Supporting Medical Student Wellness During a Pandemic: A Pilot Study of an Extra-Curricular Resilience-Promotion Program

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ABSTRACT

Background: Medical students face a unique collection of stressors, both intrinsic and external with consequences to health and well-being, ultimately impacting patient care. Health education institutions play a role in perpetuating or mitigating this experience of stress.

Objective: This pilot project aimed to identify the impact of an extra-curricular wellness program on well-being among naturopathic medical students.

Methods: Participants engaged in a 2-day facilitated wellness retreat followed by three monthly workshops, which coincided with the onset of the COVID-19 pandemic. Frequencies of pre-defined behaviours, and validated measures of stress, resilience, and mental health were assessed prior to the start of the program, immediately upon completion, and 6 months after the program concluded and were compared with wait-listed controls.

Results: There was a clear trend toward reduced stress perception and anxiety, along with improved resilience among program participants through the duration of the study and compared with controls. The positive trends over the course of the study, especially during a global pandemic, suggests that the intervention was beneficial to participants.

Conclusion: The results suggest that supporting students in cultivating the skills of resilient coping may reduce perceived stress and improve mental health for medical students, even during times of uncontrollable external stress.

Key Words   Anxiety, resilience, undergraduate medical education, wellness program, provider well-being, burnout, stress

INTRODUCTION

Medical education presents an immense allostatic load for learners due to a variety of factors, including a demanding workload, financial strain, and the competitive nature of medical school. These external factors intersect with individual temperament and coping skills.[1,2] While a certain level of stress can strengthen academic performance, uncontrollably high levels are associated with an increase in burnout, mental health struggles, and a decrease in motivation.[3] Medical students report a higher level of psychological distress when compared with other student groups.[3] The COVID-19 pandemic has led to even higher rates of distress within the general population, and among medical students in particular.[4-6]

According to a 2016 analysis in the *Journal of the American Medical Association*, 30% of medical students suffer from depression or depressive symptoms, compared with 9% of the general population of 18- to 25-year-olds.[7] The application of coping strategies has led to improved outcomes in past research.[8] However,

Rotenstein et al. found that, among medical students who suffer from depression, only 16% of participants sought help, citing lack of time, stigma, and confidentiality concerns.[7] Additional research has highlighted that female and Black medical students experience greater depression compared with their colleagues.[9]

The well-being of medical students is essential for the care of their future patients. Increased personal well-being is associated with increased empathy, which allows future doctors to better understand their patients and provide appropriate support. Medical providers who are burned out and experience mental health challenges are twice as likely to display unprofessionalism and lack of empathy, which ultimately leads to negative patient outcomes.[10] Figure 1 offers a conceptual framework of the relationships described above.

The educational experience plays a large role in the stress of students, highlighting the responsibility of institutions.[10] Three of the authors of this manuscript recently completed a systematic scoping review to map strategies implemented by medical schools to
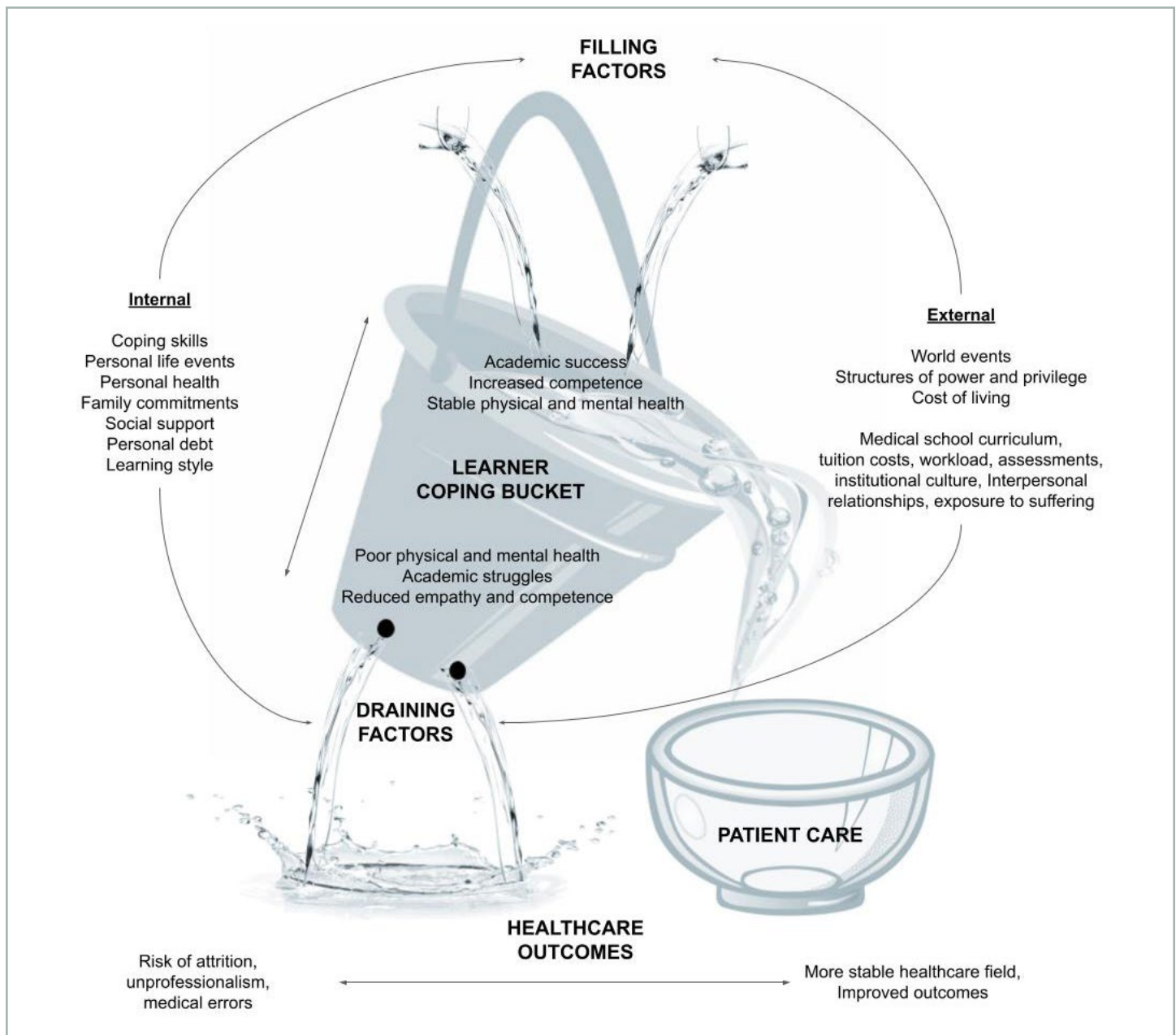
FIGURE 1 A conceptual framework, building on the "coping reservoir" model proposed by Dunn et al. (Dunn LB, Iglewicz A, Moutier C. A conceptual model of medical student well-being: promoting resilience and preventing burnout. *Acad Psychiatry.* 2008;32(1):44-53)[1] for the impact of internal and external inputs to coping of medical students on patient care. These factors — including the strategies committed or omitted by the educational institution — can contribute to or drain the coping reservoir of medical students. This leads to burnout, poor mental and physical health, and potentially poorer patient care (courtesy of authors). (Mohmand S, Monteiro S, Solomonian L. How are medical institutions supporting the well-being of undergraduate students? A scoping review. *Med Educ.* Online. 2022;27(1):2133986)

improve the well-being of students.[11] There appears to be a benefit to offering such strategies, particularly when voluntary. Interventions included mindfulness and mind-body–based programs, curriculum changes, and reflection groups. Noted barriers to participation included programs with sizable time commitments, which were not practical within an already heavy course load. However, Waechter et al. suggested mandated wellness programs may improve anxiety and perceived stress with no negative impact on academic performance, noting that students "reported enjoying sessions once trying them."[12]

The aim of this study was to evaluate a pilot program to support naturopathic medical students in developing coping strategies to mitigate stress levels and improve overall well-being. The program consisted of an immersive weekend, followed by three 1.5-hour sessions spread over 3 months. Workshop topics were selected and designed to build stress response mitigation skills through self-care practices.[13-15] Mindfulness skills were emphasized across many workshops because of their demonstrated positive effect on stress, anxiety, and depression in the general population, and in medical students specifically.[16,17]

METHODS

Population

The Canadian College of Naturopathic Medicine (CCNM)is an accredited post-graduate doctoral health education program. The majority of students complete the program full-time over 4 years, while others choose to study part-time. The first 3 years are largely classroom-based, with some clinical exposure, and the final year is a clinical internship. CCNM also offers an accelerated program for internationally or domestically trained medical doctors. The accelerated program spans 2 years, the second of which integrates with the standard cohort for the clinical internship. As with all medical programs, the curriculum is demanding and financially taxing.

Intervention

Students at CCNM from all years were invited to participate in a weekend wellness retreat subsidized by the student wellness program; the total cost to students was CA$100. Registration was limited to 12 students. Individuals on the waitlist were invited to participate in the study as controls.

The weekend retreat took place over 2 days in January 2020, and was facilitated by two naturopathic doctors (authors LS and LC). Workshops were designed to build knowledge, attitudes, and skills with respect to health-promoting lifestyle strategies. Interactive, skills-oriented, and reflective pedagogical methods were applied. Free time and opportunities for self-directed group engagement were also provided. Promotional information and the weekend agenda can be found in Appendix A.

Three 1.5-hour monthly follow-up workshops took place between February and April 2020. Topics were co-selected with participants (see Results) and were intended to reinforce themes discussed in the original retreat. The first explored concepts of "purpose" and professional advocacy; the second explored boundaries, and themes around countertransference and imposter syndrome; the third reinforced skills of mindfulness, particularly as it relates to writing exams and clinical practice. The first of the three workshops took place in person whereas the second and were held online due to the onset of the COVID-19 pandemic. The timeline of the program can be seen in Figure 2.

Analysis

Likert scales were used to evaluate participants' quantity of sleep, physical activity, and alcohol/drug consumption. Validated measures were used at baseline and both follow-ups to assess mood (Patient Health Questionnaire 9; PHQ-9 and General Anxiety Disorder 7; GAD-7), self-esteem (Rosenberg Self-Esteem Scale; RSES), stress (Perceived Stress Scale; PSS), and resilience and coping (Brief Resilient Coping Scale; BRCS). Mean scores were calculated and compared with baseline for and between participants and controls. Correlation between behaviours and outcome measures were also calculated for all participants.

Because this was a pilot study, hypothesis testing is not appropriate, and the power is too small to reach statistical significance. This is particularly true for the comparison of the participant group with controls given the small size of the control group. However, we did compare the means for each score from baseline and applied the t-test to determine 95% confidence intervals and p values. We were most interested in directional trends to inform the viability of a larger trial to measure effect.

Ethics and Data Collection

Informed consent was given, and data collected electronically using the RedCap data management software. A baseline assessment was performed prior to the original retreat in January 2020. The first follow-up assessment was distributed in May 2020 after the three follow-up sessions, at which time feedback was also solicited about the satisfaction of participants with the program. The second follow-up assessment was performed in December 2020. Ethics approval was provided in January 2020 by the Research Ethics Board of the Canadian College of Naturopathic Medicine.

RESULTS

Demographics

Of the 12 participants who took part in the program, 10 consented to participate in the study. Of the individuals on the waitlist, two consented to participate as controls. All participants were CCNM students, representing years 1–3 of the program at baseline. Nine of the study participants and both of the controls were full-time
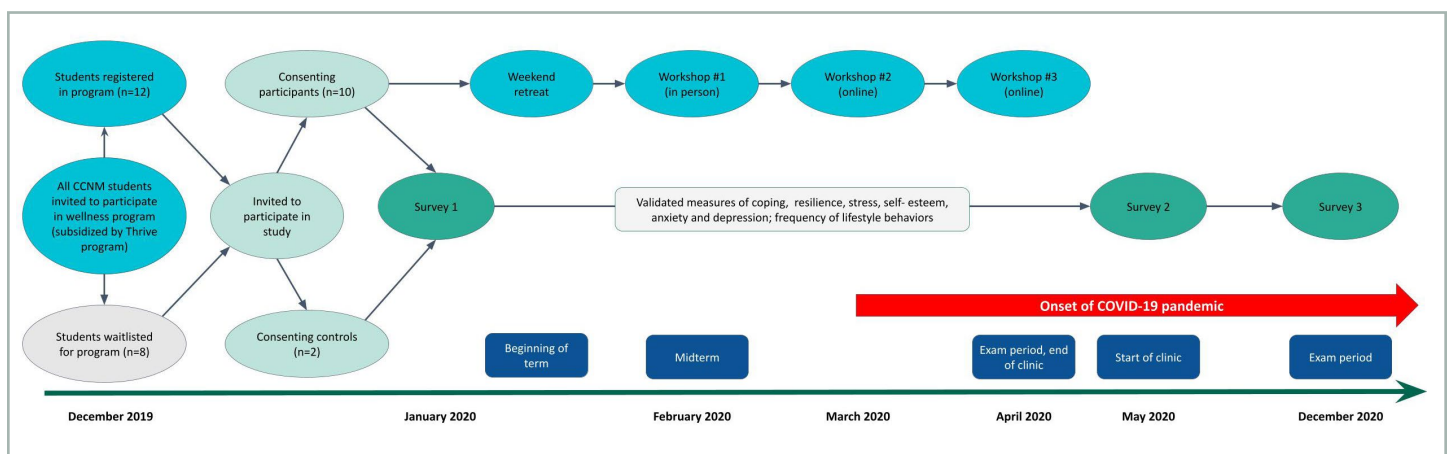

FIGURE 2 Flow diagram of intervention and study methods, with correlations to external events.

students in the 4-year program. One was an internationally trained medical doctor who was enrolled in the accelerated program. All participants were female. Among study participants, the average age was 26.5 years, five were employed, nine were in an intimate relationship at baseline, and four had been diagnosed with a mental health condition, two of whom were using medication (Table 1).

Lifestyle Behaviours

Participants were asked at baseline and each follow-up to identify the frequency of moderate to vigorous physical activity (MVPA), hours of sleep per night, and consumption of alcohol or other drugs over the previous week. At baseline, 70% of participants engaged in 2 or more hours of MVPA per week which remained stable throughout the study. Controls moved less on average than participants throughout the study period. At least 60% of participants were achieving at least 7 hours of sleep per night throughout the study period, increasing to 75% by the second follow-up. Controls were achieving fewer than 7 hours of sleep per night at baseline and second follow-up. Throughout the study, participants were consuming fewer than 1 alcoholic beverage per day on average. At the second follow-up, 75% of participants were drinking fewer than 1 alcoholic beverage per week. One of the controls consumed alcohol minimally (0–1 or 2–3 drinks per week), while one consistently consumed more than 8 drinks per week. Most participants consumed cannabis or other drugs either minimally or not at all throughout the study, as were both controls at baseline. By the second follow-up, one control was consuming cannabis or other drugs at least daily on average (Table 2).

Outcome Measures

Outcome measures are shown in Table 3. Mean coping and resilience scores indicated "medium resilient coping" for both participants and controls throughout the study period. BRCS scores improved throughout the study period for participants, increasing by 0.5 points on average, with a relatively small standard deviation. Perceived stress was moderate for participants at baseline, and remained so at both follow-ups, with a decreasing trend by the end of the study. Baseline perceived stress was higher for controls than for participants, and more than doubled by the second follow-up. Self-esteem assessment revealed similar mean scores between participants and controls at baseline and first follow-up, and notably increased in both groups by the end of the study.

Scoring of depressive symptoms revealed no to mild depression among participants throughout the study, with lower mean scores at the second follow-up. Mean scores of controls revealed moderate depression at baseline and second follow-up. GAD-7 scores suggested no to mild anxiety among participants throughout the study, with a downward trend. Mean GAD-7 scores for controls were higher at baseline and first follow-up, with notably higher scores at the end of the study.

Correlations

Pooled correlations were calculated between validated outcome measures and both demographic factors and lifestyle behaviours. Year of study was strongly correlated with anxiety as assessed by the GAD-7 ($r = 0.78$, $p = 0.003$, significant at $p < 0.05$); active management of a diagnosed mental health condition was strongly negatively correlated with anxiety ($r = -0.76$, $p = 0.004$). Sleep quantity was also strongly inversely correlated with stress perception ($r = -0.72$, $p = 0.008$). Moderate negative correlations were noted between year of study and self-esteem, between hours of paid employment and anxiety, as well as between sleep and anxiety. There was a moderate positive correlation between alcohol consumption and anxiety. All other correlations in the pooled data were weak or absent. When assessing only the

TABLE 1 Demographic characteristics of participants and controls

		Participants (*n*=10)	Control (*n*=2)
Average age at baseline		26.50 (23–43)	30.50 (27–34)
Gender		100% self-described female	100% self-described female
Enrollment status		9 FT; 1 PT	2 FT; 0 PT
Year of study	1st year	2	0
	2nd year	2	0
	3rd year	4	1
	4th year	0	1
	part-time	1	0
	IMG	1	0
Diagnosed with a mental health condition (medicated for condition)		4 (2)	1 (0)
In a relationship		Yes (9) No (1) "It's complicated" (0)	Yes (1) No (0) "It's complicated" (1)
Engaged in paid employment		Yes (5) No (5)	Yes (1) No (1)

FT = full-time student; PT = part-time student; IMG = internationally-trained medical graduate enrolled in accelerated program.

TABLE 2 Frequency of lifestyle behaviours

Frequency of lifestyle behaviours		Participant (n=10)			Control (n=2)		
		Baseline (n=10)	First follow-up (n=10)	Second follow-up (n=8)	Baseline	First follow-up	Second follow-up
Hours of MVPA/week	0–1	3	3	3	2	0	1
	2–3	1	2	2	0	2	1
	4–5	4	2	2	0	0	0
	6–7	1	0	1	0	0	0
	>8	1	3	0	0	0	0
Hours of sleep/night	0–4	1	1	0	0	0	2
	5–6	3	3	2	2	0	0
	7–8	6	5	6	0	2	0
	>9	0	1	0	0	0	0
Standard drinks/week	0–1	7	8	6	0	1	1
	2–3	2	1	0	1	0	0
	4–5	1	0	0	0	0	0
	6–7	0	1	2	0	0	0
	8–9	0	0	0	0	1	0
	>10	0	0	0	1	0	1
Times consuming cannabis or other drugs/week	0–1	8	8	7	2	1	1
	2–3	0	1	1	0	1	0
	4–5	0	0	0	0	0	0
	6–7	1	1	0	0	0	0
	8–9	0	0	0	0	0	0
	>10	0	0	0	0	0	1

MVPA = moderate-to-vigorous physical activity.

TABLE 3 Mean outcome scores

	Participants			Controls		
	Baseline (n=10)	1st FU (n=10)	2nd FU (n=8)	Baseline (n=2)	1st FU (n=1)	2nd FU (n=2)
Brief Resilience Coping Score, mean (SD)	14.9 (1.97)	15.2 (1.55)	16.4 (1.85)	14.5 (0.70)	15.2	15 (0)
Perceived Stress Scale, mean (SD)	15.6 (7.03)	16.6 (5.8)	14 (6.28)	22 (1.41)	20	33 (1.41)
Rosenberg Self-Esteem Scale, mean (SD)	15.6 (2.5)	14.8 (1.62)	23.75 (1.39)	13 (1.41)	15	21.5 (2.1)
PHQ-9, mean (SD)	5 (5.33)	5.6 (3.06)	3.25 (2.63)	15 (5.65)	20	12 (7.07)
GAD-7, mean (SD)	5.9 (4.98)	5.3 (4.08)	2.13 (2.35)	8 (4.2)	5	13.5 (3.53)

FU = follow-up; SD = standard deviation; PHQ-9 = Patient Health Questionnaire 9; GAD-7 = General Anxiety Disorder 7.

participant data, stronger correlations were noted, but these did not remain stable at different points in the study, limiting interpretation (Table 4).

Satisfaction

Participants were asked to provide feedback about the initial retreat through both Likert scales and open text. On a 1–5 scale, all participants indicated that the workshops (mean = 4.7), food (5.0), group cohesion (4.7), sense of fun (4.7), and overall comfort (4.3) were "good" or "great." All indicated a motivation to continue to

practice the skills learned (mean = 4.2). The most critical feedback was regarding the accommodations provided.

Feedback was solicited about each of the individual workshops. All but one yielded universal assessments of good, very good, or "one of my favourites," and 80% of participants reported that there was "great" balance between workshop time and unstructured time. All participants said they would recommend the retreat to a friend.

Participants were asked what topics they would be interested in exploring further. Each of the proposed topics generated interest, and the three follow-up workshops were designed based on this feedback.

TABLE 4 Pearson coefficient of pooled data (A), and participants for each assessment (B)

(A)

	Year	EMH	TMH	RS	PE	H/W	MVPA	Sleep	ETOH	Drugs
BRC	0.14	-0.02	-0.17	-0.20	0.39	0.39	0.46	0.29	0.01	0.06
PSS	0.38	0.12	-0.24	0.15	-0.20	0.34	-0.10	-0.72	0.39	0.12
RSES	-0.59	-0.48	0.43	-0.09	0.07	0.28	-0.14	0.06	-0.07	0.01
PHQ-9	0.37	0.07	-0.22	0.15	-0.22	0.50	-0.35	-0.48	0.52	0.20
GAD-7	0.78	-0.05	-0.76	-0.24	0.16	-0.54	-0.06	-0.61	0.33	0.19

(B)

	Demographic Data						Baseline				1st Follow-Up				2nd Follow-Up			
	Year	EMH	TMH	RS	PE	H/W	MVPA	Sleep	ETOH	Drugs	MVPA	Sleep	ETOH	Drugs	MVPA	Sleep	ETOH	Drugs
BRC	0.14	0.04	-0.32	-0.16	0.37	-0.46	0.74	0.44	-0.21	0.17	0.70	0.15	-0.21	0.31	0.04	0.29	0.88	0.14
PSS	0.36	0.08	-0.05	-0.23	-0.21	0.24	-0.08	-0.67	0.17	-0.36	0.19	-0.70	0.47	-0.30	-0.02	-0.44	0.10	-0.64
RSES	-0.57	0.08	0.51	0.06	0.17	0.50	0.21	-0.80	-0.28	-0.08	-0.55	0.34	-0.16	0.27	0.30	-0.11	-0.56	0.36
PHQ-9	0.43	-0.12	0.55	0.00	-0.16	0.49	-0.57	-0.80	-0.33	-0.25	-0.19	-0.46	0.32	-0.17	-0.19	-0.05	-0.27	-0.47
GAD-7	0.77	0.06	-0.91	-0.35	0.06	-0.84	0.04	-0.65	0.20	-0.26	-0.07	-0.51	0.53	-0.29	0.10	-0.10	-0.16	-0.36

Year = year of study; EMH = existing mental health condition; TMH = treating mental health condition; RS = relationship status; PE = paid employment; H/W = hours per week employed; MVPA = moderate-vigorous physical activity; ETOH = alcohol; BRC = Brief Resilient Coping Scale; PSS = Perceived Stress Scale; RSES = Rosenberg Self-Esteem Scale; PHQ-9 = Patient Health Questionnaire 9; GAD-7 = General Anxiety Disorder 7.

Absolute Value of r Strength of Relationship
$r<0.3$: none/very weak; $0.3<r<0.5$: weak; $0.5<r<0.7$: moderate; $r>0.7$: strong.

DISCUSSION

In general, there was a downward trend in anxiety and stress perception, and an upward trend in resilience and coping among participants over the course of the study, while the world was enveloped by the COVID-19 pandemic (Figure 3).

Our final workshop and first follow-up occurred within weeks of the onset of restrictions to control transmission. At CCNM, this included a halt to all in-person training, and changes to timing and modes of evaluation. The first follow-up also coincided with the end of the academic year, and the beginning of clinical internship for some participants and controls. The second follow-up occurred during the peak of the second wave, also at the end of an academic term. Other studies have demonstrated an increase in anxiety through the pandemic in both the general population[18] and medical students,[19] which was observed in the two controls. Perceived stress by the two controls also increased significantly by the end of the study. However, a downward trend in both anxiety scores and perceived stress was noted among participants over the course of the study, suggesting that the skills nurtured by the program may have buffered the impact of these stressors. Scores of resilience and coping also improved among participants while they remained steady for controls, reinforcing this theory.

The program design incorporated strategies to promote the practice of resilience-promoting lifestyle behaviours based on correlations identified in other studies. However, correlations between behaviours and outcomes in this population were of lower strength than anticipated, with the exception of sleep, where a moderate inverse correlation between hours of sleep and perceived stress was observed. This is consistently observed in other research,[20] including stress specific to the COVID pandemic,[21]

and suggests the importance of supporting students in prioritizing adequate sleep. At baseline, there was a moderate correlation between the amount of moderate-to-vigorous physical activity (MVPA) and resilient coping scores. However, at the time of the second follow-up, MVPA scores for almost all participants and controls decreased significantly and the correlation was weakened. The second follow-up measurements were taken in December 2020, a time in which COVID-19 cases were spiking in Ontario, limiting indoor physical activity options, and outdoor activity was more challenging in the Canadian environment. It is also possible that the significant universal stress of the time was too great for MVPA alone to buffer. Despite the reduction in MVPA by the second follow-up, we find the correlation between MVPA and BRC noteworthy, as daily physical activity has been shown to be one strong predictor of resilience during the COVID-19 pandemic.[21]

We did not see a significant change in any of the lifestyle factors assessed; in fact, most of the participants were practicing reasonable lifestyle behaviours at baseline. It may have been that these were not the most ideal outcome measures to assess, especially for a self-selected group, which may have already been deliberately prioritizing good self-care, especially naturopathic students who may prioritize self-care more than other healthcare students due to the strong emphasis in the profession on lifestyle medicine. These are hypotheses that need to be tested. However, we did observe a trend towards improved resilience and mental health among participants independent of improvements in lifestyle practices. This suggests that participation in the program facilitated the development of skills and self-care strategies which were not directly measured, such as cognitive frameworks and mindfulness practices. Neufeld and Malin found that mindfulness training alone was insufficient to improve the well-being of
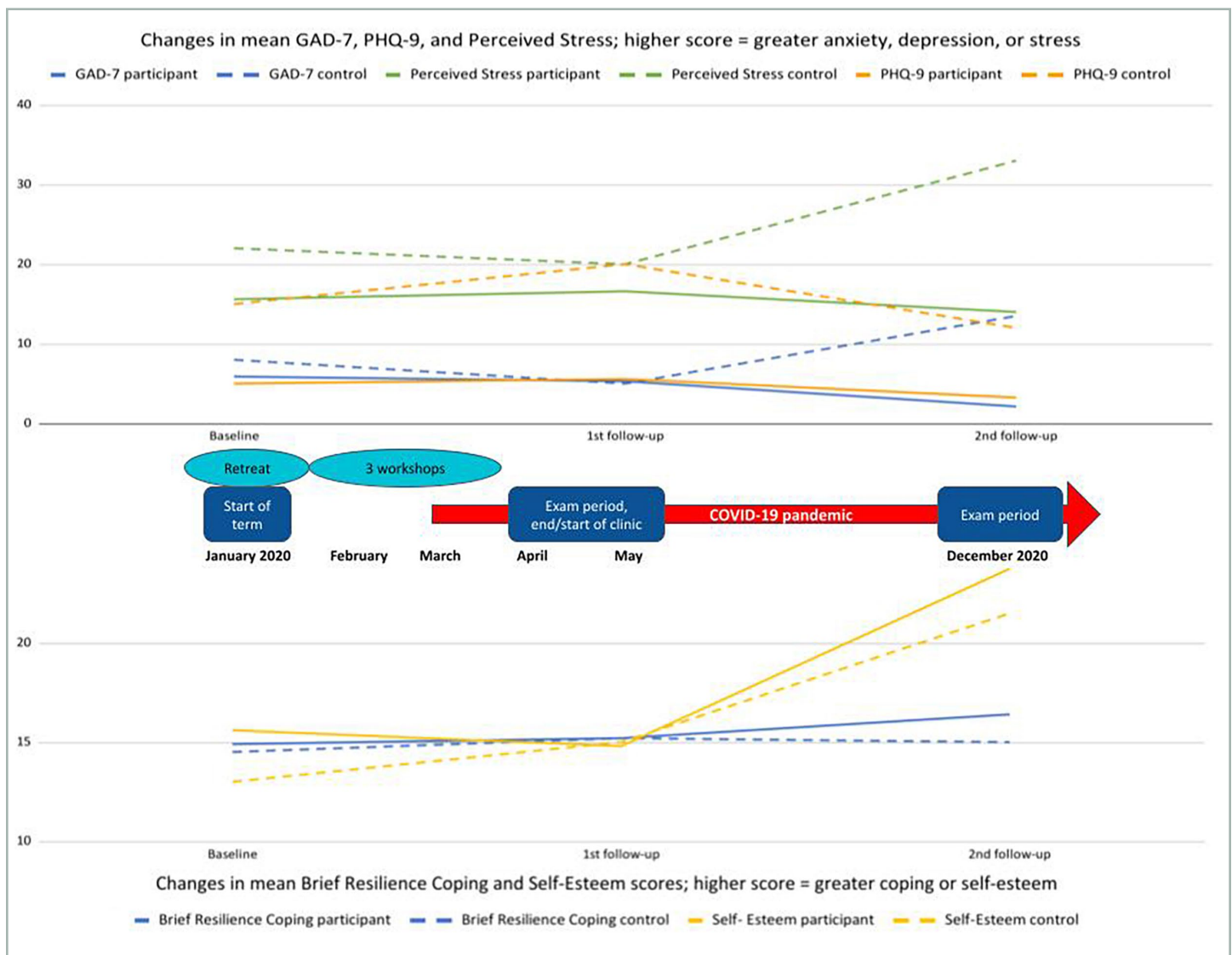
FIGURE 3 Changes in mean GAD-7, PHQ-9, perceived stress scale, mean brief resilience coping, and self-esteem scores of participants vs controls over the timeline of the study. PHQ-9 = Patient Health Questionnaire 9; GAD = General Anxiety Disorder.

medical students overall; other strategies to support resilience and psychological health are needed to enhance students' capacity to practice mindfulness as a strategy of effective coping.[22] This intervention engaged participants in its very design, asking their input into what skills needed more support after the initial retreat. In the spirit of community-based participatory programs, this itself may have enhanced the intervention's value. Future studies should seek to more accurately identify mechanisms of improvement.

Among those in the study who had been diagnosed with a mental health condition, there was a strong negative correlation between anxiety scores and being actively engaged in treatment of that condition. This seems to underscore the importance of students having the opportunity and encouragement to enter into accessible mental health care. This pilot also identified that student anxiety was correlated with the year of study. The group-based and cross-cohort nature of this program inherently promoted the opportunity for mentorship. Mentorship programs have been shown to improve resilience among medical students, which may

be beneficial as students move through their training.[23] Mentorship can be of value to the well-being of both mentor and mentee, particularly in medical students in whom the development of counseling and teaching skills is a critical domain of competence.[24,25] The immersive nature of the retreat, in which unstructured time was deliberately scheduled, allowed for relationships to be nurtured, building social support. Although whether these relationships extended beyond the boundaries of the program was not assessed, it is plausible.

These results should be interpreted with caution given the coincidental occurrence of the global health pandemic due to SARS-CoV2 during the course of the study. It is reasonable to assume that outcome measurements were impacted by this universal experience. However, the concomitance was an opportunity to observe the ways in which this program may have supported students in navigating such a universal and significant source of external stress.

As this was a pilot program, with a small sample size of intervention participants and an even smaller pool of waitlisted controls,

caution in interpreting the results is warranted; pilots, including this one, are not sufficiently powered to test hypotheses or measure effects. There was a self-selection bias in that the students who participated had identified a need and desire to develop these skills. Controls were also self-selected, but the number who consented to participate in the study was small, and not well-matched to participants at baseline. Contamination may have occurred, as the CCNM cohort is relatively small, and participants may have shared what they were learning with controls, particularly given their interest in the program. Even if assignment had been randomized, participants could not have been reasonably blinded to the intervention, inherently introducing a placebo effect. However, given the responsiveness of stress perception to the power of placebo, this may be seen as a useful enhancement of the effect as opposed to a detractor to validity. What this pilot was unable to assess was the impact of this intervention on students who did not voluntarily enroll, in which the added commitment to this program may be an additional stressor, and for whom unwilling engagement may create a "nocebo" effect. However, as Waechter et al. suggest,[12] it is possible that even unwilling participants may benefit from such programs. We would suggest that the likelihood of this may be greater if the overall curriculum is adapted to accommodate their integration.

The strengths of this study include the use of validated and quantifiable outcome measures, as well as the longer-term follow-up (this was rare in the studies identified in the previously mentioned scoping review[11]). It was important to attempt to quantify lifestyle behaviours and correlate them to outcomes in order to explore them as potential mediators or confounders, particularly since these were relevant to the content of the program. Although the complexity of both the intervention and the cultivation of well-being makes it difficult to draw definitive causation, this is an example of a whole-systems approach that is more representative of the holism of naturopathic care.

Recommendations

It is crucial that medical education institutions integrate strategies both within and beyond the formal curriculum for students to maintain and/or improve their well-being and prevent burnout. This program was designed based on evidence that healthy lifestyle behaviours improve stress perception, mental health, and resilience. However, our findings did not demonstrate that a change in lifestyle behaviours was responsible for any benefits of the program, suggesting that other, non-assessed, elements may have been. Given the correlations noted between sleep and MVPA in particular, with measures of resilience and mental health, institutions are still well-advised to incentivize these behaviours. Despite the fact that both movement and adequate sleep are powerful physiologic mitigators of stress through the improvement of both adaptive coping capacity and cognition, students experiencing a demanding curriculum may often choose study over these self-care strategies, even knowing the theoretical impact of doing so. Workloads must be reasonably manageable in order to allow for students to choose self-care. Curricula that build the capacity of students to counsel future patients in these behaviours could incorporate reflective

experience, making the deliberate implementation an externally incentivized part of the learning experience.

Given the prevalence of mental health struggles, and the stigma and other barriers reported by many medical students about seeking mental health support, medical programs would be wise to integrate strategies that give students accessible opportunities to develop mental health promotion skills and to normalize the seeking of mental health care when needed. More resources must be provided for student counseling. A traditional one-on-one approach (i.e., a therapist meeting with one student at a time) can be resource-prohibitive, but other models, such as web-based approaches[26] or group-based encounters, are not only more cost-effective but may provide a unique benefit to participants.[27,28] Peer-to-peer strategies may have promise, particularly because of the mutual benefit generally present in peer relationships.[24,25] The longitudinal "learning communities" model, in which faculty members cultivate a structured relationship with small groups of learners to actively learn together, has demonstrated potential benefit to student well-being.[29] Weaving this concept into existing faculty advisory roles may offer opportunities for the development of effective coping strategies.

Based on our results, and those of previous studies, we propose that deliberate support and incentivization should be put in place to encourage students to prioritize the lifestyle skills that mitigate the stress response and promote resilience. This is particularly relevant for trainees of lifestyle medicine, since these are the skills and behaviours that will be recommended to future patients. Depending on available resources and the needs of the specific population, this could include embedding in the curriculum, integration into guided clinical reflection and/or advising sessions, or offering stand-alone wellness training.

Curricula should be designed so as to reduce unnecessary strain and allow for prioritization of self-care, while optimizing graduate competence. This is a complex task, but necessary for student well-being. We recommend an ongoing, evidence-informed review of program design, evaluation strategies, and outcomes, including those that are wellness-related. Quality improvement methodologies may be a useful strategy by which programs can assess their unique needs.[30]

Institutions should also ensure mental health support is accessible, whether through individual counseling, access to online self-directed platforms, group-based approaches, and/or peer-to-peer strategies. We recommend that institutions and programs engage in a needs and resources assessment to identify what is most needed and feasible in their setting.

CONCLUSION

This study evaluated a program delivered during the COVID-19 pandemic to naturopathic medical students that aimed to strengthen students' use of strategies to mitigate the harmful impacts of stress. The trend towards reduced perception of stress and improved resilience over the course of the study, especially compared with controls and during a global pandemic, suggests that the intervention was beneficial. The results suggest that supporting students in cultivating

the skills of resilient coping may reduce perceived stress and improve mental health, even during times of uncontrollable external stress. It behooves medical institutions to assess, design, implement, and evaluate universal and multi-dimensional strategies to mitigate intolerable stress and enhance resilience among trainees.

AUTHOR AFFILIATIONS

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REFERENCES

1. Dunn LB, Iglewicz A, Moutier C. A conceptual model of medical student well-being: promoting resilience and preventing burnout. *Acad Psychiatry*. 2008;32(1):44-53. doi:10.1176/appi.ap.32.1.44

2. Ishak W, Nikravesh R, Lederer S, Perry R, Ogunyemi D, Bernstein C. Burnout in medical students: a systematic review. *Clin Teach*. 2013;10(4):242-245. doi:10.1111/tct.12014

3. Hill MR, Goicochea S, Merlo LJ. In their own words: stressors facing medical students in the millennial generation. *Med Educ Online*. 2018;23(1):1530558.

4. Bueno-Notivol J, Gracia-García P, Olaya B, Lasheras I, López-Antón R, Santabárbara J. Prevalence of depression during the COVID-19 outbreak: A meta-analysis of community-based studies. *Int J Clin Health Psychol*. 2021;21(1):100196.

5. Halperin SJ, Henderson MN, Prenner S, Grauer JN. Prevalence of anxiety and depression among medical students during the Covid-19 pandemic: a cross-sectional study. *J Med Educ Curric Dev*. 2021 Feb;8:2382120521991150.

6. Harries AJ, Lee C, Jones L, et al. Effects of the COVID-19 pandemic on medical students: a multicenter quantitative study. *BMC Med Educ*. 2021;21(1):1-8.

7. Rotenstein LS, Ramos MA, Torre M, et al. Prevalence of depression, depressive symptoms, and suicidal ideation among medical students: a systematic review and meta-analysis. *JAMA*. 2016;316(21):2214-2236.

8. Thompson G, McBride RB, Hosford CC, Halaas G. Resilience among medical students: the role of coping style and social support. *Teach Learn Med*. 2016;28(2):174-182.

9. Goebert D, Thompson D, Takeshita J, et al. Depressive symptoms in medical students and residents: a multischool study. *Acad Med*. 2009;84(2):236-241.

10. Natalia D, Syakurah RA. Mental health state in medical students during COVID-19 pandemic. *J Educ Health Prom*. 2021;10.

11. Mohmand S, Monteiro S, Solomonian L. How are medical institutions supporting the well-being of undergraduate students? A scoping review. *Med Educ Online*. 2022;27(1):2133986. doi:10.1080/10872981.2022.2133986

12. Waechter R, Stahl G, Rabie S, et al. Mitigating medical student stress and anxiety: should schools mandate participation in wellness intervention programs?. *Med Teach*. 2021;43(8):945-955.

13. Aylett E, Small N, Bower P. Exercise in the treatment of clinical anxiety in general practice—a systematic review and meta-analysis. *BMC Health Serv Res*. 2018 Dec;18(1):1-8.

14. Hou WK, Lai FT, Ben-Ezra M, Goodwin R. Regularizing daily routines for mental health during and after the COVID-19 pandemic. *J Global Health*. 2020;10(2).

15. Shuda Q, Bougoulias ME, Kass R. Effect of nature exposure on perceived and physiologic stress: a systematic review. *Complement Ther Med*. 2020;53:102514.

16. Zhang D, Lee EK, Mak EC, Ho CY, Wong SY. Mindfulness-based interventions: an overall review. *Brit Med Bull*. 2021 Jun;138(1):41-57.

17. Polle E, Gair J. Mindfulness-based stress reduction for medical students: a narrative review. *Canadian Med Educ J/Rev can éduc méd*. 2021;12(2):e74-80.

18. Pashazadeh Kan F, Raoofi S, Rafiei S, et al. A systematic review of the prevalence of anxiety among the general population during the COVID-19 pandemic. *J Affect Disord*. 2021;293:391-398. doi:10.1016/j.jad.2021.06.073

19. Sahu P. Closure of universities due to coronavirus disease 2019 (COVID-19): impact on education and mental health of students and academic staff. *Cureus*. 2020;12(4):e7541. doi:10.7759/cureus.7541

20. Martire VL, Caruso D, Palagini L, Zoccoli G, Bastianini S. Stress & sleep: a relationship lasting a lifetime. *Neurosci Biobehav Rev*. 2020;117:65-77.

21. Killgore WDS, Taylor EC, Cloonan SA, Dailey NS. Psychological resilience during the COVID-19 lockdown. *Psychiatry Res*. 2020;291:113216. doi:10.1016/j.psychres.2020.113216

22. Neufeld A, Malin G. Need fulfillment and resilience mediate the relationship between mindfulness and coping in medical. *Teach Learn Med*. 2022;34(1):78-88. doi:10.1080/10401334.2021.1960533

23. Fares J, Al Tabosh H, Saadeddin Z, El Mouhayyar C, Aridi H. Stress, burnout and coping strategies in preclinical medical students. *N Am J Med Sci*. 2016;8(2):75-81. doi:10.4103/1947-2714.177299

24. Moir F, Henning M, Hassed C, Moyes SA, Elley CR. A peer-support and mindfulness program to improve the mental health of medical students. *Teach Learn Med*. 2016;28(3):293-302. doi:10.1080/10401334.2016.1153475

25. Cheng SM, Taylor DL, Fitzgerald AA, Kuo CC, Graves KD. Build & belong: a peer-based intervention to reduce medical student social isolation [published online ahead of print, 2021 Nov 11]. *Teach Learn Med*. 2022;34(5):504-513. doi:10.1080/10401334.2021.1984921

26. Howell AN, Rheingold AA, Uhde TW, Guille C. Web-based CBT for the prevention of anxiety symptoms among medical and health science graduate students. *Cogn Behav Ther*. 2019;48(5):385-405. doi:10.1080/16506073.2018.1533575

27. Sahranavard S, Esmaeili A, Salehiniya H, Behdani S. The effectiveness of group training of cognitive behavioral therapy-based stress management on anxiety, hardiness and self-efficacy in female medical students. *J Educ Health Promot*. 2019;8:49. doi:10.4103/jehp.jehp_327_18

28. Wolgensinger L. Cognitive behavioral group therapy for anxiety: recent developments. *Dialogues Clin Neurosci*. 2015;17(3):347-351. doi:10.31887/DCNS.2015.17.3/lwolgensinger

29. Frosch E, Goldstein M. Relationship-centered advising in a medical school learning community. *J Med Educ Curric Dev*. 2019;6:2382120519827895. doi:10.1177/2382120519827895

30. Wong BM, Headrick LA. Application of continuous quality improvement to medical education. *Med Educ*. 2021;55(1):72-81. doi:10.1111/medu.14351

APPENDIX A: WEEKEND RETREAT PROMOTION MATERIALS AND SCHEDULE

Drop in to experiential medicine with us at a rural winter retreat! Join us in the snowy quiet of Canadian wilderness and explore the pillars of health in a deeply personal way. Be guided through a weekend of workshops designed to develop an intimate understanding of the basics of health, your most common barriers to health, and effective exercise and strategies for overcoming these obstacles. Be fully present for yourself, knowing you will take in the experience and use it to help your patients in the future.

Come out of a restful Saturday-Sunday weekend feeling nourished, empowered, and deeply familiar with the art of naturopathic medicine. Explore the pillars of health with us:

- Nourishment
- Movement
- Rest
- Relationships
- Nature
- Stress Management

Beyond the science of naturopathic medicine, we will explore the art of interpersonal management, emotional management, and stress management. These are skills that we aim to practice for ourselves in our own lives and relationships, knowing this will inform who we are as naturopathic doctors in the future. To practice these skills, we draw on exercises from cognitive behavioural therapy, emotionally-focused therapy mindfulness, motivational interviewing, narrative therapy, and personal experience.

The weekend retreat is designed to embody the principles of healthy lifestyle change. One of the main tenets of the weekend is building community, and as such, we strive to create a harmonious, safe, and open environment for learning and growing as a cohesive group. Living the principles of health is an important part of being an effective healer, and we encourage students to explore what that means for them on the retreat, as individuals, and as a group.

Structure of the Experience

Students arrive Saturday morning to a cabin accommodation, and are supported with food, nature, experience, materials, companionship, and playfulness! Accommodation includes a shared room and bathroom, a fresh whole foods diet that includes meat but can be vegetarian, all materials and exercises, and time in nature.

What happens after the retreat?

Sometimes removing yourself from your daily routine is necessary to make real change in your life. Being away from habit allows for space to think about healthy, inspired choices. But retaining the change once you've returned to your life can be a challenge, which is why we are offering several monthly meetups at CCNM after the retreat to explore each of the pillars again in a familiar setting. This reinforcement and reminder serves to establish new healthy habits as a continuing part of your life. Meetups will consist of 1-2 hours, each revisiting a specific practice explored in the retreat (for example, cognitive behaviour strategies for stress management, or mindfulness for emotional resilience), checking in on how students are incorporating this into their life, and how to troubleshoot difficulties with the practice. We will also create a Facebook group to facilitate check-ins, share resources, and maintain community.

Saturday	
10:30-12pm	Welcome, Intro Session
12-1:15pm	Lunch – Eating for personal and planetary health
1:30-3pm	Workshop 1: Forest Bathing and Movement
3pm-4:30pm	Workshop 2: Navigating Stress
5-7pm	Dinner – Mindful/intuitive eating
8-10pm	Rest and play
Sunday	
630am-8am	Morning routine
8am-9:15am	Breakfast
9:30-10:30am	Workshop 3: Nurturing our Relationships
10:30-12pm	Tidy/pack/make lunch to go
12-1:15pm	Wrap-up, planning for the future
1:30/2pm	Departure, with a refreshed mind and body