	5.85	8.56	53	0.001	1.53	7.11	40	0.183	6.50	7.34	40	0.001
PA	7.38	8.10	53	0.001	−2.71	7.12	40	0.021	3.96	6.97	38	0.001
NA	−6.17	7.12	52	0.001	2.55	5.02	38	0.003	−3.73	7.60	37	0.005
FFMQ total	12.47	14.80	49	0.001	3.05	12.16	37	0.135	16.87	14.33	39	0.001
Observe	3.00	4.72	53	0.001	1.88	6.09	40	0.058	5.13	5.84	40	0.001
Describe	2.98	3.24	52	0.001	0.97	3.22	40	0.063	4.05	3.79	40	0.001
Awareness	2.06	4.35	54	0.001	−0.27	5.01	40	0.730	1.65	5.07	40	0.046
Non-judge	2.81	4.65	54	0.001	0.71	3.91	39	0.261	3.95	4.52	39	0.001
Nonreact	1.90	3.73	52	0.001	−0.10	3.05	38	0.833	2.32	3.26	40	0.001
PES	0.53	0.76	53	0.001	0.01	0.54	40	0.866	0.51	0.67	40	0.001
SVS	7.18	8.06	55	0.001	−0.24	6.14	40	0.804	6.26	7.72	40	0.001
SCBCS	−0.83	2.48	30	0.076	0.41	2.02	22	0.352	−0.45	2.52	22	0.407
SCS total	1.83	6.32	29	0.131	1.73	3.91	22	0.051	3.32	6.91	22	0.035
Overidentification	0.17	2.13	30	0.672	0.32	1.49	22	0.329	0.27	1.96	22	0.520
Self-kindness	0.52	1.55	29	0.083	0.64	1.05	22	0.010	1.18	1.44	22	0.001
Mindfulness	0.17	1.15	30	0.433	0.18	0.91	22	0.358	0.45	1.26	22	0.106
Isolation	0.40	1.33	30	0.110	−0.36	1.50	22	0.268	−0.09	1.41	22	0.765
Common humanity	0.30	1.49	30	0.279	0.82	1.62	22	0.028	1.18	1.53	22	0.002
Self-judgment	0.50	1.91	30	0.162	0.14	1.28	22	0.623	0.32	2.08	22	0.481

Data were analyzed using paired samples *t* tests. Data includes all participants who completed at least the baseline and post-program measures.

FFMQ, Five Facet Mindfulness Questionnaire; NA, negative affect; PA, positive affect; PES, Psychological Empowerment Scale; PSS, Perceived Stress Scale; RS, Resilience Scale; SCBCS, Santa Clara Brief Compassion Scale; SCS, Self-Compassion Scale; SVS, Subjective Vitality Scale.

post to follow-up, $F(2, 35) = 4.43$, $P = 0.020$. Posthoc LSD analysis revealed that those in the action stage showed greater improvements in perceived stress than those in the contemplation stage from baseline to post-program ($P = 0.013$), and showed greater changes than pre-contemplation ($P = 0.036$) and contemplation stages ($P = 0.005$) for changes in perceived stress from post-program to follow-up. Significant differences were also found between stage of change and changes in mindfulness from baseline to follow-up, $F(2, 34) = 3.59$, $P = 0.039$. Posthoc analysis (LSD) revealed greater changes in mindfulness for those in the contemplation group than those in the pre-contemplation group ($P = 0.014$). No significant differences between any other variable were found based on stage of change at post.

Strategic Impact Questionnaire

At post-intervention, participants' mean score for their overall preparedness to practice across all skills, practices, and concepts was 4.2 ($SD = 0.51$). Further, 92.5% of participants reported that they created a plan or set an intention to integrate the yoga-based practices, skills, and concepts learned at Kripalu into their daily lifestyle. Means and standard deviations for the following items are as follows: *I felt safe to freely express my emotions and thoughts with others in my Kripalu program* ($M = 4.2$, $SD = 1.25$, $n = 40$), *meeting and interacting with others was an important part of the Kripalu program* ($M = 4.3$, $SD = 1.16$, $n = 40$), and *how likely are you to share what you learned at Kripalu with others?* ($M = 4.8$, $SD = 0.39$, $n = 39$).

At the 2-month follow-up, 90.9% of participants reported that they had been practicing yoga-based practices or techniques since the Kripalu program ($n = 22$). Participants reported a mean of 3.4 ($SD = 1.12$) days per week on average practicing yoga-based practices or techniques, whether in a group setting or on their own ($n = 20$), with each session being an average of 30.0 ($SD = 16.80$) minutes long ($n = 18$). Table 3 displays the results of the VAS for the degree to which participants reported practicing the yoga-based practices, skills, and concepts learned at Kripalu since the program

at follow-up. Correlations between participants' reported preparedness to apply the RISE practice, skill, and concept at post-program and the degree to which each practice, skill, and concept was applied since the program reported at follow-up are also displayed in Table 3.

DISCUSSION

Occupational stress is an increasing problem for frontline professionals,⁵ and if not managed, can result in poor psychological and physical health,^{2,3} loss of productivity, and absenteeism.^{1,4} The purpose of the current study was to evaluate the effect of a 5-day residential yoga-based program (RISE) on psychological health and healthy behaviors in frontline professionals. As we hypothesized, the RISE program significantly improved participants' self-reported stress, resilience, positive and negative affect, mindfulness, empowerment, vitality, sleep quality, amount of exercise, and vegetable and fruit intake, from baseline to post-program. All measures remained improved at the 2-month follow-up compared with baseline except for duration of exercise. Self-compassion was higher at post than at baseline, but only reached statistical significance at the 2-month follow-up. There were no significant changes in compassion for others between any of the time points. Participants' expectations of the program on their quality of life were correlated with changes in vitality from baseline to follow-up and negatively correlated with changes in positive affect from post to follow-up, but was not significantly associated with any other outcome measure. Furthermore, improvements in some measures were associated with participants' reported readiness to change, namely, those in the action stage at baseline and at post reported greater improvements in empowerment and stress, respectively, whereas those in the contemplation stage at post reported greater improvements in mindfulness.

Our results provide further support to the recognized benefit of yoga for stress reduction in adults.^{27,59} Previous studies of yoga programs in workplace settings have reported increased psychological health and wellbeing in university and government employees,^{20,60} police officer trainees,²⁸ nurses,²⁹ mental health

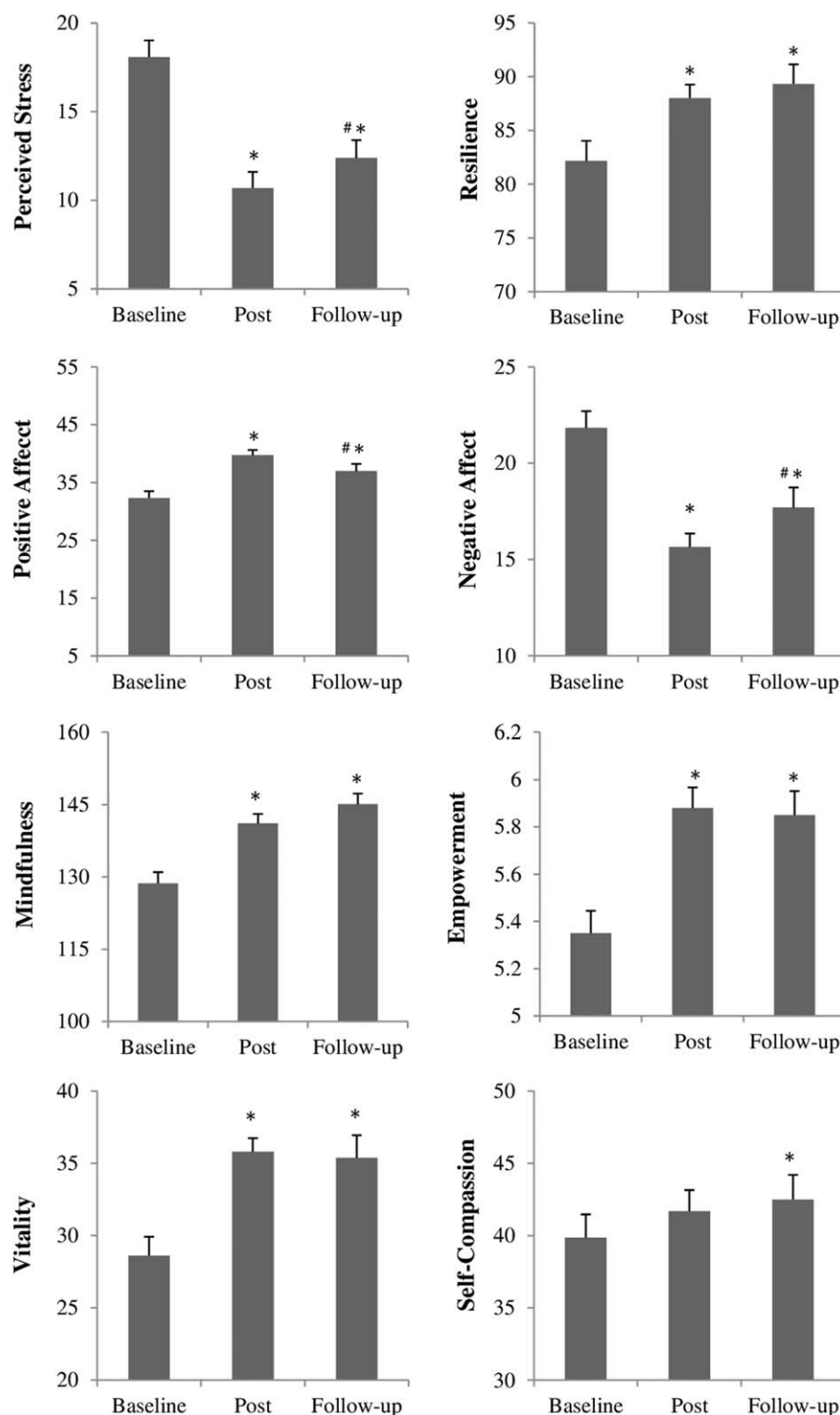


FIGURE 2. Participants' mean scores on empowerment, mindfulness, perceived stress, resilience, affect, vitality, and self-compassion at baseline, post-program, and follow-up. Data were analyzed with paired samples *t* tests, **P* < 0.05 compared with baseline, #*P* < 0.05 compared with post.

professionals,³⁰ active and retired armed forces members,³¹ and mental health care professionals.³² Mindfulness-based programs that include yoga, such as MBSR, have also demonstrated benefits in frontline professionals' psychological health and wellbeing, including self-compassion, mindfulness, and sleep quality in educators,⁶¹ and stress reduction, quality of life, and self-compassion in health care professionals.^{62,63} Although these yoga and mindfulness

studies report similar results as our current study, the RISE program was administered over 5 days compared with 6 to 20 weeks, which is the case with the aforementioned programs. Furthermore, RISE resulted in benefits not assessed in other studies, including resilience, vitality, and empowerment.

An aim of the RISE program is to cultivate skills in attendees that improve their overall health and wellbeing, including

TABLE 2. Pearson Correlations Between Questionnaire Change Scores

	PSS T2-T1	PSS T3-T1	RS T2-T1	RS T3-T1	PA T2-T1	PA T3-T1	NA T2-T1	NA T3-T1	FFMQ T2-T1	FFMQ T3-T1	PES T2-T1	PES T3-T1	SVS T2-T1	SVS T3-T1
PSS T2-T1	—													
PSS T3-T1	0.62***	—												
RS T2-T1	-0.34*	-0.02	—											
RS T3-T1	-0.22	0.55***	—											
PA T2-T1	-0.53***	0.31*	0.20	—										
PA T3-T1	-0.34*	0.19	0.53**	0.58***	—									
NA T2-T1	0.66***	0.49**	-0.39**	-0.31*	-0.17	—								
NA T3-T1	0.51**	0.67***	0.04	-0.18	-0.42*	0.78***	—							
FFMQ T2-T1	-0.56***	-0.25	0.51***	0.14	0.35*	-0.59***	-0.51**	—						
FFMQ T3-T1	-0.36*	-0.44**	0.23	0.39*	0.40*	-0.57***	-0.51**	0.56***	—					
PES T2-T1	-0.37**	-0.10	0.39**	0.25	0.10	-0.31*	-0.07	0.54***	0.40***	—				
PES T3-T1	-0.26	-0.36*	0.00	0.36*	0.25	-0.06	-0.16	0.26	0.48**	0.65***	—			
SVS T2-T1	-0.60***	-0.33*	0.50***	0.38*	0.55***	0.47***	-0.41*	0.46**	0.51**	0.25	0.25	—		
SVS T3-T1	-0.52**	-0.44**	0.34*	0.42*	0.37*	0.65***	-0.29	0.48*	0.42*	0.05	0.31	0.70***	—	

FFMQ, Five Facet Mindfulness Questionnaire; NA, negative affect; PA, positive affect; PES, Psychological Empowerment Scale; PSS, Perceived Stress Scale; RS, Resilience Scale; SVS, Subjective Vitality Scale; T1, baseline; T2, post-program; T3, 2-month follow-up.

* $P < 0.05$.

** $P < 0.01$.

*** $P < 0.001$.

TABLE 3. Participants' Self-Reported Degree of Practicing Yoga-Based Practices, Skills, and Concepts Since the RISE Program at the 2-Month Follow-Up (Visual Analogue Scale 0–100) and Correlations Between Degree of Practice at Follow-Up and Preparedness to Practice at Post

RISE Program Practice	M	SD	n	r
Breathing exercises	75.5	14.59	21	0.31
Mindful communication	70.1	15.86	19	-0.30
Mindfulness	68.9	20.47	20	0.21
Mindful eating	65.8	14.14	19	0.63*
Meditation	56.6	29.15	21	0.63*
Mindful sleep preparation	56.5	24.84	21	0.09
Yoga postures	54.0	32.94	21	0.57*
Yoga breaks	48.8	29.72	22	0.57*

* $P < 0.01$.

mindfulness and resilience. Mindfulness is a key component of the RISE program as both a mindset that can be integrated into all daily activities, such as when eating or communicating, and as a form of meditation. Mindfulness can be measured as a state when assessing one's mindfulness in the moment, or as a trait, when assessing one's mindfulness in general. We observed persistence in the ability of RISE to improve mindfulness, with the increased levels of trait mindfulness maintained at the 2-month follow-up. Similarly, other studies have demonstrated that yoga improves trait mindfulness across a wide range of populations.^{64–70} Mindfulness has been shown to partially mediate improvements in stress and quality of life following a yoga intervention.³⁷ Like mindfulness, resilience may act as a protector factor against the detrimental effects of stress,⁷¹ including the development of psychiatric disorders.⁷² Resilience programs have been implemented for workplace populations with some success with respect to decreasing stress and improving other measures of psychological health.^{14,15} Therefore, organizations should consider implementing programs that demonstrably increase employee resilience. Like mindfulness, participants developed a greater level of resilience after attending the RISE program that was maintained 2 months after the program, and even continued to increase at follow-up compared with post, albeit not significantly. In support of our findings, a previous study reported improved resilience following a workplace yoga intervention for university employees.²⁰

The constructs of self-compassion and compassion were added approximately halfway through data collection; therefore, the interpretation and generalization of these results are particularly limited. The development of self-compassion is particularly important for frontline professionals and yoga and mindfulness have been reported to increase self-compassion in these populations.^{32,61–63} In the current study, baseline levels of self-compassion were comparable to levels observed in other frontline populations.^{32,73–75} Participants' compassion for others was approximately 20% to 80% above the average value observed in noncaregiver or frontline populations^{52,76} and remained high at all time points, indicating a possible ceiling effect. Indeed, other studies with frontline professionals reported similar levels of compassion that were not significantly altered by mindfulness interventions.^{77–79} Participants' high level of compassion emphasizes the importance of increasing self-compassion in frontline professionals to prevent compassion fatigue.⁵ Indeed, previous research suggests that improvements in stress and quality of life following a yoga intervention may be mediated through increased self-compassion.³⁷

The benefits of yoga on psychological health and healthy behaviors may be due to the cultivation of three competencies:

mind-body awareness/mindfulness, self-regulation, and physical exercise.⁶⁴ Both mindfulness and resilience have been described as practices or qualities through which self-regulation can be fostered.^{38,80} Our results indicate that increased mindfulness and resilience was correlated with improvements in most psychological health measures. Improvements in mindfulness and resilience were correlated with improvements in stress, affect, empowerment, and vitality. However, there were differences in the strength of the relationships whereby mindfulness was more strongly correlated with improvements in stress, affect, and empowerment, resilience was more strongly correlated with improvements in vitality. As was expected, mindfulness and resilience were correlated with each other, and other studies have also reported correlations between both constructs.^{81,82} All psychological health variables were correlated with each other to some degree except for vitality and empowerment. The reason for the lack of significant correlations between vitality and empowerment is unclear, and to the best of our knowledge, there are no previous studies assessing this relationship to date. In alignment with our results, reports from RCTs indicate that yoga increases vitality compared with control^{20,83,84} and qualitative research indicates yoga increases a sense of empowerment.⁸⁵

Chronic stress can lead to poor health, including the development of noncommunicable lifestyle diseases such as diabetes and cancer.^{86,87} In addition to reduction of stress, positive changes in lifestyle habits, including increased exercise, nutrition, and proper sleep, can prevent negative health outcomes.⁸⁸ We observed increased exercise, vegetable and fruit intake, and sleep quality post-program. Of these health-related outcomes, vegetable and fruit intake and sleep quality remained improved at the follow-up, indicating that RISE facilitated modifications in healthy behaviors that may be sustained in the long term. Indeed, previous research suggests that yoga is associated with health-related outcomes, including vegetable and fruit intake, and sleep quality, use of fewer medications, lower body mass index (BMI), and attenuated weight gain.^{33,89,90} Yoga has also been shown to increase exercise adherence compared with passive control without explicit instructions to exercise.⁹¹ Yoga may promote healthy behaviors and outcomes through increased mind-body awareness, which enhances attention to endogenous cues that inform which behaviors promote healthy functioning,⁶⁴ and some evidence for this relationship exists.⁹² In support of this hypothesis, we found that increased mindfulness from baseline to post was correlated with increased exercise and fruit intake, and an increase in mindfulness from baseline to follow-up was correlated with increased vegetable intake and sleep quality.

Integration of the yoga-based practices, skills, and concepts into participants' daily life is essential for continued stress management and psychological health. Participants reported that they were prepared to use the yoga-based skills and practices they learned at the RISE program moving forward, and the majority of participants set a plan or intention to continue to use them. Reportedly, they continued to use the yoga-based skills and practices approximately three times per week on average, one-third signed up for yoga classes since the program, and most participants were integrating these practices into their workplace setting. The RISE program encourages and teaches attendees to share the yoga-based skills that they learned with their colleagues to generate a multiplier effect. Indeed, on average, participants reported that they were very likely to extremely likely to share what they learned with others. This is a cost-effective approach for organizations by seeding organizations with skills and tools to manage stress that then propagate throughout the organization. These findings support the feasibility and acceptability of the RISE program as a sustainable practice, at least up to 2 months. The qualitative results of this study will provide a deeper inquiry into the integration of the

yoga-based tools and techniques into participants' daily life and will be published elsewhere.

Given the preliminary nature of this study, there are several limitations that require discussion. First, the use of a single-arm design with a modest sample size provides a less confident evaluation of an intervention compared to an RCT. However, the preliminary data from this study will be used in the design of a more scientifically rigorous RCT in the future. Second, given the nature of this study as a pilot investigation, we did not perform a formal statistical adjustment to the *P* values for multiple comparisons to rule out type 1 error; however, many of the *P* values were small enough that the conservative Bonferroni correction would still result in *P* values at *P* value less than 0.05. Third, the sample was heterogeneous and included professionals from multiple sectors, including education, corrections, human services, and health care, and held different positions within each sector. While all participants were frontline professionals who commonly experience issues of workplace stress and compassion fatigue, we contend that a homogenous group from one sector could provide less variability in the data and strengthen the results. Fourth, the sample was composed of mostly white, educated, females who also self-selected into the program, constraining the generalizability of the results to other demographics. Fifth, those with higher levels of stress at post-program were less likely to complete the follow-up assessment, biasing the sample of full completers toward those with lower stress levels. Sixth, a longer follow-up period would have provided data on the long-term changes in psychological health and healthy behaviors and how they relate to continued practice of the various yoga-based skills and practices. Lastly, the reliance on self-report measures to assess psychological health is a limitation and future studies should also assess objective measures, such as salivary biomarkers of stress and immune function. To meet the limitations of the current study, future work will be conducted. As the next step, future RCTs will compare professionals who attend the RISE program to a waitlist control group (passive control) and then a comparison to a retreat control group (active control), with subjective and objective measurements taking place across a longer follow-up period.

Taken together, the results of the current study indicate that the yoga-based RISE program improved psychological health and well-being in frontline professionals and that most improvements persisted up to 2 months following the program. Furthermore, the practices and techniques learned at the program continue to be used and integrated into their daily life and work. Continued practice could prevent or mitigate the negative impact of chronic stress on health and wellbeing in frontline professionals, but more research is needed to confirm or refute this possibility. Workplace stress remains a growing concern for many organizations and effective, feasible programs that reduce employee stress and improve psychological health are needed to prevent workplace burnout and detrimental outcomes to health and wellbeing, as well as loss of productivity and absenteeism. The results from the current study provide compelling support of providing the RISE program to frontline professionals to improve their psychology health and wellbeing.

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