

Development of a Positive Psychology Program (LAVENDER) for Preserving Medical Student Well-being: A Single-Arm Pilot Study

Global Advances in Health and Medicine

Volume 10: 1–12

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DOI: 10.1177/2164956120988481

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Elaine O Cheung, PhD^{1,2} , Ian Kwok, MA¹,
Allison B Ludwig, MD³, William Burton, PhD³, Xinzi Wang, MA¹,
Neha Basti, BS¹, Elizabeth L Addington, PhD^{1,2},
Carly Maletich, MA, LCPC¹ and Judith T Moskowitz, PhD, MPH^{1,2}

Abstract

Background: Mental health tends to worsen over the course of medical school, with steep declines in well-being in students' clerkship year (M3). Positive emotion promotes adaptive coping to stress and may help preserve medical student well-being.

Objective: This study describes the development of LAVENDER (Leveraging Affect and Valuing Empathy for Nurturing Doctors' Emotional Resilience), a program aimed at increasing positive emotion to preserve well-being in medical students.

Methods: We conducted a single-arm pilot of LAVENDER, a positive psychology intervention developed for medical students delivered in an interactive classroom format to a cohort of 157 third-year medical students at the Albert Einstein College of Medicine. Our primary outcome was the acceptability of LAVENDER. We also examined preliminary efficacy using measures of emotion, stress and burnout collected at each intervention session.

Results: LAVENDER showed good acceptability: 76% of participants agreed that the LAVENDER skills were useful and 72% agreed that they would recommend the LAVENDER program to others. Qualitative feedback suggested that medical students enjoyed the program and found the skills to be useful for coping with stress, but also reported the following barriers to engagement: lack of time to practice the skills, resistance to the mandatory nature of the wellness sessions, and difficulty integrating the skills in daily life. We did not find support for the preliminary efficacy of LAVENDER for improving medical student well-being in students' clerkship year. Participants showed decreases in positive emotion and increases in symptoms of burnout over the intervention period ($ps < .01$).

Conclusion: The current paper describes the development and a single-arm pilot test of LAVENDER, a positive psychology program tailored for medical students. Although we found preliminary evidence for the acceptability of LAVENDER, we did not find support for the preliminary efficacy. Lessons learned and next steps for the program are discussed.

Keywords

Positive psychology, intervention, emotion, stress, burnout, coping

Received July 30, 2020; Revised November 15, 2020. Accepted for publication December 23, 2020

Introduction

Medical school can be a demanding and stressful experience that takes a significant toll on medical students' mental health. Students enter medical school with superior mental health profiles relative to their age-matched peers,¹ but show elevated rates of depression, anxiety, burnout, substance abuse, and suicidality by the end of their first year in medical school, and these elevated rates

¹Department of Medical Social Sciences, Northwestern University Feinberg School of Medicine, Chicago, Illinois

²Osher Center for Integrative Medicine, Northwestern Medicine, Chicago, Illinois

³Department of Family and Social Medicine, Albert Einstein College of Medicine, New York City, New York

Corresponding Author:

Elaine O. Cheung, Department of Medical Social Sciences, Feinberg School of Medicine, Northwestern University, Osher Center for Integrative Medicine, 625 N Michigan Ave, Suite #2700, Chicago IL 60611, USA.
Email: elaine-cheung@northwestern.edu



of poor mental health tend to be sustained through graduation.^{1,2} For example, a study conducted at the Albert Einstein College of Medicine found that the proportion of students at-risk for depression in medical school increased from 28% at the beginning of their first year of medical school to 39% by the end of their third year.³

The development of depression and poor mental health during medical training can lead to reduced clinical empathy⁴ and can have downstream consequences for patient care.⁵ Depression, burnout, and stress among physicians have been linked to diminished quality of patient care, including lower patient satisfaction with care and increased likelihood of medical errors.^{6,7} Given the critical consequences of burnout and depression for both physicians and patients alike, it remains imperative to address burnout and depression in its formative stages. Indeed, there has been an increasing call for the integration of stress management, resilience, and coping skills training in medicine.^{5,8} The clerkship year of medical school may be a pivotal point to target for intervention, as medical students typically move from basic science to clinical training, and research has demonstrated steep declines in both mental health and clinical empathy during this time in medical school.^{3,4} In fact, prior research suggests that the third year of medical school may be a “sweet spot” to target for intervention, as students report the need for additional support during this transition period, and see the importance of developing effective coping strategies as they encounter novel stressful experiences in clerkships.^{9,10}

Many medical schools have begun to implement a broad range of well-being curricula and activities for preserving medical student well-being (e.g., mindfulness training, pass/fail grading in preclinical courses, learning communities, social activities).¹¹ Unfortunately, there has been limited research evaluating the efficacy of these approaches making it difficult for medical schools to identify which interventions are effective for preserving medical student well-being, and what are the optimal methods for delivery and implementation.¹¹

One of the most common evidence-based strategies implemented by medical schools is mindfulness training, with one national survey of 27 medical schools finding that 93% of schools surveyed (25/27) offered mindfulness training to its students.¹¹ Studies evaluating mindfulness and related mind-body skills interventions (e.g., meditation, relaxation techniques, deep-breathing, guided imagery, biofeedback) have found that these interventions show promise for reducing self-reported stress and salivary cortisol, and for increasing mindfulness, empathy, and elements of emotional intelligence in medical students.^{8,12–19} However, most of the studies to date have relied on volunteer, self-selected samples, and studies that have evaluated mindfulness based stress reduction programs that have been integrated into the

mandatory curriculum have not found measurable improvements on medical student well-being or empathy.^{15,20} There is a need for research evaluating the efficacy of alternative well-being programs and activities to accommodate students’ different preferences for coping. Indeed, medical trainees show interest in learning about other evidence-based coping strategies, including positive psychological skills.^{15,21}

Accumulating research suggests that the ability to cultivate positive emotion amidst stress may show promise as a protective factor for preserving the well-being of physicians and physicians-in-training. For example, one multi-institutional study of 4400 medical students found that medical students with high levels of positive mental health (e.g., positive emotion, life satisfaction, sense of meaning and purpose) were less likely to report having serious thoughts of dropping out of medical school, less likely to report suicidal ideation, less likely to have engaged in unprofessional behaviors (e.g., cheating and dishonest behaviors) in medical school, and were more likely to endorse altruistic professional beliefs regarding physicians’ responsibility to society (e.g., making an impact on the problem of the medically underserved).²² In addition, positive emotion has been associated with enhanced patient-centered motivation, meaning, and professional satisfaction among practicing physicians,²³ and decreased likelihood of burnout and increased job satisfaction among surgical residents.²⁴ Finally, studies have linked the use of positive coping strategies (e.g., maintaining a positive outlook, finding meaning in work, positive reframing) with increased personal growth among third year medical students,²⁵ and decreased likelihood of burnout and increased quality of life among practicing surgeons.²⁶ Collectively, these findings suggest that interventions focused on cultivating skills for increasing positive emotion may show promise for preserving medical student well-being.

In the current investigation, we were interested in developing a positive psychological intervention specifically tailored for medical students. The current program is adapted from a theory-based positive psychology program developed for people coping with health-related stress.^{27–30} This program teaches participants eight empirically supported skills for increasing the frequency of positive emotion experienced in daily life. This program is grounded in our Positive Pathways to Health theoretical model (see Figure 1),³¹ that posits that positive psychological interventions promote physical and psychological well-being for people coping with stress through increases in positive emotion experienced in daily life. The increased positive emotion is theorized to lead to proximal effects for coping, such as providing the individual with a time-out from the stress, broadened attention and cognition, reduced emotional reactivity to

stress, and strengthened social relationships. In turn, these proximal effects for coping are theorized to lead to reduced stress, improved physiological function and health behaviors, and ultimately improved physical and psychological well-being. Given that positive emotion is associated with lower likelihood of burnout and higher levels of professional satisfaction and meaning among physicians and medical trainees,^{23,24} we expect that increased positive emotion will be the primary mechanism of this intervention for preserving psychological well-being and preventing burnout in medical students.

The original positive psychology program is typically delivered to participants over five, weekly hour-long sessions with daily home practice exercises in between each session. This program has previously demonstrated feasibility, acceptability, and efficacy for increasing positive emotion and improving psychological adjustment across a number of populations coping with health-related stress, including people newly diagnosed with HIV,³² women with metastatic breast cancer,²⁷ dementia caregivers,²⁸ and people with elevated depressive symptomatology.^{29,33} In addition, the intervention has been delivered using a variety of different modes, including one-on-one sessions delivered in person with a trained facilitator,^{27,29,30} one-on-one sessions delivered online (i.e., videoconferencing remotely) with a trained facilitator,²⁸ and self-guided sessions that the participant completes individually by reviewing online intervention content (e.g., lessons, videos).^{27,29,33} The current paper describes the process of adapting and tailoring this existing positive psychology program for third-year medical students at the Albert Einstein College of Medicine.

The tailored program is called LAVENDER (Leveraging Affect and Valuing Empathy for Nurturing Doctors' Emotional Resilience). The LAVENDER program is delivered by 1–2 trained facilitators to medical students over four, 35–40 minute sessions, in a group format. Although this positive psychology intervention has demonstrated feasibility, acceptability, and efficacy in multiple populations coping with health-related stress,^{27–30} there are a number of factors that are specific to the medical profession that may impede uptake of the intervention, adoption of the skills, and long term practice of behaviors. First, the demands of medical training can leave students with limited time and energy to participate in activities focused on enhancing or preserving their psychological well-being. Traditional psychological interventions often require a significant time commitment that may not be feasible under the constraints of medical training. Second, the broader culture of medicine may serve as a barrier to medical students' willingness to engage with the intervention content. Despite the importance of physician well-being for ensuring optimal patient care, self-care is oftentimes neglected among

physicians. Indeed, the overarching culture of medicine tends to espouse a dichotomy between those who provide care and those who receive it. In such a culture, seeking help is often stigmatized and viewed as a sign of weakness. In the current research, we employed strategies to identify and overcome such barriers to participation and engagement in the LAVENDER program.

The current investigation describes our process of developing, tailoring and pilot testing the LAVENDER program. We conducted a single-arm pilot trial of the LAVENDER program delivered to a cohort of 157 third-year medical students at the Albert Einstein College of Medicine. We hypothesized that LAVENDER would demonstrate good acceptability (our primary outcome). Furthermore, we examined the preliminary efficacy of the program by assessing positive and negative emotion, stress, and burnout in medical students at the beginning of each of the four sessions. We hypothesized that medical students would report increased or stable levels of positive emotion, and decreased levels of negative emotion, stress, and burnout over the intervention period.

Methods

Participants

Participants were 157 medical students at the Albert Einstein College of Medicine in New York (Class of 2020) ($M_{\text{age}} = 25.88$, $SD = 2.25$, 49% women and 51% men). We delivered the intervention to the entire cohort of third year medical students from September to December 2018. This study was assigned exempt status by the Institutional Review Board at the Albert Einstein College of Medicine.

Procedure

This study used a single-arm design to test the acceptability and preliminary efficacy of LAVENDER in a cohort of third year medical students from September to December 2018. The LAVENDER program was integrated into a mandatory coordinated wellness curriculum (WellMed) for all third-year medical students entering their clerkship year (M3) at the Albert Einstein College of Medicine in New York. LAVENDER consisted of four, 35–40 minute sessions delivered once per month in the fall of students' clerkship year. One to two trained facilitators taught each session of LAVENDER in a classroom format. There were 5 total facilitators from Northwestern University who delivered the LAVENDER program to the medical students. The facilitators were masters or PhD-level researchers with extensive backgrounds in psychology

or public health research, and all had expertise with the LAVENDER program.

Tailoring the positive psychology program for medical students.

Our team consulted with 5 medical students at Northwestern University's Feinberg School of Medicine to inform adaptation of the intervention content, exercises, and skills to optimize the acceptability and relevance for medical trainees. The medical students were asked to review the existing positive psychology intervention that had previously been delivered to populations coping with health-related stress,^{27–30} so that they could provide feedback on the skills and offer suggestions of how the intervention could be adapted for medical students.

Based on the feedback from the medical students, we adapted the existing positive emotion skills intervention to address the specific needs and perspectives of medical students. For example, we substituted two of the existing skills taught in the original intervention (personal strengths and attainable goals) with two positive psychological skills that the students considered to be more relevant for coping with the stress of medical training: self-compassion (the tendency to be kind and

understanding toward oneself in instances of pain and failure)^{34,35} and emotional awareness (understanding the range and functions of emotions, both positive and negative, to promote a balanced perspective of emotions in life and medicine).³⁶ In addition, we adapted the skill of “acts of kindness” to become “compassion toward others” by incorporating content from empathy training and mindful compassion cultivation interventions for medical trainees in our program.³⁷ Finally, we adapted the lesson content, activities, and home practice to incorporate examples that reflected the unique stressors experienced during medical school (e.g., constant sense of being evaluated, working with difficult personalities on teams, feeling isolated on rotations).

LAVENDER program. The final eight skills taught in LAVENDER are outlined in Table 1, and are presented in the following order: emotional awareness,³⁶ gratitude,³⁸ noticing positive events,³⁹ capitalizing on positive events,⁴⁰ positive reappraisal,⁴¹ mindfulness,⁴² self-compassion,^{34,35} and compassion toward others.^{37,43–45} These eight skills in the LAVENDER program were integrated into students' mandatory wellness curriculum and taught over four, monthly sessions in the fall of

Table 1. LAVENDER Intervention Content.

Session	Content	Home Practice
1	<p>Introduction</p> <p>Skill 1: Emotional Awareness</p> <ul style="list-style-type: none"> Functions of both positive and negative emotions How to broaden their emotional vocabulary <p>Skill 2: Gratitude</p> <ul style="list-style-type: none"> How to cultivate small moments of gratitude even in the midst of stress <u>Group activity</u>: Gratitude Pictionary game 	<ul style="list-style-type: none"> Daily emotion reporting Daily gratitude journal Gratitude expression challenge
2	<p>Skill 3: Positive Events</p> <ul style="list-style-type: none"> How to recognize positive events in life and associate them with positive emotions <p>Skill 4: Savoring</p> <ul style="list-style-type: none"> How to savor and extend the positive emotions associated with each positive event <p>Skill 5: Positive Reappraisal</p> <ul style="list-style-type: none"> How to find the “silver lining” <u>Group activity</u>: Lemons to lemonade game 	<ul style="list-style-type: none"> 3 Good Things Log: Noticing 3 positive events and writing about it Reporting a relatively minor stressor each day and listing the ways in which the event can be positively reappraised Lemons to lemonade online reappraisal messaging board
3	<p>Skill 6: Mindfulness</p> <ul style="list-style-type: none"> Mindfulness = attention + non-judgment How to incorporate mindfulness into daily activities <u>Group activity</u>: Mindful chocolate eating activity <u>Group activity</u>: Practicing mindfulness meditation by listening to guided instructions in mindful breathing 	<ul style="list-style-type: none"> Pick an everyday activity to do mindfully (informal mindfulness) 10-minute mindful meditation (formal meditation practice)
4	<p>Skill 7: Self-Compassion</p> <ul style="list-style-type: none"> How to show compassion for oneself, especially in the context of medical training <p>Skill 8: Compassion toward others</p> <ul style="list-style-type: none"> Personal and social benefits of being kind to others 	<ul style="list-style-type: none"> Self-compassion letter Changing self-criticism to self-compassion Practice a small act of kindness each day

students' clerkship year. Each session lasted approximately 35–40 minutes and covered one to three skills. The sessions were delivered in a group format by 1–2 trained facilitators to the entire cohort of medical students in a single large classroom. Students were seated at tables of 7, with monitors at each table that displayed the presentation slides. The sessions consisted of a combination of lecture (delivered to the entire cohort), experiential activities for practicing the skills (e.g., guided meditations, mindful chocolate eating, gratitude Pictionary, “Lemons to Lemonade” reappraisal activity, conducted at their tables of 7), and small group discussions (conducted at their tables of 7). To address the skepticism that medical students may experience regarding positive psychology, the facilitators presented empirical studies in the lectures that provide the scientific evidence base for each of the skills.

In addition, we created a mobile-friendly website that includes medical-student specific tutorials, practices, scientific articles, and additional resources to accompany the in-person sessions that the students could use to access the lesson content and practice the skills between the monthly sessions. To address the limited time and demanding work schedules of medical school, we organized the lesson content and home practice on the website by time commitment (e.g., 1-minute to 5-minute tutorials). We included brief videos (3–5 minutes each) and infographics summarizing the intervention content, to offer multiple options for medical students to engage with the skills with minimal time commitment.

Study Evaluation

Acceptability. At the end of the final session (Session # 4), participants were asked to complete a study evaluation survey in which they responded to the following two questions using a scale from 1 (*strongly disagree*) to 7 (*strongly agree*): “I found the skills I learned from LAVENDER to be useful” and “I would recommend LAVENDER to others.” In addition, the evaluation surveys included 5 open-ended prompts for participants to provide qualitative feedback on the acceptability of the intervention (see Table 2 for prompts and illustrative quotes from participants).

Preliminary efficacy. At the beginning of each of the four in-class sessions, participants completed the following measures of medical student well-being:

Stress. Stress was assessed used the 4-item perceived stress scale (PSS).⁴⁶ Respondents indicate how often they found their lives to be unpredictable, uncontrollable, and overloaded in the past month on a scale of 0 (*never*) to 4 (*very often*). The PSS showed high internal reliability across sessions (Table 3).

Emotion. Positive and negative emotion was assessed using 6 items assessing the frequency of positive (happy, excited, content) and negative emotions (worried, irritable/angry, sad).⁴⁷ Respondents rated the frequency they experienced each emotion in the past week from 0 (*never*) to 8 (*always*). The emotion measure showed high internal reliability across sessions (Table 3).

Burnout. Burnout was assessed using a modified, abbreviated 6-item version of the Maslach Burnout Inventory⁴⁸ that assessed the frequency of emotional exhaustion (3 items) and depersonalization (3 items) symptoms experienced in the past year using the following scale: never, a few times a year, a few times a month, a few times a week, every day. Burnout showed acceptable internal reliability across sessions (Table 3). Consistent with previous research, we classified respondents as burned out if they reported symptoms of emotional exhaustion or depersonalization at least weekly.⁴⁹

Data Analysis

Descriptive frequency statistics were calculated for acceptability ratings. Given that the data collected from the in-class sessions did not have identifiers to link participants' responses over time, differences in medical student outcomes (positive emotion, negative emotion, perceived stress, and burnout (continuous score)) across the four sessions were examined using analysis of variance (ANOVA) tests. We also conducted a logistic regression examining the likelihood of being classified as burned out (1 = burned out, 0 = not burned out) across the four sessions.

Results

Acceptability

Quantitative ratings indicated high acceptability of the LAVENDER program. 76% of participants agreed that the LAVENDER skills were useful (scores ≥ 5), and 72% agreed that they would recommend LAVENDER to others (scores ≥ 5). Participants' qualitative feedback is depicted in Table 2. Participants reported that the LAVENDER program helped them become more aware of themselves and the importance of prioritizing psychological well-being. They also noted that LAVENDER provided them with new tools for coping with stress, particularly helping them be mindful and helping to put their problems into perspective. Participants reported most enjoying the experiential and interactive aspects of the program, highlighting the meditation and breath awareness activities, the mindful-chocolate-eating activity, and the “Lemons to Lemonade” positive reappraisal activity. Some negative

Table 2. Course Evaluation Responses.

Prompt	Illustrative Responses from Participants
A) Has LAVENDER helped you as a medical student and/or as a person? If so, how?	<p>Positive Responses</p> <ul style="list-style-type: none"> ■ It reminded me, and made me conscious of my need for emotional wellness and the necessity of prioritizing it. ■ It has equipped me of a variety of tools to put me back in the moment, instead of spending time thinking about the past and future too much. ■ It helps me be more mindful that my struggles aren't specific to me, that I should allow myself to feel but also forgive. ■ It was really enjoyable reflecting with friends together during these sessions. <p>Negative Responses</p> <ul style="list-style-type: none"> ■ Other than during the sessions, I haven't really thought about LAVENDER ■ Not really. It taught important principles, but they didn't provide much new information ■ I think that in theory this is a great thing, but it's hard to remember in the midst of stress
B) What aspects of LAVENDER did you find useful and/or effective?	<p>Positive Responses</p> <ul style="list-style-type: none"> ■ The self-compassion workshop was the most helpful and needed for me. ■ I thought that the positive reappraisal technique was something that I was able to apply. Also in general I began meditating (using headspace) occasionally because of the program ■ The exercise of the chocolate [mindfulness chocolate eating activity] was useful, easy to practice on my own. ■ Being together with colleagues, discussing coping skills, enjoyed the mindful-chocolate-eating session. ■ I liked the meditation activities and the positive re-appraisal activity. The interactive ones were great. <p>Negative Responses</p> <ul style="list-style-type: none"> ■ I had already learned about many of the techniques in my psychology study in undergrad education
C) What aspects of LAVENDER could be improved?	<ul style="list-style-type: none"> ■ Intro to techniques in breathing/meditation is great but making it habit/routine is HARD! ■ More interaction/active sessions to implement the skills being taught. ■ The applicability to our lives. ■ The session could be shorter. ■ I feel like having these sessions so spread out made me forget what the sessions were about. ■ I think doing more activities that illustrate the main points of the lectures would be nice. ■ There are systemic issues in place that positive reappraisal can't fix. ■ Education is so busy, collectively a culture exists where we prioritize getting things done over personal wellness.
D) Do you have suggestions for changes that could be implemented to promote wellness in your program?	<ul style="list-style-type: none"> ■ More suggestions on how to practically practice these skills on a regular basis. ■ More discussion with peers. ■ Less mandatory sessions but keep programs active, make them optional, have it be student led-like open-ended sessions where we can just talk without oversight. ■ Perhaps break up into smaller groups/a different space

feedback provided by the medical students included comments about how these skills were not particularly novel as some students had learned about these skills in their undergraduate psychology classes or had familiarity with the skills through their own personal practices. In addition, several students provided negative comments regarding the need to address the systemic and cultural issues in medical training that interfere with students' ability to engage in practices and activities that promote personal well-being.

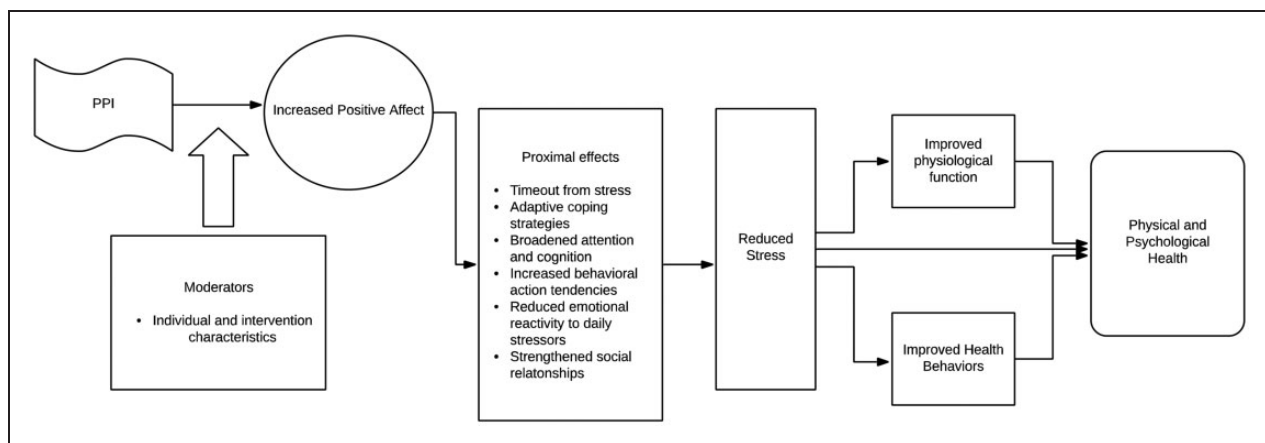
Barriers to engagement. The barriers to engagement and suggestions for improvement that participants provided

for LAVENDER centered on the following themes: A) lack of time, B) delivery mode, C) resistance to mandatory/forced wellness sessions, and D) difficulty making the skills a habit and integrating the skills into daily life.

A. **Lack of time.** Lack of time was listed as the leading factor that precluded participants from consistently practicing the skills outside of the sessions. A few participants even provided their time schedule of a daily routine to indicate that time is the greatest barrier that prevented them from practicing the skills and deriving benefits from the intervention.

Table 3. Medical Students' Emotion, Stress, and Burnout Across Sessions.

	α	Session 1		Session 2		Session 3		Session 4		Omnibus Test	
		M	95% CI	M	95% CI	M	95% CI	M	95% CI	F or χ^2	p
Positive Emotion (scale: 0–8)	0.74–0.90	5.63	5.38–5.88	5.47	5.07–5.87	4.69	4.20–5.17	5.20	4.67–5.74	4.09	.007
Negative Emotion (scale: 0–8)	0.69–0.80	2.93	2.67–3.18	3.04	2.64–3.44	3.25	2.76–3.73	3.41	2.87–3.94	1.07	.36
Perceived Stress (scale: 0–16)	0.71–0.87	5.23	4.70–5.75	5.69	4.86–6.53	5.88	4.85–6.91	5.56	4.43–6.68	0.57	.63
Burnout (scale: 0–24)	0.76–0.85	5.50	4.74–6.25	7.19	5.98–8.40	6.91	5.54–8.38	7.89	6.26–9.52	3.61	.01
Burned Out (%) ₋	–	43.5%	–	35.4%	–	51.5%	–	53.6%	–	3.25	.35

**Figure 1.** Positive Pathways to Health theoretical model outlining the pathways through which positive psychological interventions' (PPI) may influence physical and psychological health through increases in positive affect, reproduced from Moskowitz et al.³¹

B. Delivery mode. Participants suggested that they benefited from the group discussions and that they would be more likely to engage with the intervention content if a greater proportion of time in the sessions was dedicated to the experiential and interactive components relative to lecture. Participants emphasized the desire to connect with their peers during these sessions, because they did not get the opportunity to see their classmates as frequently during their busy clinical rotations in their clerkship year. As such, participants suggested smaller group sessions, ideally led by peers, and recommended the activities and exercises be adapted so that they could practice the skills in a social manner with their friends, as opposed to exercises that are practiced on an individual basis.

C. Resistance to mandatory or forced wellness. Participants reported some resistance to the idea of “mandatory” or “forced” wellness. Participants suggested that instead of making the program a mandatory component of the curriculum, it may be more

effective to offer it as an optional program they could participate in as needed.

D. Integrating skills into daily life. Participants reported difficulty integrating the LAVENDER skills into their daily life. Some participants noted that they enjoyed the skills learned during the sessions, but they did not remember to practice them outside of the session or had difficulty applying them to daily life when they tried to practice the skills by themselves. They welcomed further recommendations for how to translate these skills into a habitual response when encountering real-life difficulties or stressors.

Preliminary Efficacy

The estimates and significance tests for medical student outcomes across the four intervention sessions are displayed in Table 3. Both positive emotion and total burnout score differed as a function of intervention session ($ps < .01$). Post-hoc comparisons revealed that

participants reported lower levels of positive emotion at Session 3 ($M = 4.69$ 95% CI [4.20–5.17]) relative to Session 1 ($M = 5.63$ 95% CI [5.38–5.88]) ($p = .005$). Participants also reported higher burnout scores at Session 4 ($M = 7.89$ 95% CI [6.26–9.52]) relative to Session 1 ($M = 5.50$ 95% CI [4.74–6.25]) ($p = .055$), although the comparison was only marginal in statistical significance. None of the other comparisons were significant (all $ps > .08$). Negative emotion and general stress did not differ as a function of intervention session (all $ps > .36$). Finally, the proportion of students classified as burned out (experiencing symptoms of emotional exhaustion or depersonalization at least weekly) did not differ as a function of intervention session ($p = .35$).

Discussion

The current paper describes the development, tailoring, and pilot testing of LAVENDER, a positive emotion skills program adapted for medical students. We found preliminary evidence for the acceptability of LAVENDER: 76% of participants agreed that the LAVENDER skills were useful and 72% agreed that they would recommend the LAVENDER program to others. Participants' qualitative feedback suggested that students found the LAVENDER program to be helpful for increasing their self-awareness and emphasizing the importance of prioritizing their psychological well-being. Participants also noted that the LAVENDER program was useful for providing them with new tools for coping with stress, including helping them be mindful and putting their problems into perspective. Participants reported most enjoying the experiential and interactive components of the program. Some negative feedback provided by the medical students included comments on how these skills were not particularly novel as some students had prior familiarity with the skills, as well as comments regarding the need to address the systemic and cultural issues in medical training that have a negative impact on medical student well-being. Moreover, the students reported the following barriers to engagement for LAVENDER: lack of time to practice the skills, preference for more experiential and social activities over lecture, resistance to the mandatory nature of the wellness sessions, and difficulty integrating the skills in daily life.

Despite finding initial support for the acceptability of the LAVENDER program, we did not find evidence for the preliminary efficacy of LAVENDER for mitigating declines in medical student well-being. Consistent with previous observational and intervention studies documenting declines in student well-being in their clerkship year,^{3,4,9} we found some evidence for worsening well-being over the course of the intervention period (fall of students' clerkship year), such that students reported

decreases in positive emotion from Session 1 to Session 3 and increases in burnout from Session 1 to Session 4.

The current study contributes to a growing body of research on the development of interventions for addressing burnout and well-being in medical students.^{8,12–15} Consistent with the findings from previous research on mindfulness and mind-body skills programs for medical students, we found that medical students perceived the LAVENDER program to be useful for learning skills for coping with the stress of medical school and to provide them with opportunities to practice self-care.^{17,18} However, the current study differs from these previous studies^{8,12–15} in that we did not find support for the preliminary efficacy of the LAVENDER program for reducing stress or preserving medical student well-being. The lack of support for the preliminary efficacy of LAVENDER was surprising given the previous evidence for the efficacy of this intervention for promoting psychological adjustment in other samples coping with serious life stress.^{27–30,32,33}

There are several differences between our study and the previous studies evaluating the efficacy of mindfulness and mind-body skills programs for medical students^{8,12–15,20} and previous studies evaluating the efficacy of positive psychological intervention in other samples coping with serious life stress.^{27–30,32,33} Some of these differences include: the mandatory nature of participation in the LAVENDER program, the lower frequency and dosage of intervention delivery, the delivery format of the intervention, and the introduction of the intervention during clerkship year. These differences were echoed in the qualitative feedback from the medical students, and understanding these differences may provide important lessons regarding the optimal methods for delivery and implementation of such wellness programs.

First, the LAVENDER program was integrated as part of a mandatory wellness curriculum for the medical students. Our qualitative feedback from the medical students suggested that the mandatory nature of the wellness sessions may have had a negative impact among participants who perceived the mandatory nature of the sessions as a barrier to engaging with the program. Indeed, previous studies that have integrated mindfulness-based stress management interventions as part of the mandatory medical school curriculum have similarly found declines in medical student well-being over the study period.^{15,20} Although incorporating well-being interventions into students' mandatory didactic time has the advantage of providing medical students with protected time in their otherwise busy schedules to prioritize their psychological well-being, making participation obligatory ("forced wellness") can lead to cynicism and resentment, and may have counterproductive effects on engagement and efficacy.^{15,18,20} What's more,

many of these well-being interventions require participants to be open and willing to engage in the skills, and forcing students who are not open or willing to engage to attend such programs can end up being disruptive to their fellow classmates who would otherwise be open.^{15,18} Medical schools should consider offering students protected time for wellness, but allowing them the option to choose the types of wellness activities and programs that would best suit their individual preferences.

Second, given the demanding schedules of medical students in their clerkship year, we were unable to follow the typical frequency and dosage of delivery of the positive psychology intervention or other mindfulness and mind-body skills programs for medical students. The original positive psychology intervention typically consists of 1 session per week (lasting 1 hour per session) for 5 weeks with daily home practice in between sessions. The mindfulness-based stress reduction (MBSR) and mind-body skills programs have a more intensive time commitment, typically consisting of one session per week (lasting 2 to 2.5 hours per week), for 8 to 12 weeks, with additional daily home practice. In the current pilot study, we condensed the LAVENDER program to be delivered once per month (lasting 35–40 minutes per session) over four months in the fall of students' clerkship year. Perhaps 4, 35–40 minute sessions delivered monthly may not be sufficient for promoting change in psychological well-being, and a higher dosage and more continuous delivery of the intervention (i.e., weekly instead of monthly) may be necessary for medical trainees. Indeed, research on habit formation suggests that habits typically take approximately two months to establish, and emphasize the importance of consistency of practice for developing a habit.⁵⁰ Future research should examine the optimal frequency and dosage of intervention delivery that is necessary for promoting change in psychological well-being in medical students.

Third, the delivery format of the intervention may not have been optimal for maximizing medical student engagement with the intervention content. In the current study, we had 1–2 outside facilitators deliver the intervention content in an interactive classroom format to the entire cohort of 157 medical students at once. Previous research in medical students suggests that a small group format (5–10 students per 1–2 faculty facilitators) focused on group discussion and experiential activities may be beneficial for increasing medical students' comfort sharing their professional vulnerabilities and stressors, and for increasing students' willingness to engage with positive psychological techniques.^{8,12–15} In addition, facilitators were not physicians themselves, and were not faculty or employees at the Albert Einstein College of Medicine. As such, students may not have

been as motivated to engage with the LAVENDER skills as they might have been if the intervention were delivered by an especially credible, relatable source at their institution (e.g., a well-respected faculty member, resident, or peer). Medical students might be more likely to try adopting the skills if they saw a role model demonstrating the skills themselves and emphasizing the importance of prioritizing psychological well-being for becoming a successful, healthy physician. Future research should test the efficacy of the intervention delivered in a small group format (5–10 students per group) by well-liked and respected faculty members, residents, or peers in their program.

Fourth, it is possible that introducing these positive psychological skills earlier in students' medical school may have increased uptake and impact. Most prior studies evaluating mindfulness and mind-body skills programs for medical students have targeted students during their first two years of medical school, given that students' mental health begins to decline within the first year of medical school.^{8,12–15,20} In the current study, we chose to target students' clerkship year of medical school for intervention, as previous research has demonstrated particularly steep declines in medical student well-being and empathy during students' clerkship year^{3,4} and because students have reported the need for additional support as they transition to clerkship.^{9,10} Perhaps inclusion of the skills earlier in medical school training may increase uptake and impact, as first and second year medical students may have more time and motivation to learn and practice these skills.

Strengths of the current research include the novel focus on cultivating positive emotion and the development of a tailored, positive psychological intervention for medical students. One limitation of the current study is that the single-arm design of this pilot study lacked a control group to compare this intervention cohort to a contemporary group of medical students experiencing the same stressful context. As a result, we cannot determine whether the decreases in positive emotion and increases in burnout in this cohort are attributable to the LAVENDER program; it might have had no impact. Alternatively, LAVENDER may have had a buffering effect, such that well-being would have been worse had students not participated in the program. It also is possible that the LAVENDER program increased emotional awareness and thus students' reports of emotion and burnout more accurately reflected their experience. Future studies need a comparison group to determine whether practicing the LAVENDER skills influences medical students' well-being. Another limitation of the current study is that we were not able to collect identifiers that linked students' responses over time, and as such were not able to examine longitudinal changes in students' well-being over time or to examine

individual use of the website or self-reported use of the skills for a dose-response analysis. Future research should conduct a formal pre-post evaluation of these measures, with longitudinal identifiers linking participants' survey responses over time and examining use of the skills, to provide a more rigorous evaluation of the efficacy of the intervention.

Finally, although programs such as LAVENDER may help medical students cope more effectively with the stress of medical training, it is not sufficient for medical schools to limit their efforts toward addressing burnout at the individual level. Burnout is not a problem that is driven solely by a lack of resiliency in the individual, but rather symptoms that reflect problems in the training environment more broadly. When medical schools limit their efforts to providing individual-level solutions to burnout (e.g., mindfulness training, yoga), these solutions can be perceived as “band-aid” solutions that put the responsibility of wellness on the medical trainees and overlook the real problems in the learning environment that contribute to burnout (e.g., mistreatment, lack of faculty engagement). Thus, it is important for medical schools take a multifaceted approach to combating burnout in medical training, and to provide solutions both at the individual and organizational level concurrently to better address burnout in medical training.

Conclusion

The current paper describes the development and pilot testing of LAVENDER, a positive psychology program tailored for medical students. Although we found preliminary evidence for the acceptability of LAVENDER, we did not find support for the efficacy of LAVENDER for preserving medical student well-being. Future controlled studies are necessary to examine efficacy for potentially buffering the deleterious effects of the stress of medical school on trainee well-being. Ultimately, if shown to be efficacious, LAVENDER can be incorporated to the medical school curriculum as part of comprehensive programs to train medical students in self-care skills that may prevent burnout throughout their careers.

Acknowledgments

We thank Eva Shiu for assisting with delivering the intervention content in Phase 2 of the study. We thank the medical students at the Albert Einstein College of Medicine and at Northwestern University's Feinberg School of Medicine for participating in this research.

Author Contributions

All authors have contributed significantly to the design, analysis and writing of this manuscript. The contents represent original work and have not been published elsewhere. No

commercial party having a direct financial interest in the results of the research supporting this article has or will confer a benefit upon the authors or upon any organization with which the authors are associated.


Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This study was supported by a National Science Foundation postdoctoral research fellowship awarded to Dr. Cheung (NSF #1714952).

ORCID iD

Elaine O Cheung  <https://orcid.org/0000-0002-5083-4252>

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