Technical Report

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Enhancing Caregiver Resilience: Courses with Positive Psychology Tools Promote Durable Improvements in Healthcare Worker Burnout

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Abstract

Background: Burnout affects roughly half of physicians and nurses, portending poor safety climate, decreased patient satisfaction, and serious medical errors. While current healthcare worker (HCW)-directed interventions for burnout show promise, they are limited by the significant time commitment required and the limited time healthcare workers can provide. The role of more compact resiliency didactics and brief web-based interventions in mitigating burnout is not clear.

Purpose: We evaluated the role of short-term resiliency education, which included participation in multimodal PPT, in improving HCW burnout.

Methods: In this non-randomized repeated-measures study, HCW enrolled in a one- or two-day resiliency course between January 2014 and September 2017. Courses included didactics on burnout prevalence, strategies for coping and improving well-being, along with evidence-based PPT (Table 1) used during and after the course. Paired T-tests compared participant burnout before, after, and at 1-month follow-up. Multivariate regression evaluated the effects of participant demographics, course format, course ratings, baseline burnout, and self-reported PPT use on burnout improvement.

Results: 1,042(74.6%) HCW participated in the one-day course and 354(25.4%) in the two-day course. Among one-day course participants, burnout increased between baseline and day of course completion ($p<.001$), but had returned to baseline at 1 month follow-up ($p=.505$). Among two-day participants, burnout decreased between baseline and the day of course completion ($p<.001$)), and between baseline and 1-month follow-up ($p=.002$). In a multiple regression model only higher burnout at baseline and use of the "Three Good Things" tool each uniquely predicted decreased burnout at one month ($F(23, 95) = 2.16$, $p = .005$, $R^2=0.19$) .

Conclusions: Higher baseline burnout and PPT use predicted the greatest improvements in HCW burnout. Participants of a two-day resilience course exhibited significant improvements in burnout up to 1-month later. However two-day participants reported higher baseline burnout, which may have accounted for their greater improvement compared to one-day participants.

Practice Implications: Short-term educational interventions for burnout appear promising, and may increase their effectiveness by targeting burned out individuals and encouraging direct participation in PPT.

Main Text

Introduction

Burnout among healthcare workers is at an all-time high, affecting 40-75% of physicians and one-third of nurses, and remains an unanswered challenge in achieving high quality care.[1-4] The need for intervention is especially urgent in the current healthcare landscape, as providers face increased workplace demands to meet quality metrics amid rising patient-to-provider ratios, as well as insufficient resources to address the work-life imbalance and emotional stress endemic to patient care.[5, 6] The result is a potent milieu that exacerbates the feelings of exhaustion, cynicism, and low efficacy characterizing burnout.[7] Burnout not only portends decreased productivity, loss of work hours, and early retirement among HCW, but also poses a significant threat to patient safety climate, independently predicting 30-day patient mortality, infection rates, and self-reported medical errors.[8-12]

Interventions targeting HCW burnout fall under organization-directed and person-directed approaches. In a recent meta-analysis, organization-directed interventions were found to be more efficacious, at the cost of being more difficult to implement.[13, 14] Modifications to clinical workflow, for instance, entail altering complex interconnected systems of providers and patients while balancing against adverse consequences. Simpler organization-directed approaches, such as a work-hours reductions, have produced the adverse effect of poorer self-assessments of clinical skills and patient care among resident physicians.[13, 14] By comparison, person-directed interventions impart strategies to prevent development or worsening of burnout. Small group approaches designed to impart mindfulness strategies over protected time have demonstrated sustained burnout improvement among both physician and nurse groups, though

have required significant time commitment with multiple rounds of in-person contact and significant cost.[15-19]

These limitations have led investigators to study the use of positive psychology tools (PPT) – short exercises designed to improve well-being by reflecting on "positive and self-relevant information".[20] While some PPT were initially designed to mitigate depression, a two-week online "Three Good Things" intervention has been shown to also improve HCW burnout up to 12 months later.[21, 22] Currently, HCW-directed interventions do not combine resilience education with exposure to PPT. Here, we evaluate the efficacy of one- and two-day in-person resiliency courses combined with multiple web-based PPT in improving HCW burnout.

Materials and Methods

Design and study population

This is a non-randomized study of survey data collected and evaluated under a repeated-measures design, evaluating HCW burnout before and after participants took either a one- or two-day "Enhancing Caregiver Resilience" course, offered by well-being and patient safety researchers and staff within a large academic health system. Participant burnout was assessed before, at the end of, and one month after participating in the course.

Participants learned about the course through the health system patient safety center website, by attending talks by affiliated faculty, and word of mouth referrals. A wide variety of roles were represented, including nurses, physicians, pharmacists, clinical support (CMA, nursing aide, etc), clinical social workers, physical/speech/occupational therapists, nutritionists, administrative support, and other health system employees. Participants came from 123 hospital

systems, stand-alone sites, and national and international healthcare organizations, including one site in Beijing, and another in Singapore.

Enhancing Caregiver Resilience Course

Courses were offered between January 2014 and October 2017. One-day courses were held on weekdays and included a total of 8 training hours. Two-day courses were held over consecutive days, for a total of 16 hours. Course instructors included patient safety center staff and guest speakers, each expert in their respective topics and responsible for delivering the same modules across course administrations.

Courses consisted of two core elements, 1) providing education on particular sub-topics of resiliency and their basis in the scientific literature, and 2) sharing and practicing various evidence-based PPT**.** Each course began with the module, **"**Resilience/Burnout: Prevalence & Severity", designed to define and normalize healthcare worker burnout. Subsequent didactic modules elaborated on the impacts of interpersonal relationships and teamwork climate on resilience ("relationship resilience" and "disruptive behaviors"), self-care strategies ("science of mindfulness" and "fatigue management"), and adaptation to disruptive life events from both scientific and philosophical perspectives ("coping with change"). Depending on the module, participants would also complete PPT exercises in-person with other participants (e.g. discussing a moment of awe they had experienced). Participants were also encouraged to use online PPT in the weeks following course completion. Course modules and relevant supporting research are summarized in Table 1.

Survey assessment of course and participant burnout

Participants were asked to complete online surveys at three time points: one prior to starting the course (baseline), one at the end of the course, and another at 1-month follow-up. All surveys were administered via Qualtrics survey software, each including assessments of burnout in addition to demographic and workplace items such as gender, work position, current and total work experience, and shifts worked during the week. End of course surveys added Likert-scale evaluations of the course and individual modules.

Measurement of personal burnout

Burnout was assessed using a 5-item derivative of the Maslach Burnout Inventory's emotional exhaustion subscale.[23, 24] This subscale has been previously applied toward studying burnout and job stress in healthcare workers, correlates with measures of decreased productivity and staff turnover, and has been validated against the ICD-10 diagnosis of "job-related neurasthenia".[13, 19, 21, 24-26] Respondents rated their level of agreement on a 1-5 scale ("disagree strongly" to "agree strongly") with statements such as "I feel fatigued when I get up in the morning and have to face another day on the job" and "Events at work affect my life in an emotionally unhealthy way". Each participant's mean score across 5 items was converted to a 0-100 point scale, with higher scores representing more severe emotional exhaustion. The scale exhibited good reliability in the current sample (Cronbach's alpha = .87).[25]

Course Evaluation

Three items asked participants to rate the course on a 1-5 scale ("Disagree Strongly" to "Agree Strongly"), using questions such as "I would recommend this course to a friend" or "I would like to have a resilience course like this delivered to my hospital". Thirteen items asked

participants to rate various aspects of the course on a 1-5 scale ("Very Poor" to "Very Good"), on questions such as "Satisfaction with course faculty" and "Content of the training". Participants rated individual modules by answering the question, "how would you evaluate the content", on a 1-5 scale from "very poor" to "very good". At 1-month follow-up, participants were asked to rate their usage of individual modules on a 1-5 scale ("Disagree strongly" to "Agree strongly") with statements such as "I have used the following tool in the past 4 weeks to help with my personal resilience".

Statistical Methods

Chi-squared and Mann-Whitney U testing was used to compare demographic data. Paired T-tests assessed change in burnout over time. Standardized effect sizes were calculated for all paired tests using Cohen's d.[27, 28] Effect sizes were interpreted according to prior conventions, with values above 0.2, 0.5, and 0.8 reflecting "small", "medium", and "large" effect sizes, respectively.[28]

ANOVA was used to assess the effects of demographic characteristics (gender, position, work experience, shifts) and course enrollment on burnout improvement at one month course follow-up. Pearson correlation was used to measure the associations of scaled measures – including baseline burnout, course quality and content evaluations, and self-reported PPT use – with burnout improvement. Multiple regression ascertained whether baseline characteristics and significant univariate predictors, identified in ANOVA and bivariate correlations, contributed to 1-month burnout change in a multivariate analysis. Statistical tests were two-tailed, with $p < .05$ set as threshold for significance. Analyses were conducted in SPSS Statistics v24.0. This study was conducted under IRB approval Pro00063703.

Results

Respondent Demographics

There were 1,396 total participants, 1,042 (74.6%) in the one-day course and 354 (25.4%) in the two-day course, who completed at least a baseline survey. Demographic data are broken down by course in Table 2**.** With respect to professional role, nurse managers comprised the largest group, (18.1%, n=252), followed by registered nurses (16.9%, n=236), and other managerial staff (e.g. clinic managers; 13.7%, n=19). Course participants identified as majority female (80.0%), and most worked day shifts (87.9%). A majority had spent at least 1 year in their current work position (85.2%) and reported at least 5 or more years of total professional experience (95.0%). Nearly half had 21 or more years of professional experience (47.5%).

Compared to one-day courses, two-day courses were attended by a higher proportion of males (21.3% vs. 16.1%, X^2=4.47, p=.034). Two-day courses enrolled a higher proportion of HCW (56.4% vs 37.8%) in a direct patient care role (e.g. physician, physician assistant, nurse), whereas one-day courses enrolled a higher proportion of administrators (16.1% vs 6.8%), (X^2=63.127, p<.001). Two day course participants reported being in their current job position for a longer period of time, but reported an overall lower total work experience (U=203,077 , p=.004 and U=163,487.5, p=.002, respectively). More two-day than one-day course participants reported working night and variable shifts (X^2=42.86, p<.001).

Course Evaluation

Participants in both courses rated course content favorably, with over 93% of course modules receiving the top two ratings of “good” or “very good” on a 5-point Likert scale (Figure 1). The vast majority of participants slightly or strongly agreed that they would recommend the

course to friends (98%) or share the Three Good Things tool with others (97.7%), and 85.9% reported wanting a similar course delivered in their hospital.

Participants in 2-day courses on average provided more favorable overall ratings for resiliency course quality (4.83 ± 0.30 vs. 4.79 ± 0.25, $t(1025) = 2.65$, $p = .008$), as well as course content compared to 1-day participants (3.80 ± 0.69 vs. 2.40 ± 0.30, $t(466) = 37.99$, $p<.001$). However, 1-day participants were equally likely to recommend the course as 2-day participants (4.82 ± 0.51 vs. 4.85 ± 0.52, $t(871) = 0.88$, $p = .38$) and reported similar levels of PPT use over a 1 month follow-up period (3.50 ± 0.92 vs. 3.63 ± 0.88, $t(103) = 0.91$, $p = .36$; See Figure 2).

Well-being Scores

At baseline, participants in two-day courses reported a statistically higher level of burnout (51.4 ± SD 28.2) compared to participants in one-day courses (45.5 ± 27.6) ($p < .001$). Among participants in the one-day course, burnout scale scores increased from baseline (44.04 ± 26.69) to immediately after (49.75 ± 27.23) taking the course, ($t(230) = 4.86$, $p < .001$, $d = 0.21$), and then decreased from immediately after (53.96 ± 24.00) to 1 month follow-up (46.60 ± 28.13), ($t(74) = -2.81$, $p = .006$, $d = 0.28$) (Figure 2). No significant differences in burnout were reflected between baseline (44.88 ± 28.09) and 1 month follow-up (43.62 ± 29.39; $t(122) = -0.67$, $p = .505$; See Figure 3).

For participants in the two-day course, burnout decreased between baseline (49.84 ± 27.76) and immediately after the course (44.69 ± 22.81) as well as between baseline (49.01 ± 30.95)) and the 1 month follow-up (37.81 ± 29.03; $t(304) = -4.57$, $p < .001$, $d = 0.20$ and $t(47) = -3.27$, $p = .002$, $d = 0.37$; See Figure 2). Burnout did not significantly decrease between

immediately after the course (40.30 ± 21.18) and the one month follow-up (35.82 ± 26.45) ($t(54) = -1.55$, $p = .126$, $d = 0.19$).

Univariate ANOVA evaluated the effect of participant demographic characteristics and course enrollment on 1 month change in burnout. Participation in two-day courses compared to the one-day courses predicted larger decreases in burnout (-11.2 points vs. -1.26 points; $F(1, 169)$, $p=.008$, $\eta p^2=.041$). Neither differences in gender, job position, years in current position, total years of work experience, nor shift time of day were significantly related to burnout improvement.

Individuals with higher baseline burnout exhibited larger decreases in burnout between baseline and 1-month follow-up ($r = -0.36$, $p < .001$). With respect to course evaluations, neither aggregated measures of likelihood to recommend the course (3 items), course quality (13 items), nor module ratings (10 items) were predictive of changes in burnout at follow-up ($r = -0.13$, $p = .091$; $r = -0.056$, $p = .467$; $r = 0.096$, $p = .237$).

A scaled measure of overall use of module content after the course, was averaged across 10 didactic and PPT modules. Higher content use was correlated with greater reductions in burnout ($r=-.186$, $p=.033$). Individually, higher reported use of the Three Good Things ($r=-.266$, $p<.001$), fatigue management ($r=-.177$, $p=.029$), mindfulness ($r=-.175$, $p=.029$), signature strengths ($r=-.184$, $p=.024$), and relationship resilience ($r=-.200$, $p=.014$) modules predicted decreases in burnout.

In a multiple regression model including demographics, course enrollment, and all significant predictors of burnout change identified in univariate analyses (e.g. baseline burnout, meal quality ratings, ratings for the “relationship resilience” module, and use of various PPT), only baseline burnout and self-reported use of Three Good Things each independently predicted

decreased burnout one month later ($F(23, 95) = 2.16$, $p = .005$, $R^2=0.19$) (Table 3). A regression model including only baseline burnout ($\beta =-0.386$, $p<.001$) and self-reported use of the Three Good Things ($\beta = -0.271$, $p<.001$) explained 21.0% of the variance in burnout improvement from before to one month after the course ($F(2,163)=23.0$, $p<,001$, $R^2=0.210$). Notably, course length (1 vs. 2-day) did not significantly contribute to the analysis when baseline burnout and use of Three Good Things were included ($\beta = -0.12$, $p = .15$), suggesting that observed burnout improvement in 2-day course participants was driven more so by confounders such as higher baseline burnout and greater use Three Good Things.

Discussion

High rates of burnout in healthcare have prompted an urgent call for evidence-based interventions.[13, 29] The current study found that participation in short-term resiliency courses, in addition to multiple web-based PPT, produced improvements in burnout. Multivariate analyses revealed that the degree of improvement depended on the level of baseline burnout, such that higher burnout at baseline predicted greater reductions in burnout after the course, and one month later. Participants who reported using the Three Good Things PPT in the month following the course also reported greater reductions in burnout. Burnout improvement was not independently determined by job position, work experience, or general favorability toward course quality or content. This suggests courses were not only effective for certain groups of HCW, and that burnout improvement is not merely a proxy for satisfaction with the course.

Participants of the two-day courses achieved an average 11.2-point decrease on scaled scores of burnout (emotional exhaustion domain) at one-month follow-up. This amount approaches a medium effect size and exceeds the 2.7-point reduction (5 points when equivalently

scaled from 0 to 100) in emotional exhaustion measured across 12 randomized controlled trials and 28 cohort studies in a recent meta-analysis.[13] Mindfulness and stress management-based approaches, the most effective among person-directed interventions in the same meta-analysis, achieved a pooled 4.7-point reduction.[13] Previous studies have shown that even single-point changes in burnout predict changes in full-time work effort, self-reported medical errors, and even suicidal ideation among HCW.[9, 30-32]

Perhaps most promising is our achievement of comparable burnout reduction at a substantially reduced time cost compared to other burnout interventions. In a similar course-based approach, Krasner employed small-group mindfulness didactics, meditation, narrative exercises, and discussion of meaningful clinical experiences with primary care physicians to achieve a 6.8-point (12.6-point, rescaled 0 to 100) decrease in emotional exhaustion at 15 months.[15] This program required 2.5 hour weekly meetings over 8-weeks, a full-day 7-hour retreat, 45-60 minutes of recommended practice a night, and 10 monthly maintenance sessions for a total of approximately 90 course hours. The current intervention demonstrated similar efficacy after approximately 20 course hours, composed of two 8-hour days and elective use of online PPT.[15]

An approach favoring use of multiple PPT was advocated by Seligman and originally explored by Fordyce, who showed that combining individually effective self-study training programs into one program increased participant well-being compared to controls. [22, 33, 34] On the other hand, in a study assessing the efficacy of PPT in various doses and combinations, Gander found that combining a gratitude intervention and Three Good Things within a two week period did not yield an incremental increase in happiness over each PPT alone, and posited that individuals could be saturated by a multimodal strategy.[35] While the varied methodology of

burnout interventions in each makes direct comparison challenging, we argue that an abridged facilitated curriculum, with the addition of PPT for use during and after the course, presents a novel and apparently effective format. Notably, improvements scaled with overall PPT use in univariate analysis and with use of Three Good Things in multivariate analysis, suggest that PPT use and level of participant engagement was especially critical.

Use of the Three Good Things PPT in particular appeared to have a unique impact on burnout improvement. In a recent prospective pilot study in HCW, Sexton et al demonstrated significant decreases in participant burnout at 1 month, 6 month, and 12 month follow-up.[21] This is fairly remarkable given that participants required no formal training and took a mere 2-3 minutes each night to complete the exercise.[21] Beyond its efficacy, Three Good Things was the most favorably rated PPT overall in our study. Seligman noted that participants in his studies who reported lasting improvements in well-being after using Three Good Things also voluntarily performed the exercises outside the one-week intervention period.[22] In keeping with these observations, we contend that Three Good Things is uniquely accessible, and in emphasizing positive experiences and individual agency, opposes the feelings of exhaustion, cynicism, and low efficacy endemic to burnout; together these factors incentivize its repeated use and efficacy in reducing burnout.

Our study should be interpreted in context of its limitations. Under a non-randomized design, these data are vulnerable to various sources of selection bias. While participants were similarly burned out to prior study populations, 25.3 points at baseline compared to the 23·8 points on a 54-point emotional exhaustion scale in a recent metanalysis, our unique use of an abridged 5-item emotional exhaustion scale compared to the full 8-item version may complicate direct comparison. Any remaining baseline difference remains pertinent especially when lower

well-being and higher burnout predict greater responses to positive psychology interventions.[13, 21, 36]

Although sustained burnout improvement was observed only in two-day course participants, this group reported higher levels of baseline burnout, worked more in direct clinical care roles with later and less predictable shift schedules, and had occupied their current positions for a longer period of time, recapitulating the established relationship between more demanding and less predictable work lives and higher levels of burnout.[5, 6] The effect of self-selection likewise cannot be excluded, as a more willing and engaged population may have enrolled in the more intensive two-day course. Despite the limited ability to infer a dose-response relationship regarding course length, multivariate analysis partially addresses concerns for heterogeneity of course populations. That course length was not shown to independently predict burnout improvement suggests the greater efficacy of two-day courses may have arisen due to confounding from PPT use and baseline burnout.

It should be noted that the 1 month follow-up interval in our study was relatively short, and longer term changes in burnout remain unknown. A recent pilot study showed Three Good Things to be effective out to at least 12 months, whereas others have argued person-directed interventions are effective over only a shorter duration (less than 6 months).[21, 37] In either case, extended follow-up is merited. Losses to follow-up over the chosen study duration were also not insignificant, with 90.3% (n=1290) and only 17.3% (n=242) of participants completing follow-up surveys immediately and 30 days after training. Despite inoptimal response rates, our data are buttressed by the substantial size of our study, demonstrating significant and appreciable effect sizes despite attrition. A number of approaches that could have increased response rates were disfavored, including in-person follow-up, phone interviews, and monetary incentives,

which would have respectively mandated a greater time commitment from participants, increased the potential for response biases, and added significant operating costs. One viable alternative is increasing follow-up rates through peer accountability. West leveraged preexisting professional relationships, encouraging physician colleagues to self-organize in groups of 6-10 over paid meals in the 6-month COMPASS intervention, and was able to demonstrate burnout improvement that was comparable to facilitated group discussions.[16, 17] Resiliency courses with PPT could adopt this approach by administering courses to and forming working groups from pre-existing HCW teams.

Although our intervention engendered lower time commitment relative to prior interventions, the current resiliency course format still poses challenges to feasibility, especially if health care organizations must facilitate protected time for up to two contiguous in-person days. Future iterations of the course should be evaluated using different combinations of interventions, retaining modules which were more central to burnout improvement, like Three Good Things, while paring down less effective modules. In addition, targeting courses toward HCW who are most likely to benefit, such as those reporting higher burnout, may provide another avenue for healthcare organizations to save resources.

Finally, the absence of a priori randomization with clear intervention and control groups limits conclusions about the overall efficacy of the intervention, or comparison of various PPT and course lengths, issues which would better be addressed in a randomized controlled trial. The comparative effects of individual PPT on HCW burnout is currently the subject of one such randomized trial (ID:NCT02603133), which is currently under review.[38] Despite these limitations, the repeated measures design of this study allows participants to serve as their own

experimental controls and in part mitigates the influence of confounders that would arise in between-subjects comparisons.[39]

Conclusion

A multimodal resiliency curriculum was well received in a diverse sample of healthcare workers, and resulted in significant improvements in burnout out to at least one month later. These benefits were most effective in individuals with higher levels of burnout and greater post-course engagement with positive psychology tools. Formal randomized placebo-controlled studies, over a longer follow-up interval, are needed to establish ideal course length and course elements to maximize burnout improvement and minimize required time commitment. These data show that an intervention incorporating person-directed education and positive psychology approaches can be both feasible and effective in the short-term, and may serve as an impactful counterpart to organization-directed initiatives in addressing healthcare worker burnout.

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Figures and Tables

Table 1. Positive psychology tools (PPT) and studies validating their use.

	Intervention	Description	Study
Day 1			
	Three Good Things	Participants record three positive experiences on a daily basis, their role in each, and select a positive associated emotion from 10 options. Participants may share responses with others or access other responses.	Seligman (2005)[22]; Wellenzohn (2018)[40]; Sexton (2018)[21]
	Gratitude letter	After watching a video demonstration, participants write letters to an individual, living or deceased, to whom they are thankful, elaborating on why their actions were personally significant.	Seligman (2005)[22]
	Cultivating awe; Roaming awe	After being presented with optical illusions, exotic photography, or a live illusion (roaming awe), participants write about previous awe-inducing experience before engaging in round table discussions with other participants. Following the course, participants record daily awe-inducing experiences for 1 week.	Rudd (2012)[41]
	Cultivating meaning & signature strengths	Participants list their top five strengths and record plans to apply identified strengths in the following week.	Seligman (2005)[22]; Peterson (2005)[42] Mitchell (2009)[43]
	Random acts of kindness	Participants receive daily prompts to perform, record, and reflect on kind acts each evening for 1 week.	Lyubomirsky (2005)[44]
Day 2			
	Best possible self; Resilience writing (Days 1 & 2); You at your best (savor the save)	Participants complete resiliency exercises prompting "best possible self" visualization and reflection on their strongest positive life experiences.	Polyson (1985)[45]; King (2001)[46]; Sheldon (2006)[47]

Table 2. Respondent Demographics for (A) 1-day and (B) 2-day course participants.

Respondent characteristics	1-day course N = 1042	2-day course N = 354	p-value
Gender			.034
Female	820 (78.7%)	297 (83.9%)	
Male	222 (21.3%)	57 (16.1%)	
Professional Role			<.001
Nurse Manager/Charge Nurse	190 (18.3%)	88 (24.9%)	
Other Manager (e.g. Clinic Manager)	167 (16.1%)	62 (17.6%)	
Registered Nurse	148 (14.2%)	36 (10.2%)	
Attending/Staff Physician	40 (3.8%)	25 (7.1%)	
Admin Support (e.g. Clerk, Receptionist)	33 (3.2%)	24 (6.8%)	
Technologist (e.g. Lab, Radiology, Surgery)	31 (3.0%)	9 (2.5%)	
Pharmacist	26 (2.5%)	8 (2.3%)	
Chaplain/Clergy	7 (0.7%)	6 (1.7%)	
Clinical Social Worker	7 (0.7%)	6 (1.7%)	
Physical/Occupational/Speech/Respiratory Therapy	16 (1.6%)	9 (2.5%)	
Physician Assistant/Nurse Practitioner	7 (0.7%)	5 (1.4%)	
Resident/Fellow Physician	7 (0.7%)	5 (1.4%)	
Environmental Support (housekeeper)	3 (0.3%)	2 (0.6%)	
Clinical Support (CMA, Nurses Aid, etc.)	2 (0.2%)	N/A	
Medical Student	1 (0.1%)	N/A	
Other (Health IT, HR, unspecified non-clinical)	355 (34.1%)	68 (19.3%)	
Work Experience - Years in current position			.008
Less than 6 months	68 (6.5%)	25 (7.1%)	
6-11 months	94 (9.0%)	20 (5.6%)	
1-2 years	222 (21.3%)	61 (17.2%)	
3-4 years	194 (18.6%)	53 (15.0%)	
5-10 years	223 (21.4%)	92 (26.0%)	
11-20 years	156 (14.9%)	76 (21.5%)	
21 or more years	87 (8.3%)	27 (7.6%)	
Work Experience - Years of professional experience			<.001
Less than 6 months	2 (0.2%)	0 (0.0%)	<.001
6-11 months	1 (0.1%)	1 (0.3%)	
1-2 years	9 (0.9%)	15 (4.3%)	
3-4 years	27 (2.6%)	14 (4.0%)	
5-10 years	157 (15.2%)	64 (18.2%)	
11-20 years	330 (31.9%)	108 (30.8%)	
21 or more years	510 (49.2%)	149 (42.5%)	
Shifts worked:			<.001
Days	949 (90.9%)	278 (78.5%)	
Evenings	19 (1.8%)	7 (2.0%)	
Nights	23 (2.2%)	23 (6.5%)	
Variable Shifts	53 (5.1%)	46 (13.0%)	

Values are expressed as n (%). Demographic data were compared with Chi-squared test (two-tailed).

Figure 1. Percentage of participants providing favorable evaluations (“good” and “very good”) of course content by module, in 1-day and 2-day resilience courses.

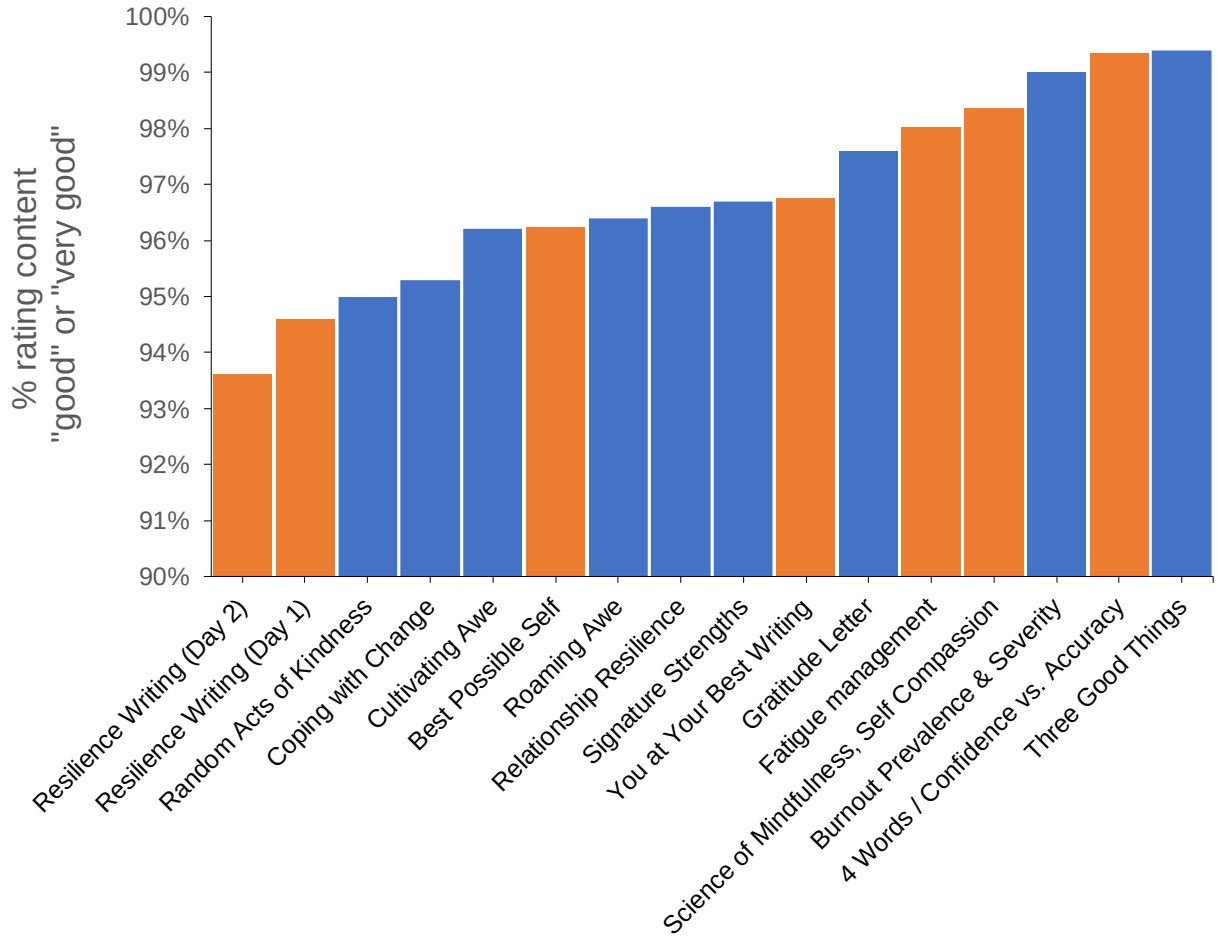
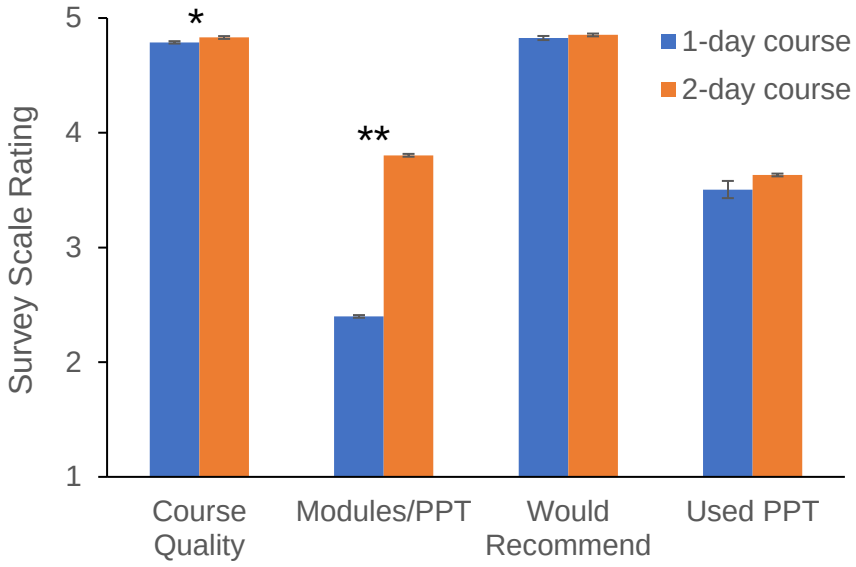
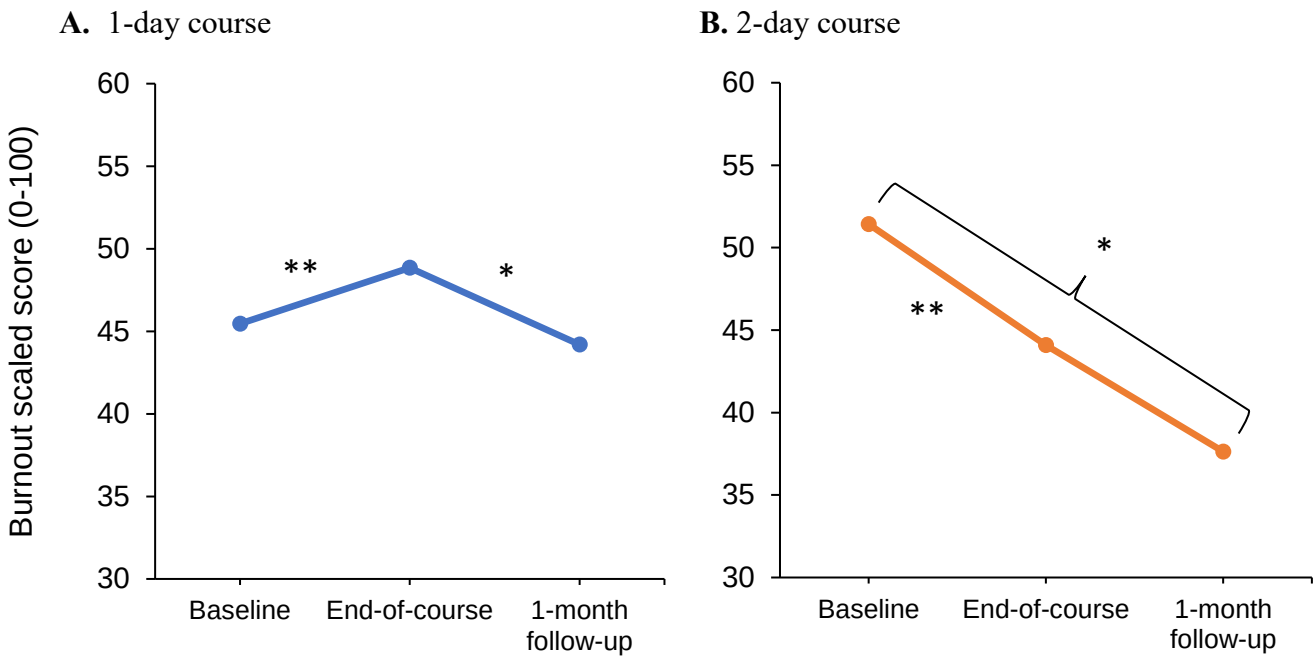


Figure 2. Comparing course quality, content, and overall PPT use by participation in 1- or 2-day resilience courses.



Measures constitute averages of survey questions, scored on 5-point Likert Scales, measuring course quality (13 items), recommending the course (3 items), didactic modules and PPT [9 items (1-day) and 16 items (2-day)], and use of PPT (10 items). Scores in each were compared between courses using independent samples T-tests. Significant results are indicated for $p<0.01$ (*) and $p<0.001$ (**).

Figure 3. Average burnout scaled scores pre-course, post-course, and 1-month follow-up in (A) 1-day and (B) 2-day resilience courses.



Plotted burnout scores constitute unpaired averages of all respondents at each survey time point. Burnout scores were derived from the 5-item emotional exhaustion domain of the Maslach Burnout Inventory and rescaled from 0-100. Paired differences between time points were evaluated using paired T-tests. Significant results are indicated for $p<0.01$ (*) and $p<0.001$ (**).

Table 3. Multiple regression model for change in burnout from baseline to one month follow-up.

	B	β	t	p-value
(Constant)	63.91		1.69	0.10
Baseline burnout	-0.25	-0.35	-3.87	**<0.001****
Use of "Three Good Things"	-4.00	-0.22	-2.23	**0.03***
Course (1-day vs. 2-day)	-5.28	-0.12	-1.14	0.26
Gender	6.60	0.13	1.42	0.16
HCW Role (reference: "Other non-clinical")				
Direct patient care	-2.40	-0.06	-0.51	0.61
Ancillary care	-2.23	-0.04	-0.36	0.72
Administrator	1.10	0.01	0.14	0.89
Years in current position (reference: < 5 years)				
5-10 years	-4.57	-0.09	-0.87	0.39
11-20 years	-2.16	-0.04	-0.40	0.69
> 21 years	-7.50	-0.11	-1.14	0.26
Total work experience (reference: < 5 years)				
5-10 years	14.97	0.24	1.57	0.12
11-20 years	10.31	0.21	1.15	0.25
> 21 years	12.97	0.30	1.48	0.14
Shift time of day (reference: day shift)				
Evening	9.12	0.07	0.68	0.50
Night	14.58	0.09	0.97	0.34
Variable	-4.27	-0.06	-0.64	0.52
Use of "Fatigue Management Strategies"	-0.98	-0.06	-0.55	0.58
Use of "Mindfulness Strategies"	1.69	0.10	0.80	0.58
Use of "Signature Strengths"	0.22	0.01	0.13	0.43
Use of "Relationship Resilience"	-2.69	-0.18	-1.57	0.90
Meal Quality Rating	-4.10	-0.12	-1.27	0.12
"Relationship Resilience" Rating	1.23	0.03	0.34	0.21
Would Share "Three Good Things" with others	-6.66	-0.10	-1.06	0.73

PPT = positive psychology tool. Significant results indicated for $p<0.05$ (*) and $p<0.001$ (**).

Table S1. Pearson correlations between course quality and organization ratings and changes in burnout at 1 month.

Course evaluation	Change in burnout
How would you evaluate the course? - Quality of the discussions	0
How would you evaluate the course? - Content of the training	0.037
How would you evaluate the course? - Applicability of the training	0.043
How would you evaluate the course? - Time spent on discussion	0.051
How would you evaluate the course? - Quality of the Room/facility	-0.015
How would you evaluate the course? - Pace of training	0.074
How would you evaluate the course? - Learning environment	-0.065
How would you evaluate the course? - Respect of participant privacy	-0.103
How would you evaluate the course? - Meal quality (if applicable)	-.188*
How would you evaluate the course? - Use of evidence in the course	-0.037
How would you evaluate the course? - Satisfaction with course faculty	-0.044
How would you evaluate the course? - Satisfaction with quality of discussions	-0.048
How would you evaluate the course? - Satisfaction with course organizers	0.006
How would you evaluate the course? - Quality of the discussions	0
How would you evaluate the course? - Content of the training	0.037
How would you evaluate the course? - Applicability of the training	0.043

Significant results are indicated for $p<0.05$ (*).

Table S2. Pearson correlations between recommending resiliency courses and change in burnout at 1 month.

Course evaluation	Change in burnout
I would recommend this course to a friend	-0.069
I will share Three Good Things with others	-0.166*
I would like to have a similar resilience course delivered to my hospital	-0.034

Significant results are indicated for $p<0.05$ (*).

Table S3. Pearson correlations between module and/or PPT evaluations and changes in resilience at 1 month.

Module / PPT evaluation	Change in burnout
Burnout Prevalence & Severity	0.007
Three Good Things	-0.012
Cultivating Awe	0.152
Relationship Resilience	0.173*
Coping with Change	0.059
Gratitude Letter	0.064
Cultivating Meaning & Signature Strengths	-0.028
Roaming Awe	0.130
Random Acts of Kindness	0.079
Resilience Writing Introduction (Day 1)	-0.037
Resilience Writing Exercise (Day 1)	0.158
Resilience Writing Exercise (Day 2)	0.183
Best Possible Self Writing Exercise	-0.049
Fatigue Management Strategies	-0.151
Science of Mindfulness & Self Compassion	-0.238
You at Your Best Writing Exercise	-0.182
4 Words / Confidence vs. Accuracy	-0.157

PPT = positive psychology tool. Significant results are indicated for $p<0.05$ (*).