Editorial: How Do We Become a More "Utilized" Resource in Primary Care?

Marianne Trevorrow,[1] MA, ND

There have been many recent discussions in the media and in this publication about barriers to healthcare parity, either between provinces or in underserved remote communities, where naturopathic doctors (NDs) could be part of the solution to the lack of access to basic primary care. One idea that is being increasingly discussed is the reduction of regulatory barriers that medical and allied health providers face to being able to practice in more than one province or territory. The federal government, in fact, demanded earlier this year that, along with increased healthcare transfer funding, the provincial Ministries of Health begin to look at ways to facilitate licensing for healthcare providers (HCPs) across provincial and territorial boundaries.[1] At the same time, the regulated medical professions are increasingly calling for national licensing, similar to the system that has been in place in Australia for several years.

For NDs, with our highly uneven regulatory framework, this is an especially urgent concern. Increasingly, NDs across Canada are serving as an initial contact in primary care for Canadians without access to a family physician. However, without the ability to provide care to the full extent of our training, we face the moral hazard of not always being able to provide the care that is needed by our patients. For those NDs, like myself, who practice near a provincial or territorial border, these ethical issues can be particularly acute, as we can frequently end up in situations where we ask patients to do virtual visits from outside their homes to avoid falling afoul of in-province/out-of-province care delivery regulations.

On the positive side, many private benefit providers have added or expanded naturopathic medicine to their benefit pools in the past few years, improving access to our services for many people who would not have been able to afford them otherwise. But the primary barrier that NDs still face in all our member jurisdictions is regulatory. As we keep fighting the same scope battles on a province-by-province basis, too much of our energy is given over to what seem like endless regulatory hurdles, rather than focusing on providing valuable, trusted, and evidence-informed naturopathic care. Without scope parity between the regulated provinces, we are far away from even being able to develop a framework for national licensure and so, to a large extent, are left standing at the starting line of a national discussion on healthcare transferability where we could be contributing effectively.

Still, there is hope on the horizon with the addition of naturopathic medicine to Canadian Veteran's benefits, as well as ongoing discussions with the Federal Indigenous Services about adding ND care to the Indigenous non-insured health benefits (NIHB) system. As these are both national programs, the hope is that our participation will strengthen our efforts to achieve regulation in the jurisdictions where this is still pending, including much of Atlantic Canada, Québec, Yukon, and Nunavut.

This edition leads off with our regular letter from our CAND Chair Mark Fontes, who will be ending his 9-year participation on the board (including 3 as Chair) at the AGM in June. As he writes, during this period our national association has achieved some significant milestones, including a National Awareness campaign and, as mentioned, the addition of naturopathic coverage under federal Veteran's benefits. Another major undertaking of the CAND was the transformation of this publication from *Vital Link* to *CANDJ*, the first peer-reviewed and indexed naturopathic journal in North America and one of a very small number globally. This transition has opened up *CANDJ* to the publication of naturopathic-led research, and although in many ways we are still a work in progress, we are hearing positive feedback from both inside and outside our membership, including several people with prominent leadership roles in Canadian academia and conventional medicine.

Our editor selection/original research article for this edition is a pilot project from CCNM-Toronto on naturopathic medical student wellness by Solomonian et al. In their article, they report on a facilitated wellness/workshop program for a small group of ND1–ND4 students that coincided with the beginning of the COVID-19 pandemic in early 2020, with a 6-month post-program follow-up. Using validated measures of stress and resilience, they found beneficial effects at completion and at 6 months, compared with controls. With the current attention on healthcare

Correspondence to: Dr. Marianne Trevorrow, MA, ND, Canadian Association of Naturopathic Doctors, 20 Holly Street, Suite 200, Toronto, ON M4S 3B1, Canada.
E-mail: drmtrevorrow@cand.ca

To cite: Trevorrow M. Editorial: How Do We Become a More "Utilized" Resource in Primary Care?. *CAND Journal*. 2023;30(2):1-2. https:/doi.org/10.54434/candj.145

Received: 26 May 2023; **Accepted:** 26 May 2023; **Published:** 29 June 2023

resilience and burnout in the post-COVID pandemic period, we believe this project is easily replicable on a larger scale and look forward to seeing more projects supporting student resilience in the future.

In addition, we have a lively and thought-provoking Perspectives piece on a homemade human milk substitute based on an emergency formula recipe suggested by the World Health Organization. In light of recent widespread shortages of commercial formula in Canada and the United States affecting many parents of young infants, the authors argue that the commodification of critical foods such as infant formulas can lead to food insecurity, with important public health implications.

Our case report for this edition is a study of a nature cure intervention including diet and yoga prescriptions from the team at Yoga & Naturopathy Medical College & Hospital in Tamil Nadu, India. We are sure that readers with a special interest in nature cure will find the authors' conclusions intriguing and worth a closer look.

As we go to press, I'm pleased to report that our Associate Editor, Cyndi Gilbert, has been approved as part of a CAND/CANDJ delegation to the Ontario Chiefs' Assembly in Thunder Bay in June, along with Sarah Connors, one of the scholars from our CANDJ Indigenous reconciliation and publication standards project from last year. We hope our two ambassadors will be able to share some of the progress we've made with this publication to align our commitment to reconciliation with our policies impacting Indigenous Peoples, communities, Traditional Knowledge, practices, and medicines.

As much of our traditional and complementary medicine (T&CM) knowledge has its origins in Indigenous communities around the world, we continue to work on upholding our commitments and recognize the importance of transdisciplinary collaboration for the preservation of our planet and the health of its inhabitants.

AUTHOR AFFILIATIONS
[1]Editor in chief, *CAND Journal*.

ACKNOWLEDGEMENTS
Not applicable.

CONFLICTS OF INTEREST DISCLOSURE
I have read and understood the *CAND Journal*'s policy on conflicts of interest and declare that I have none.

FUNDING
This research did not receive any funding.

REFERENCES
1. Mercer G. Calls are growing for a national medical licence. But some experts say it could create a more transient work force. *The Globe and Mail*, Feb 10, 2023. Accessed May 20, 2023. https://www.theglobeandmail.com/canada/article-health-care-doctor-licences-canada/

CANDJ

Update from the Chair

Mark Fontes, ND

To CAND members and my colleagues,

It is with many mixed emotions that I write my last update for the *CAND Journal* as Chair of the Canadian Association of Naturopathic Doctors (CAND). The update provides me with a moment to reflect on my 9 years as a CAND board member, the last 3 as Chair.

When I first joined the CAND board in 2014, a lot of work was being done by the Board and staff to clarify the mandate of the CAND, *who* it serves, and *how,* as the national association, we can provide the best possible results for our "customers." This led to the formation of the CAND core customer groups, each of which is led by a CAND Board Director – Naturopathic Doctor Membership, Student Membership, Government Relations, Insurance Companies, and Corporate Partners. We still use these groups today to guide and focus the work the CAND does on behalf of its members.

It has been an honour to be a part of many significant projects the CAND has undertaken on behalf of the profession, including: the National Awareness campaign; the Better Health Together campaign; government successes, such as the recent coverage for Veterans; upgrading and updating the CAND website; and organizing and implementing a successful Naturopathic Medicine Week, which gathers more momentum each year.

In early 2020, the CAND had to pivot and focus on the impact of COVID-19 on our profession. With the aid of our government relations experts, Hill and Knowlton, and with input from the membership, the CAND engaged with the Ministry of Finance to ensure that the governments' financial aid programs were available to NDs and clinics. Our advocacy work with government also resulted in NDs being included in the Public Health Agency of Canada's (PHAC's) "Guidelines for the Health Sector" in the Community Health Section. As a board, we learned a lot during this time and understood the importance of providing clear and consistent communication to our members. As an association, we never strayed from our messaging to government about the important role Naturopathic Doctors play in our healthcare system addressing the healthcare needs of Canadians across the country.

Over the past year, the CAND Board has reviewed our core customer groups, and it is currently working hard setting the stage for many great years ahead.

It has been an honour to be a part of the CAND Board and to have worked with dedicated Naturopathic Doctors from across Canada. I would also like to thank our Executive Director, Shawn O'Reilly, for all of her excellent work and commitment to advance our profession.

With gratitude,
Dr. Mark Fontes ND

Dr. Mark Fontes, ND, is Chair of the Canadian Association of Naturopathic Doctors.

Correspondence to: Mark Fontes c/o Shawn O'Reilly, Canadian Association of Naturopathic Doctors, 20 Holly Street, Suite 200, Toronto, ON M4S 3B1, Canada.
E-mail: soreilly@cand.ca

To cite: Fontes M. Update from the Chair. *CAND Journal*. 2023;30(2):3. https:/doi.org/10.54434/candj.144

Received: 19 May 2023; **Accepted:** 19 May 2023; **Published:** 29 June 2023

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

Leslie Solomonian,[1] ND, MPH, **Lachlan Crawford,**[1] ND, **Shakila Mohmand,**[1] ND, **Sasha Monteiro,**[1] BSc, MSc, and **Teresa Neves,**[1] MSW, RSW

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

Correspondence to: Lachlan Crawford, 134 W Concord St, #1, Boston, MA 02118, USA. **E-mail:** Lachlanpaigecrawford@gmail.com

To cite: Solomonian L, Crawford L, Mohmand S, Monteiro S, Neves T. Supporting Medical Student Wellness During a Pandemic: A Pilot Study of an Extra-Curricular Resilience-Promotion Program. *CAND Journal*. 2023;30(2):4-13. https:/doi.org/10.54434/candj.138

Received: 15 March 2023; **Accepted:** 30 May 2023; **Published:** 29 June 2023

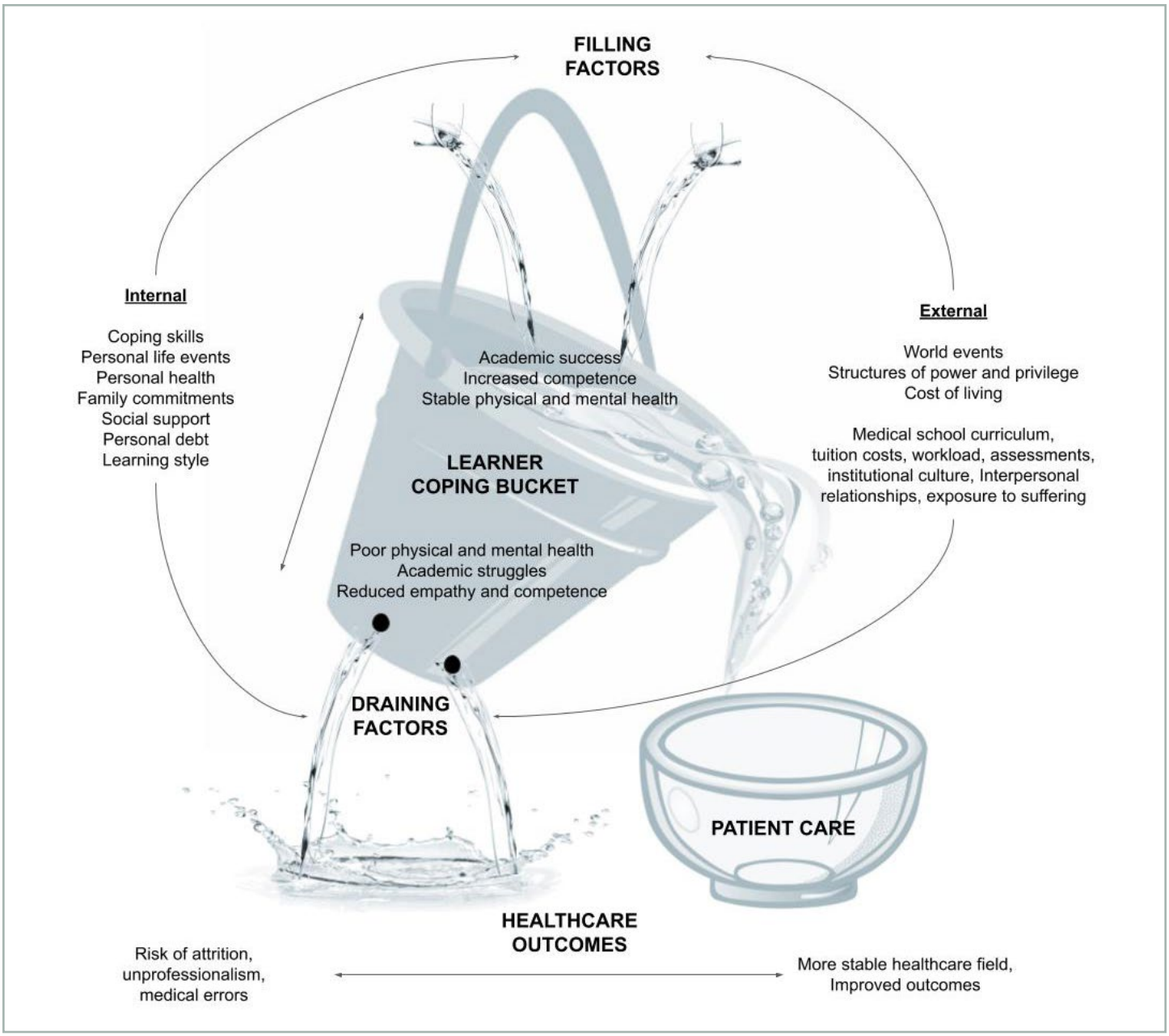

FIGURE 1 A conceptual framework, building on the "coping reservoir" model proposed by Dunn et al. (Dunn LB, Iglewicz A, Moutier C. A conceptual model of medical student well-being: promoting resilience and preventing burnout. *Acad Psychiatry.* 2008;32(1):44-53)[1] for the impact of internal and external 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

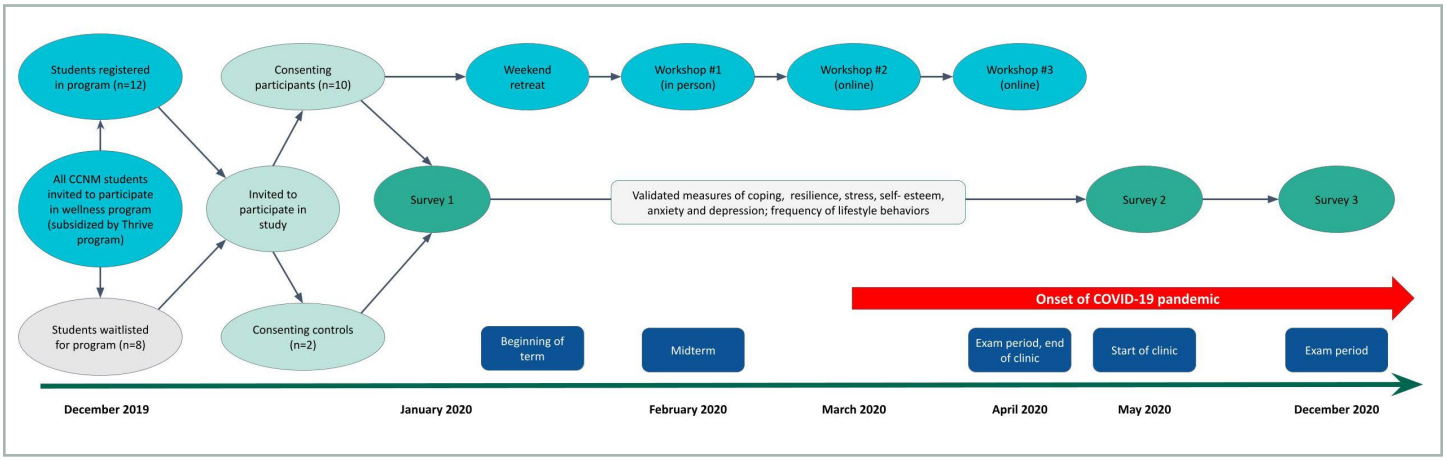

FIGURE 2 Flow diagram of intervention and study methods, with correlations to external events.

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

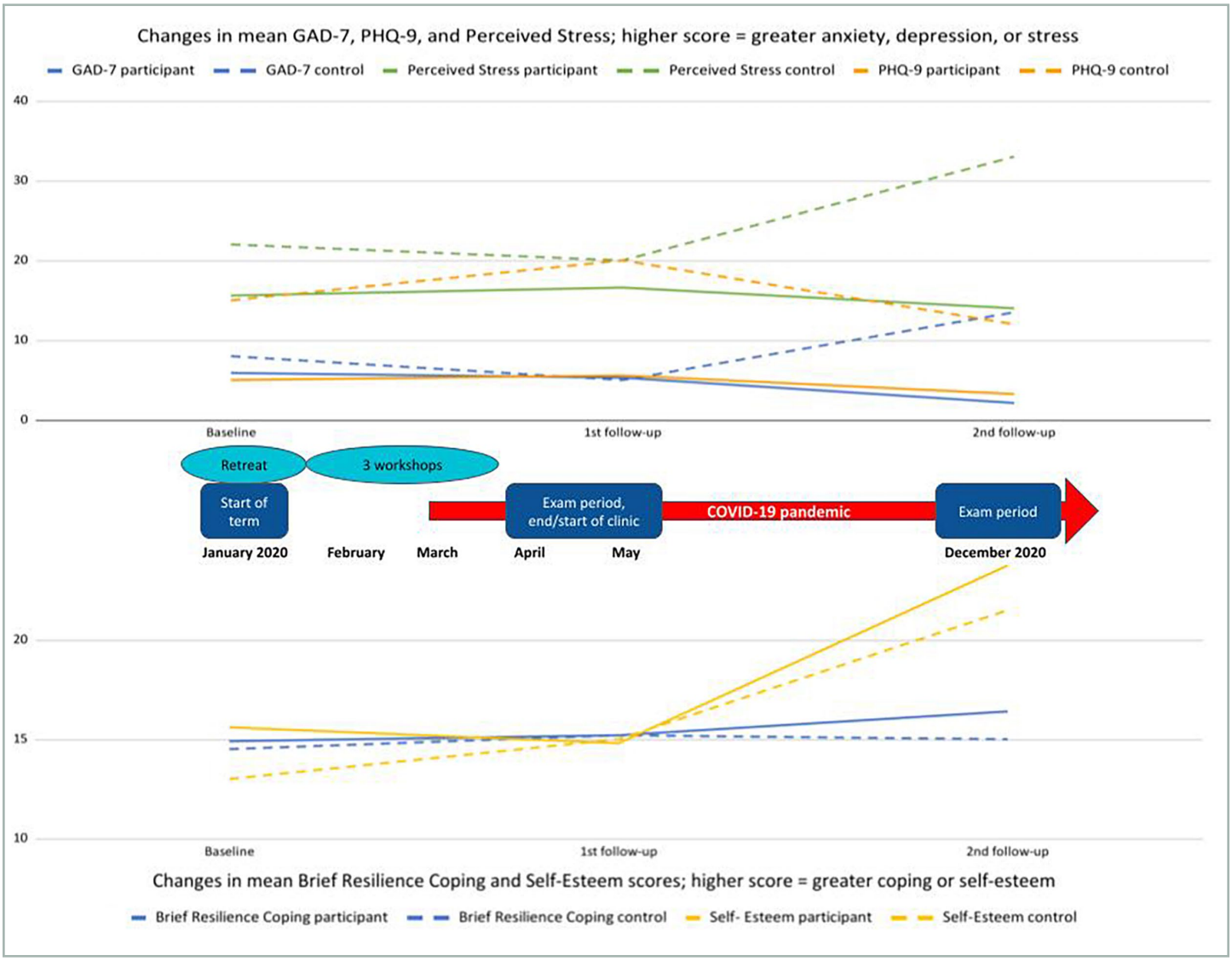

FIGURE 3 Changes in mean GAD-7, PHQ-9, perceived stress scale, mean brief resilience coping, and self-esteem scores of participants vs controls over the timeline of the study. PHQ-9 = Patient Health Questionnaire 9; GAD = General Anxiety Disorder.

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

[1]Canadian College of Naturopathic Medicine, North York, ON, Canada.

ACKNOWLEDGEMENTS

We are grateful to the CCNM Thrive program for subsidizing this series of workshops. We are also deeply grateful to the students who bravely participated in the first iteration of this program, and those who generously engaged in its evaluation.

CONFLICTS OF INTEREST DISCLOSURE

We have read and understood the *CAND Journal*'s policy on disclosing conflicts of interest and declare the following interests: At the time of the study, L. Solomonian and T. Neves were employed by the Canadian College of Naturopathic Medicine, where this program was offered. L. Solomonian and L. Crawford planned and facilitated the program. Otherwise, there are no conflicts of interest to declare.

FUNDING

This research did not receive any funding.

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

Challenging the Maligning of Homemade Human Milk Substitutes During a Shortage of Commercial Formula

Amanda Waters,[1] ND, **Meghan Holpuch,**[2] ND, and **Leslie Solomonian**[3] ND, MPH

ABSTRACT

Infant formula (human milk substitutes) has been commercialized and capitalized in such a way that during times of shortages, families unable to offer human milk struggle to provide for their infant's needs. A thoughtfully designed and safely prepared homemade recipe may meet the needs of families struggling to access commercial products. Analysis of a simple recipe indicates that it appears to be of greater nutritional value than the emergency formula suggested by the World Health Organization. Naturopathic doctors play a key role in empowering parents to provide safe and reliable nutrition for infants. As a profession, we have a great responsibility to advocate for the decommodification of food in order to promote food security and sovereignty, ensuring that people of all ages, including infants, have access to the most appropriate food for their health.

Key Words Human milk substitute, breastmilk, food supply

The principles of naturopathic medicine instruct us to understand and address the underlying cause of disease and dysfunction. This includes not only looking at the physical, emotional, and spiritual influences on the individual human experience of health, but also investigating the social and ecological determinants of health, advocating for necessary change when these present obstacles to well-being. During and subsequent to the COVID-19 pandemic, there was a shortage of infant formula across North America, which threatened the health and well-being of our youngest community members. In this article, we interrogate the political and corporate drivers of the commercial formula monopoly and its consequences.

Naturopathic doctors are poised to play a pivotal role in such crises. There is a gaping absence of reliable information to share with patients when neither human milk nor commercial formula is readily available. While this is a perspective piece, in order to demonstrate the opportunities this offers, we present a case in which an infant's health was threatened when her caregiver was unable to provide human milk, was unwilling to use commercial formula, and lacked reliable guidance for making a substitute herself. Provision of a homemade recipe resulted in the infant's health improving. We conducted a nutritional analysis of a homemade recipe similar to what was recommended in this case and compared it with a common commercial formula option, an approximation of human milk, a World Health Organization (WHO) emergency formula, and the recommended dietary allowances for infants in the United States. We conclude that appropriately prepared homemade milk substitutes may fill a critical gap in infant nutrition, particularly in emergency situations.

It is imperative that, in our desire to educate and serve our communities, we make space for the multitude of reasons why parents may choose to feed their infant a human milk substitute. This decision is deeply seated in social and cultural values, closely tied to impacts of poverty and privilege (which are themselves created and perpetuated by political and corporate influences), and ultimately a private and very individual choice for each parent to make—one that naturopathic doctors have an obligation to support. Naturopathic doctors have a role to play in continuing to encourage and support breastfeeding,* while also advising on other safe and effective strategies of feeding infants in various circumstances. We provide strategies by which naturopathic doctors might engage effectively with patients under their care.

This article focuses on the United States and Canada. However, the impact of pharmaceutical formula marketing around the world has played a significant role in the morbidity and mortality of innumerable infants, not only due to situational supply chain breakdown.[1]

THE BUSINESS OF FORMULA: CAUSES AND CONSEQUENCES

In order to make meaningful change, it is important to explore the historical context in which formula became a staple in infant nutrition and the drivers of the global infant feeding crisis. Substitutes

* We are using the term "breastfeeding" to mean both breast- and chestfeeding, a term sometimes preferred by individuals who are not women (e.g., trans men) and who feed their infants from their bodies. Similarly, we use the term "human milk" rather than "breast milk."

Correspondence to: Leslie Solomonian, 1255 Sheppard Avenue E, Toronto, ON, M2K 1E2, Canada. **E-mail:** lesliend@gmail.com

To cite: Waters A, Holpuch M, Solomonian L. Challenging the maligning of homemade human milk substitutes during a shortage of commercial formula. *CAND Journal*. 2023;30(2):14-19. https:/doi.org/10.54434/candj.130

Received: 15 November 2022; **Accepted:** 26 April 2023; **Published:** 29 June 2023

for human milk have always been essential, in cases such as parental death or inability to breastfeed. Because the nutritional profiles of animal milks vary considerably from human milk, their exclusive use is not appropriate as a substitute.[1] In some cultures, wet nurses played a role in feeding infants—often at the expense of their own children.[2] Commercial formulas are—in theory—a nutritionally effective and accessible option. However, the marketing of commercial infant formulas has played a direct role in reducing rates of breastfeeding in North America and around the world, compromising the health of infants and breastfeeding parents while putting profit in the pockets of corporations and their shareholders.[3]

Cow milk became the basis of the first commercial infant formula, created by Justin von Liebig in 1865. By 1970, widespread availability of commercial formula, paired with strong marketing campaigns and cultural shifts associated with the feminist movement, resulted in an increase in the use of commercial formula. This resulted in a corresponding decrease in breastfeeding rates in North America.[3] A 2022 report from the World Health Organization (WHO) reveals that the global formula industry is currently valued at US$55 billion.[4] Pervasive marketing methods significantly influence choices parents make with respect to feeding their babies, largely through reinforcing misinterpretations and false information,[5] undermining parents' confidence in themselves and their ability to breastfeed. When breastfeeding dyads become dependent on formula, the positive feedback mechanism essential to human milk production is halted. In 1981, the World Health Assembly developed "The International Code of Marketing of Breast-Milk Substitutes" to stop aggressive and inappropriate marketing of formula and ensure breastfeeding is encouraged.[6]

Although commercial human milk substitutes are not considered drugs (i.e., products do not require a Drug Identification Number), they are regulated by the Food and Drug Administration (US) and Food and Drug Regulations (Canada). Commercial formula is manufactured in laboratories; it is not food. Ideally, it is used only in rare situations in which human milk is not available. Commercial formulas are convenient because they are pre-*formulated*, theoretically ensuring that the baby is getting macro and micro-nutrients in an appropriate amount. They are designed to approximate human milk as closely as possible, an impossible task given human milk's dynamic and individualized nature.[1] In addition, commercial formulas do not offer the myriad other benefits that human milk and the breastfeeding process provide for the lifelong health of children and those who feed their infants from their bodies, as well as communities as a whole.[7,8] The health of infants dependent on formula in lower-income settings is threatened when commercial formula is unaffordable or unavailable, or the water used to prepare it is contaminated.[9] Many commercial formulas also contribute significantly to broader animal cruelty and climate destruction through industrial farming of dairy cows (with its impact on deforestation, methane production, and antibiotic resistance), monoculturing of genetically-modified soy, and the destruction of critical tropical habitat for the extraction of palm oil.[10,11]

The authors emphasize that the pharmaceutical industry is to blame for these harms, emphatically *not* the families that turn to formula to feed their infants with the best of intentions. Formula manufacturing and marketing is big business, and its primary purpose is to create profit, not support good health.[12]

The combination of the COVID-19 worldwide pandemic, ongoing climate breakdown, and numerous human conflicts around the globe resulted in a general breakdown of food supply chains. This, combined with recalls of several infant formula products due to poor manufacturing practices, led to shortages of infant formulas in North American markets in 2022.[13] We saw the latest consequence of the commodification of infant nutrition: when there is a shortage of formula, babies go hungry, particularly those already made vulnerable by socioeconomic systems that include racism, heterocispatriarchy, misogyny, and capitalism.[14,15]

Parents are advised to feed infants up to 6 months of age human milk exclusively, or commercial milk substitute (i.e., formula). However, the only guidance that healthcare organizations provide parents who are not able to fully satisfy their infant's nutritional needs during a crisis is to keep looking.[16-18] Not only does this put the onus for solving a public health problem on already overwhelmed parents, it perpetuates the corporate commodification of child feeding. Some parents resort to diluting the commercial formulas they can find, which can result in delayed growth and development due to insufficient calories or nutritional imbalances. Milk banks can be difficult to access, and many are understocked. Some parents may seek human milk through social media platforms, which can pose a risk of infection transmission since these sources cannot be screened as would those at a milk bank.

Parents may also seek recipes online, which is strongly discouraged by the conventional medical community due to concerns that raw materials may be contaminated, that they may lack essential nutrients, or that they will be unsafely prepared or stored.[19,20] A scan of the peer-reviewed literature reveals extremely limited information on the subject, and that which is available describes only harms.[21,22] This may be in part due to publication bias associated with commercial interests, or the fear of liability associated with publishing such literature. In fact, concern about bias in the literature surrounding commercial formula (or "breastmilk substitutes") is such that a recent Delphi study was undertaken to create guidelines around the scientific and ethical conduct of such studies.[23] Unfortunately, clinical decisions and medical research (or lack thereof) driven by fear of liability can lead to devastating gaps in medical care and can result in even greater harm for patients who are left to make uninformed decisions without the support of their doctor. A harm-reduction approach, conversely, can allow for pragmatic conversations with patients regarding the risks, benefits, and research available.[24] It prompts clinicians to take the time to understand the motivations behind decisions and build a meaningful therapeutic alliance in order to allow for incremental health-promoting behaviour change. Nuanced conversations such as these are not possible when a provider is crippled by a fear of liability, or when reliable scientific data is unavailable.

AN ILLUSTRATIVE CASE

As healthcare providers with expertise in nutrition, naturopathic doctors are well equipped to provide nutritional guidance in

situations where neither human milk nor commercial formulas are readily available. This is an important role and potentially fills a critical gap, as the case study below illustrates.

A 3-week-old infant was brought to the clinic by her legal guardian to establish primary care. The patient had been exposed to benzodiazepines *in utero*, which could have contributed to the infant being small for gestational age (4th percentile for weight and 6th for length). The physical exam was otherwise unremarkable, and a heel stick for a standard newborn metabolic screening was performed. A comprehensive feeding history revealed that the child had received human milk for the first 5 days of life, at which point she was removed from her mother's care and placed with her guardian. From the infant's 5th day of life on, she had been fed exclusively goat's milk pasteurized at home, as the guardian was fearful about the highly processed ingredients in commercial formula and wished to offer an alternative. The guardian was educated about the dangers associated with nutrient deficiencies associated with pure goat's milk supplementation for infants and strongly encouraged to switch to a commercially available infant formula, which she verbally agreed to do. The infant was brought back to the clinic approximately one month later with a concern about seizure-like episodes. The infant was afebrile and appeared healthy in the clinic. When questioned about feeding, the guardian disclosed that she had continued to feed the infant goat's milk only. Results from the newborn screening subsequently revealed organic acidemia. A consult with the neurology and pediatric metabolic departments at a local hospital suggested that the seizure-like activity and acidemia were both likely due to a deficiency of folic acid.

Although motivated to change the infant's food, the guardian was still reluctant to use conventional formula and didn't have access to human milk. She was, however, willing to try a homemade formula. She was provided with a recipe that included store-bought pasteurized goat's milk, lactose powder, folic acid, iron, and flax or fish oil. Within 2 weeks, bloodwork revealed that the previous acidemia had resolved and seizure-like activity had decreased in frequency and duration. The infant was followed for approximately 1 month, over which time the seizures eventually stopped, and then the patient was lost to follow-up.

This case is an example of a situation that had potentially dangerous implications resulting from a poorly assumed "black-or-white" approach to infant feeding; the caregiver agreed to change her approach to appease the provider, when in reality no behaviour change was made. Taking a harm-reduction approach on follow-up and offering a homemade alternative, an option that aligned with the caregiver's values, made her willing to modify her behaviour. Ultimately, both the caregiver and medical provider were able to provide the care the infant needed, and she received the nourishment required for her to survive.

CREATING AN EMERGENCY HOME-MADE INFANT FORMULA

The World Health Organization (WHO) offers some hard-to-find guidance for infant feeding in emergencies.[25] It is clear from a quick glance that the basic ingredients (⅓ cup of boiled water, ⅔ cup of boiled milk, and 5 mL of sugar), although likely easy to access, only provide adequate *macro*nutrients, and are not suitable for longer-term use. Despite the fact that there would be major micronutrient gaps in this simple formula, the WHO is the only medical institution that has been willing to publicly take a harm-reduction approach to offering families in crisis an alternative to a starving infant. We argue that there is a great nutritional distance between the WHO emergency formula and the tightly regulated commercial milk substitute which is staunchly insisted on in all other circumstances.

We sought to create a recipe that caregivers could easily make at home for short-term situations in which human milk and commercial formula were unavailable (Table 1). Our process was iterative; we started with a recipe that has been mentioned in the naturopathic literature and, using the FoodData Central database,[26] modified it to meet, as closely as possible, the nutritional profile of a commercial formula commonly available in Canada.[27]

We also analyzed the WHO emergency recipe and offered some comparison with the nutritional profile of human milk (Table 2).[28,29] It is important to note that the nutritional profile of any milk expressed from a mammal, including that of humans, is dynamic and unique to the nursing dyad at that moment, as well as the nutritional status of the parent, and environmental and genetic factors. Nutritional assessments are thus approximations.[1,30,31] We also provide the recommended daily intakes per the United States Department of Agriculture (USDA) for infants under 6 months of age.[32]

DISCUSSION

This process was a thought experiment intended to demonstrate that a homemade recipe may be a viable short-term option for emergency situations. It appears to be of greater nutritional value than the formula suggested by the WHO, with comparable excesses of protein, phosphorus, calcium, and potassium (as well as vitamin A) beyond what is recommended for daily intake. For example, excess nutritional calcium in infants can result in problematic hypercalcemia.[34] The extra phosphorus that this recipe

TABLE 1 Homemade human milk substitute recipe

Batch recipe to be kept in the fridge until consumed. Please refer to Table 2 for guidance on determining appropriate daily volume.
2.5 cups pasteurized goat milk
1.5 cups filtered water
1 tsp flax seed oil
0.25 tsp cod liver oil (ideally third-party tested for contaminants)
3 tbsp blackstrap molasses
1 tbsp sunflower oil
Per *daily* preparation, add:
400 mcg folate (ideally methylated)
400 IU/10 mcg cholecalciferol (vitamin D)
100 mcg liquid iodine
75 mg ascorbic acid powder
450 mg magnesium

TABLE 2 Nutritional comparison of human milk, commercial formula, homemade substitute, and WHO emergency recipe; USDA RDI standards for a 4.75 kg infant provided as comparison; volumes of milk and substitutes reflect 475 kcal.

	USDA RDI for 4.5 kg infant	Human milk per 698 mL	Commercial substitute per 712.50 mL	Homemade substitute per 608 mL	WHO recipe per 1016 mL
Energy (kcal)	4.75*				
Protein (g)	9.10	6.98	9.43	12.76	22.36
% of total energy	-	0.06	0.08	0.11	0.19
Carbohydrate (g)	60.00	46.67	53.10	38.92	48.72
% of total energy	-	0.39	0.45	0.33	0.41
Fat (g)	31.00	29.67	25.15	30.57	21.83
% of total energy	-	0.56	0.48	0.58	0.41
Minerals					
Calcium (mg)	200.00	216.74	370.32	480.23	838.78
Phosphorus (mg)	100.00	94.82	202.63	397.99	687.66
Magnesium (mg)	30.00	20.32	377.31	314.57	81.96
Iron (mg)	0.27	0.20	8.52	7.23	0.01
Zinc (mg)	2.00	1.15	4.75	1.08	2.80
Manganese (mg)	0.00	0.00	0.07	0.00	0.00
Copper (mg)	0.20	0.35	0.36	0.16	0.01
Iodine (mg)	0.11	0.00	0.07	0.06	0.00
Selenium (mg)	0.02	0.01	0.01	0.01	0.01
Sodium (mg)	110.00	115.14	127.17	249.66	259.30
Potassium (mg)	400.00	345.42	510.07	1224.81	1023.45
Chloride (mg)	0.18	0.00	300.45	0.00	0.00
Vitamins					
Vitamin A (mcg)	400.00	413.15	419.24	402.40	218.32
Vitamin D (mcg)	10.00	0.68	7.16	12.17	7.49
Vitamin E (mcg)	4000.00	541.84	6319.97	5066.67	341.04
Vitamin K (mcg)	0.00	2.03	42.62	1.74	2.05
Vitamin C (mg)	40.00	33.87	56.60	48.71	0.00
Thiamine (mg)	0.20	0.07	0.38	0.17	0.38
Riboflavin (mg)	0.30	0.35	0.66	0.49	0.94
Niacin (mg)	2.00	1.20	4.75	0.99	0.42
Pantothenic Acid (mg)	1.70	1.26	2.38	0.44	1.01
Vitamin B6 (mg)	0.10	0.07	0.29	0.16	0.00
Folic Acid (mcg)	65.00	33.87	75.46	238.52	0.00
Vitamin B12 (mcg)	0.40	0.34	1.40	0.25	3.69
Choline (mg)	125.00	108.37	113.19	57.30	121.32

USDA: United States Department of Agriculture; RDI: recommended daily intake.
*Caloric requirement for infants is appropriate to age (a proxy for velocity of growth) and weight: A simple estimate is 100 cal/kg/day.[33]

provides may compensate for that impact, although hyperphosphatemia is also potentially a burden to the kidneys, which may also be strained by the high amount of protein provided by this recipe.[35] Potassium is also eliminated via renal mechanisms; if this system is already strained, the excess potassium in this recipe could lead to hyperkalemia if used for extended periods of time.[36]

Because we have not clinically tested this recipe, it is impossible to fully assess the benefits and risks associated with it, or the long-term health implications. The infant in the cited case was also lost to follow-up. However, the resolution of seizure-like activity suggests that acute micronutrient deficiencies had been addressed. It is important to emphasize that a recipe such as the one analyzed here is to be used only in emergency situations, as opposed to being a viable long-term alternative to breastfeeding or the use of a commercial infant formula. There is an opportunity to conduct further research in order to adjust and evaluate the recipe for longer-term use.

As in all naturopathic care, clinicians are encouraged to engage in collaborative partnership with patients, which includes independent critical analysis of available options and appropriate

discussion of risks and benefits relevant to the individual family. Ideally, we encourage parents to breastfeed as much as possible through breastfeeding-friendly strategies, which include countering the pervasive propaganda of formula companies.[37] We also are well-positioned to discuss options for human milk substitution, including in a crisis.

Both harm reduction[24] and motivational interviewing[38] frameworks offer principles and strategies (including empowerment, self-efficacy, empathy, pragmatism and individualism) to support caregivers in making the safest and most appropriate feeding decision for their infant. Vaccine hesitancy is a parallel challenge for those working with children and families in practice; the most successful approaches for supporting patients in making the best decision for their family involve non-confrontational and open discussions built on trust and respect.[39]

As this manuscript was being prepared, an interesting parallel piece was published in *The New Yorker* which offered very similar critiques of the socio/economic/political influences on infant feeding and the drivers of the recent formula shortage.[40] The solution being explored therein was that offered by the biotech industry in the form of laboratory generated "milk components." While scientifically fascinating, this only serves to perpetuate the structures of oppression and inequity that drove the formula crisis in the first place. Those who already benefit from structural privilege—who have higher health literacy, economic position, access to resources, ability to navigate infrastructure—will find it easier to access formula, donated human milk, or "Biomilq" during a crisis. The same privilege will also make it easier for some to access the ingredients and time to safely prepare an emergency recipe. Additional research on this topic is desperately needed to further investigate and validate recipes that are accessible, available and acceptable to people and places around the world. As with all recommendations, it behooves naturopathic doctors to be mindful of the individual circumstances of families and ensure that they are able to compassionately and competently provide the support required to implement recommendations.

CONCLUSION

As naturopathic doctors, we educate, empower, and trust parents to care for and meet their infants' myriad needs. Ensuring safe and reliable nutrition should be no different. To optimize lifelong health, we have a responsibility to contribute to the collective efforts to support access to human milk, actively counter the harmful messaging of commercial formula companies, and provide non-judgemental support for families who find themselves choosing to use a commercial product. In the context of emergencies, such as food supply chain challenges, a thoughtfully designed and safely prepared homemade recipe may meet the needs of families struggling to find commercial products. The recipe analyzed here appears to be of greater nutritional value than the emergency formula suggested by the WHO, with comparable excesses of protein, phosphorus, calcium, and potassium. As a profession, we have a great responsibility to advocate for the decommodification of food in order to promote food security and sovereignty, ensuring that people of all ages, including infants, have access to the most appropriate food for their health.

AUTHOR AFFILIATIONS

[1]National University of Natural Medicine, Portland, OR, USA; [2]Independent Scholar, Steamboat Springs, CO, USA; [3]Canadian College of Naturopathic Medicine, Toronto, ON, Canada.

ACKNOWLEDGEMENTS

We are grateful to the contributions of Shivangi Maheshwari in the development of this manuscript.

CONFLICTS OF INTEREST DISCLOSURE

We have read and understood the *CAND Journal*'s policy on conflicts of interest and declare that we have none.

FUNDING

This research did not receive any funding.

REFERENCES

1. Pietrzak-Fiećko R, Kamelska-Sadowska AM. The comparison of nutritional value of human milk with other mammals' milk. *Nutrients*. 2020;12(5):1404. doi:10.3390/nu12051404
2. Bertmann F, Dunn CG, Racine EF, Fleischhacker S. The risk of homemade infant formulas: historical and contemporary considerations [published correction appears in *J Acad Nutr Diet*. 2022;122(8):1566]. *J Acad Nutr Diet*. 2022;122(4):697-708. doi:10.1016/j.jand.2021.03.007
3. Baker P, Russ K, Kang M, et al. Globalization, first-foods systems transformations and corporate power: a synthesis of literature and data on the market and political practices of the transnational baby food industry. *Global Health*. 2021;17(1):58. doi:10.1186/s12992-021-00708-1
4. World Health Organization. Scope and impact of digital marketing strategies for promoting breastmilk substitutes. April 28, 2022. Accessed March 3, 2023. https://www.who.int/publications-detail-redirect/9789240046085
5. Munblit D, Crawley H, Hyde R, Boyle RJ. Health and nutrition claims for infant formula are poorly substantiated and potentially harmful. *BMJ* 2020;369:m875 doi:10.1136/bmj.m875
6. World health Organization. International code of marketing of breast-milk substitutes. January 27, 1981. Accessed March 3, 2023. https://www.who.int/publications/i/item/9241541601
7. Gertosio C, Meazza C, Pagani S, Bozzola M. Breastfeeding and its gamut of benefits. *Minerva Pediatr*. 2016;68(3):201-212.
8. Binns C, Lee M, Low WY. The long-term public health benefits of breastfeeding. *Asia Pac J Public Health*. 2016;28(1):7-14. doi:10.1177/1010539515624964
9. Peletz R, Simuyandi M, Sarenje K, et al. Drinking water quality, feeding practices, and diarrhea among children under 2 years of HIV-positive mothers in peri-urban Zambia. *Am J Trop Med Hyg*. 2011;85(2):318-326. doi:10.4269/ajtmh.2011.11-0140
10. Joffe N, Webster F, Shenker N. Support for breastfeeding is an environmental imperative. *BMJ*. 2019;367:l5646. doi:10.1136/bmj.l564
11. Smith JP. A commentary on the carbon footprint of milk formula: harms to planetary health and policy implications. *Int Breastfeed J*. 2019;14:49. doi:10.1186/s13006-019-0243-8
12. Baker P, Santos T, Neves PA, et al. First-food systems transformations and the ultra-processing of infant and young child diets: The determinants, dynamics and consequences of the global rise in commercial milk formula consumption. *Matern Child Nutr*. 2021;17(2):e13097. doi:10.1111/mcn.13097
13. A baby-formula shortage feeds criticism of corporate heft and price gouging. *The Economist*. May 17, 2022. Accessed March 3, 2023. https://www.economist.com/finance-and-economics/2022/05/17/a-baby-formula-shortage-feeds-criticism-of-corporate-heft-and-price-gouging?gclid=Cj0KCQjwwJuVBhCAARIsAOPwGATo2nw4SHOyOSYWOEAYwGEjQ3sWDzZGxKaCcMD5MUMU-WW8N2aebv4aAgsNEALw_wcB&gclsrc=aw.ds

14. Bresnahan M, Zhu Y, Zhuang J, Yan X. "He wants a refund because I'm breast-feeding my baby": A thematic analysis of maternal stigma for breastfeeding in public. *Stigma and Health*. 2020;5(4):394-403. doi:10.1037/sah0000208

15. Brown A. Sociological and cultural influences upon breastfeeding. *The Global Health Network Collections*. July 1, 2018. Accessed March 3, 2023. https://tghncollections.pubpub.org/pub/9-sociological-and-cultural-influences-upon-breastfeeding/release/2?readingCollection=61d16144

16. Information for families during the formula shortage. Assistant Secretary for Public Affairs (ASPA). HHS.gov. July 11, 2022. Accessed March 8, 2023. https://www.hhs.gov/formula/index.html

17. Information for families on the limited supply of infant formula. Government of Canada. February 2, 2023. Accessed March 8, 2023. https://www.canada.ca/en/health-canada/services/infant-care/infant-formula/shortage.html

18. Abrams S. With the baby formula shortage, what should I do if I can't find any? *HealthyChildren.org*. June 28, 2022. Accessed March 8, 2023. https://www.healthychildren.org/English/tips-tools/ask-the-pediatrician/Pages/Are-there-shortages-of-infant-formula-due-to-COVID-19.aspx

19. Safety of Homemade Infant Formulas in Canada. *Canada.ca*. November 21, 2014. Accessed March 8, 2023. https://www.canada.ca/en/health-canada/services/canada-food-guide/resources/infant-feeding/safety-homemade-infant-formulas-canada.htm

20. FDA advises parents and caregivers to not make or feed homemade infant. Center for Food Safety and Applied Nutrition. U.S. Food and Drug Administration. February 24, 2021. Accessed March 8, 2023. https://www.fda.gov/food/alerts-advisories-safety-information/fda-advises-parents-and-caregivers-not-make-or-feed-homemade-infant-formula-infants

21. Davis SA, Knol LL, Crowe-White KM, Turner LW, McKinley E. Homemade infant formula recipes may contain harmful ingredients: a quantitative content analysis of blogs. *Public Health Nutr*. 2020;23(8):1334-1339. doi:10.1017/S136898001900421X

22. Vieira MA, Kube PK, van Helmond JL, et al. Recipe for disaster: homemade formula leading to severe complications in 2 infants. *Pediatrics*. 2021;148(3):e2021050947. doi:10.1542/peds.2021-050947

23. Jarrold K, Helfer B, Eskander M, et al. Guidance for the conduct and reporting of clinical trials of breast milk substitutes. *JAMA Pediatr*. 2020;174(9):874-881. doi:10.1001/jamapediatrics.2020.0578

24. Hawk M, Coulter RWS, Egan JE, et al. Harm reduction principles for health-care settings. *Harm Reduct J*. 2017;14(1):70. doi:10.1186/s12954-017-0196-4

25. Infant feeding in emergencies. World Health Organization. Published September 1997. Accessed March 8, 2023. https://apps.who.int/iris/bitstream/handle/10665/107984/E56303.pdf?sequence=1

26. FoodData Central. U.S. Department of Agriculture. Accessed March 8, 2023. https://fdc.nal.usda.gov/

27. Enfamil A+® infant formula. Enfamil A+ Canada. Published October 10, 2022. Accessed March 8, 2023. https://www.enfamil.ca/products/enfamil-a

28. Institute of Medicine (US) Committee on Nutritional Status During Pregnancy and Lactation. *Nutrition During Lactation*. Washington (DC): National Academies Press (US); 1991. 6, Milk Composition. Available from: https://www.ncbi.nlm.nih.gov/books/NBK235590/

29. Prentice P, Ong KK, Schoemaker MH, et al. Breast milk nutrient content and infancy growth. *Acta Paediatr*. 2016;105(6):641-647. doi:10.1111/apa.13362

30. Andreas NJ, Kampmann B, Mehring Le-Doare K. Human breast milk: a review on its composition and bioactivity. *Early Hum Dev*. 2015;91(11):629-635. doi:10.1016/j.earlhumdev.2015.08.013

31. Foroutan A, Guo AC, Vazquez-Fresno R, et al. Chemical composition of commercial cow's milk. *J Agric Food Chem*. 2019;67(17):4897-4914. doi:10.1021/acs.jafc.9b00204

32. National Academies of Sciences, Engineering, and Medicine; Health and Medicine Division; Food and Nutrition Board; Committee to Review the Dietary Reference Intakes for Sodium and Potassium; Oria M, Harrison M, Stallings VA, eds. *Dietary reference intakes for sodium and potassium*. Washington (DC): National Academies Press (US); 2019. Appendix J, Dietary Reference Intakes Summary Tables. Available from: https://www.ncbi.nlm.nih.gov/books/NBK545442/

33. Faizan U, Rouster AS. Nutrition and hydration requirements in children and adults. [Updated 2022 Aug 29]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK562207/

34. Lietman SA, Germain-Lee EL, Levine MA. Hypercalcemia in children and adolescents. *Curr Opin Pediatr*. 2010;22(4):508-515. doi:10.1097/MOP.0b013e32833b7c23

35. Chetta KE, Hair AB, Hawthorne KM, Abrams SA. Serum phosphorus levels in premature infants receiving a donor human milk derived fortifier. Nutrients. 2015;7(4):2562-2573. doi:10.3390/nu7042562

36. Lehnhardt A, Kemper MJ. Pathogenesis, diagnosis and management of hyperkalemia. *Pediatr Nephrol*. 2011;26(3):377-384. doi:10.1007/s00467-010-1699-3

37. Canada. Protecting, promoting and supporting breastfeeding: a practical workbook for community-based programs—2nd edition. Canada.ca. December 4, 2019. Accessed March 8, 2023. https://www.canada.ca/en/public-health/services/health-promotion/childhood-adolescence/publications/protecting-promoting-supporting-breastfeeding.html

38. Hall K, Gibbie T, Lubman DI. Motivational interviewing techniques—facilitating behaviour change in the general practice setting. *Aust Fam Physician*. 2012;41(9):660-667.

39. Lafnitzegger A, Gaviria-Agudelo C. Vaccine hesitancy in pediatrics. *Adv Pediatr*. 2022;69(1):163-176. doi:10.1016/j.yapd.2022.03.011

40. Fischer M. Biomilq and the new science of artificial breast milk. *The New Yorker*. March 6, 2023. Accessed April 14, 2023. https://www.newyorker.com/magazine/2023/03/13/biomilq-artificial-breast-milk

Effect of Yoga and Naturopathy Treatments on Psychological Burden in Obesity: A Single Case Report

Deenadayalan Boopalan,[1] MD, **Venugopal Vijayakumar,**[2] PhD, **Poornima Ravi,**[3] BNYS, **Yogapriya Chidambaram,**[1] BNYS **Akila Anandhan,**[4] MD, and **Maheshkumar Kuppusamy,**[5] PhD

ABSTRACT

Obesity is defined as abnormal or excessive fat accumulation in the body and is a major risk factor for various non-communicable diseases (NCDs), such as diabetes mellitus, cardiovascular diseases, hypertension, and hyperlipidemia. According to the World Health Organization, more than 1 billion people worldwide are obese—650 million adults, 340 million adolescents, and 39 million children. The often ignored component of obesity is the psychological burden associated with the condition impacting multiple aspects such as low self-esteem, depression, and anxiety. This case report shows the effect of an integrated yoga and naturopathy-based lifestyle in a patient with morbid obesity, with special reference to his psychological status. A 19-year-old male college student diagnosed with obesity underwent integrated yoga and naturopathy management for a period of 20 days. Outcome measures such as anthropometric measurements, positive and negative affects scale (PANAS), depression, anxiety, and stress scale (DASS), and day-to-day activity scale were taken before and after the 20-day intervention period. Results showed improvements in negative affect, depression, and anxiety levels, along with a reduction in body weight. Further studies with adequate sample sizes and experimental study designs are required to validate our findings.

Key Words Depression, anxiety, stress, integrated approach

INTRODUCTION

Obesity is a multifactorial disease, caused by genetic, biological, psychological, cultural, and social factors in addition to many other determinants of health. Lifestyle, family history, and psychological factors play an intertwining role in the pathogenesis of obesity. Globally, there has been a significant increase in the prevalence of obesity in the past 50 years.[1] In general, body mass index [BMI (kg/m^2)] greater or equal to 30 kg/m^2 is considered obesity. Several studies showed that 20% to 60% of persons with obesity, and extreme obesity in particular, suffer from psychological illness.[2] The prevalence of obesity continues to rise, severely impacting physical and mental well-being. Current evidence shows that obesity is associated with serious mental disorders, particularly anxiety and depression.[3] In spite of remarkable advancements in the pharmacological management of various disease conditions, lifestyle modification still remains a cornerstone in the management of obesity. Yoga and naturopathy are an alternative system of medicine popularized in India that emphasizes salutogenesis,[4] which is the intentional focus on health promotion and adopting healthy lifestyle behaviours rather than solely focusing on disease management.[5] Naturopathy uses all the five elements of Nature to treat various diseases and also to promote health and well-being. Hydrotherapy, mud therapy, heliotherapy, fasting, and diet therapy are various modalities of treatment in naturopathy. Yoga includes the practice of asana, pranayama, mudra, bandha and meditation for therapeutic purpose.[5] In this case report, we aimed to examine the effect of yoga and naturopathy-based lifestyle interventions on physical and psychological well-being in a patient with obesity.

CASE DESCRIPTION

A 19-year-old male college student, diagnosed with morbid obesity (BMI 45 kg/m^2) since 2020, visited our hospital for holistic yoga and naturopathy treatment for weight reduction and mental well-being in February 2022. A general physical examination revealed no pallor, icterus, cyanosis, or edema. A systemic examination showed normal functioning of all the systems, and no abnormalities were detected. He did not present with any metabolic disorders (diabetes, thyroid dysfunction) other than obesity. On naturopathy diagnosis, he had mixed encumbrance, and iris diagnosis revealed open and closed lesion in regions in zones 4, 6, and 7 in both eyes. According to yogic *tridosha* theory, *vata* is dominant. He also admitted that he often felt disinterested in carrying out day-to-day activities, was upset about his physical

Correspondence to: Dr. Maheshkumar Kuppusamy, BNYS, MSc, Ph.D., Department of Physiology, Govt. Yoga & Naturopathy Medical College & Hospital, Chennai- 600106, Tamil Nadu, India. **E-mail:** doctor.mahesh1985@gmail.com

To cite: Boopalan D, Vijayakumar V, Ravi P, Chidambaram Y, Anandhan A, Kuppusamy M. Effect of yoga and naturopathy treatments on psychological burden in obesity: a single case report. *CAND Journal*. 2023;30(2):20-22. https:/doi.org/10.54434/candj.122

Received: 10 July 2022; **Accepted:** 15 May 2023; **Published:** 29 June 2023

appearance and felt guilty for not caring for his health properly. At the onset of his treatment, body weight was 131.5 kilograms, height 1.71 meters with a BMI of 45 kg/m^2. After explaining the intervention procedures, written informed consent was obtained.

Therapeutic Intervention

The intervention involved yoga practices (including surya namaskar, *nadi shodhana*, and *bhramari* pranayama) and naturopathy (natural raw diet [Table 1], massage therapy, cold hip bath).

Yoga

Surya namaskar, or sun salutation, is a component of Hatha yoga consisting of 12 postures (asanas), performed rhythmically, involving major components of the spine, joints, and muscles of the body.[6] *Nadi shodhana*, or alternate nostril breathing, is a slow, rhythmic, alternate nostril breathing technique, consisting of inhaling through one nostril, exhaling through the other nostril and repeating the procedure through the other nostril.[7] *Bhramari* pranayama, or humming bee breathing, is done by closing the ears using the index fingers, and after a full inhalation exhaling, making a soft humming sound.[8]

Natural Diet

The natural raw uncooked diet included raw fruit salad, raw vegetable salad, sprouts, fruit and vegetable juices [656 kcal to 858 kcal] (Table 1).

Cold Hip Bath

A cold hip bath was taken once a day (20 minutes) for 20 days. The hip bathtub was filled with cold water at 10–18°C, enough to cover the hips and reaching up to the umbilical region of the bather.[9]

Massage Therapy

Massage therapy included manipulation of tissue in the body for therapeutic purposes. Partial massage was given to the abdomen on alternate days for the period of 20 days.

TABLE 1 Naturopathy diet menu

Time	Natural Diet (Raw/Uncooked)
6:30 am	200 ml of vegetable or green juice (bottle gourd, ash gourd, plantain pith)
9:30 am	Sprouts – 25 g (green gram, ground nut, pearl millets); vegetable salad – 200 g (carrot, beet root, cucumber, chow chow, yellow pumpkin); fruit salad – 200 g (guava, muskmelon, watermelon, orange, pineapple, papaya, grapes)
12:00 pm	Greens and fruit juices – 200 ml (curry leaves, mint, lemon, coriander, grapes, watermelon, muskmelon)
2:00 pm	Sprouts – 50 g (green gram, ground nut); fruit salad – 200 g (guava, muskmelon, watermelon, orange, pineapple, papaya, grapes)
4:30 pm	Greens and fruit juices – 200 ml (curry leaves, mint, lemon, coriander, grapes, watermelon, muskmelon)
7:00 pm	vegetable salad – 200 g (carrot, beet root, cucumber, chow chow, yellow pumpkin); fruit salad – 200 g (guava, muskmelon, watermelon, orange, pineapple, papaya, grapes)

Outcome Measures

Psychological well-being outcome measures, such as positive affects, negative affects scale (PANAS),[10] were used. The Negative Affect portion of the PANAS evaluates 10 emotions (guilty, hostile, ashamed, afraid, irritable, scared, nervous, upset, distressed, jittery) using a Likert scale ranging from 1 (very slightly or not at all) to 5 (extremely). The depression, anxiety, and stress scale (DASS),[11] day-to-day activity scale, and anthropometric measures were used for assessment before and after the 20-day intervention.

RESULTS AND DISCUSSION

After the 20 days of integrated yoga and naturopathy treatments, a reduction in body weight from 131.5 kg to 124 kg, with a corresponding reduction in BMI from 45 kg/m^2 to 42.2 kg/m^2, in negative affects from 44 to 5, and in depression score from 23 to 11, were observed (Table 2). However, stress level and positive effects were unfavorable because the patient was preparing for exams during the intervention period. It was hard for him to adapt to the natural raw diet initially since he loved eating non-vegetarian food and rarely consumed fruits and vegetables. Moreover, the patient himself admitted that he was gaining interest in building his career and was very proud of the physical transformation he achieved during the 20 days. He also gained confidence in facing society and fellow beings.

Yoga is a safe and cost-effective modality to reduce depression and anxiety and improve quality of life. A cold hip bath capable of inducing shivering has been shown to encourage the production of irisin, an adipokine that facilitates white adipose tissue mimicking functions similar to brown adipose tissue and enhances metabolism.[12] Naturopathy and yoga have been found to be effective in reducing inflammation, anxiety, and depression.[13] A restricted calorie diet has been shown to reduce obesity-induced

TABLE 2 Baseline and post-test assessment of the patient

Parameters		Baseline (Day 1)	Post (Day 21)
Height (centimeters)		171	171
Weight (kilograms)		131.5	124
Body mass index (kg/m^2)		45	42.4
Waist hip ratio		1.02	0.9
Mid-arm circumference	Right (cm)	42	42
	Left (cm)	45	45
Mid-thigh circumference	Right (cm)	78	77
	Left (cm)	76	76
Positive affect		28	26
Negative affect		44	5
Depression		23	11
Anxiety		18	8
Stress		19	21
Day-to-day activity scale		62	52

anxiety among college students.[14] Calorie restriction also leads to activation of silent information regulator 1 (SIRT1), which controls the key aspects of lipid and glucose metabolism through interaction with transcription factors.[15] SIRT1 regulates many endocrine functions, preventing cells from oxidative stress damage, and promotes DNA stability as well as decreasing various disorders, such as cancer, neurodegenerative disorders, and metabolic abnormalities.[16] Obesity and its psychological burdens are related to circadian rhythms, which control energy homeostasis by controlling glucose and lipid rhythms in animals and humans,[17] as a misalignment of circadian rhythms has been reported in obesity.[18] Integrated yoga and naturopathy treatment are documented as regulating circadian rhythms, known as the biological clock, located in the hypothalamic suprachiasmatic nucleus, functioning as a metabolic, endocrine, and sleep regulator.[19] A previous pilot study on naturopathy treatment focused only on naturopathy showed significant changes in anthropometric measures (BMI, weight, waist circumference).[20] The current case study is unique in documenting a reduction in body weight, along with a reduction in depression and anxiety, in a patient with obesity through yoga and naturopathy.

CONCLUSION

Yoga and naturopathy treatments may be effective in a more holistic approach to the management of obesity and a reduction in the psychological burden associated with obesity. However, further studies with a larger sample size and high-quality study design are required to confirm the findings described here.

AUTHOR AFFILIATIONS

[1]Department of Naturopathy, Government Yoga and Naturopathy Medical College and Hospital, The Tamil Nadu Dr. M.G.R. Medical University, Chennai, India; [2]Department of Yoga, Government Yoga and Naturopathy Medical College and Hospital, The Tamil Nadu Dr. M.G.R. Medical University, Chennai, India; [3]Government Yoga and Naturopathy Medical College and Hospital, The Tamil Nadu Dr. M.G.R. Medical University, Chennai, India; [4]Department of Acupuncture and Energy Medicine, Government Yoga and Naturopathy Medical College and Hospital, The Tamil Nadu Dr. M.G.R. Medical University, Chennai, India; [5]Department of Physiology, Government Yoga and Naturopathy Medical College and Hospital, The Tamil Nadu Dr. M.G.R. Medical University, Chennai, India.

CONFLICTS OF INTEREST DISCLOSURE

We have read and understood the *CAND* Journal's policy on conflicts of interest and declare that we have none.

FUNDING

This research did not receive any funding.

REFERENCES

1. Bray GA, Kim KK, Wilding JPH, World Obesity F. Obesity: a chronic relapsing progressive disease process. A position statement of the World Obesity Federation. *Obes Rev.* 2017;18(7):715-23.
2. Kalarchian MA, Marcus MD, Levine MD, et al. Psychiatric disorders among bariatric surgery candidates: relationship to obesity and functional health status. *Am J Psychiatry.* 2007;164(2):328-34.
3. Iacovides A, Siamouli M. Comorbid mental and somatic disorders: an epidemiological perspective. *Curr Opin Psychiatry.* 2008;21(4):417-21.
4. Salwa H, Nair PMK. Raising burden of non-communicable diseases: importance of integrating yoga and naturopathy at primary care level. *J Complem Integr Med.* 2021;18(2):271-8.
5. Maheshkumar K, Venugopal V, Poonguzhali S, Mangaiarkarasi N, Venkateswaran S, Manavalan N. Trends in the use of yoga and naturopathy based lifestyle clinics for the management of non-communicable diseases (NCDs) in Tamilnadu, South India. *Clin Epidemiol Global Health.* 2020;8(2):647-51.
6. Bandyopadhyay A, Halder K, Pathak A, Kumar B, Saha M. Surya namaskar: as an alternative for aerobic fitness. *Int J Yoga.* 2022;15(2):163.
7. Sharma VK, Trakroo M, Subramaniam V, Rajajeyakumar M, Bhavanani AB, Sahai A. Effect of fast and slow pranayama on perceived stress and cardiovascular parameters in young health-care students. *Int J Yoga.* 2013;6(2):104.
8. Maheshkumar K, Dilara K, Ravishankar P, et al. Effect of six months pranayama training on stress-induced salivary cortisol response among adolescents—randomized controlled study. *Explore.* 2022;18(4):463-6.
9. Mooventhan A, Chaudhari S, Venugopal V. Effect of cold hip bath on blood glucose levels in patients with type 2 diabetes mellitus: a pilot study. *Diabetes Metab.* 2019;46(5):411-2.
10. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J Pers Soc Psychol.* 1988;54(6):1063.
11. Oei TPS, Sawang S, Goh YW, Mukhtar F. Using the depression anxiety stress scale 21 (DASS-21) across cultures. *Int J Psychol.* 2013;48(6):1018-29.
12. Lee P, Linderman JD, Smith S, et al. Irisin and FGF21 are cold-induced endocrine activators of brown fat function in humans. *Cell Metab.* 2014;19(2):302-9.
13. Jerrin RJ, Theebika S, Panneerselvam P, Manavalan N, Maheshkumar K. Yoga and naturopathy intervention for reducing anxiety and depression of Covid-19 patients—a pilot study. *Clin Epidemiol Global Health.* 2021;11:100800.
14. Wang J, Ran X, Ye J, et al. Obesity-associated anxiety is prevalent among college students and alleviated by calorie restriction. *Nutrients.* 2022;14(17): 3518.
15. Schug TT, Li X. Sirtuin 1 in lipid metabolism and obesity. *Ann Med.* 2011;43(3):198-211.
16. Elibol B, Kilic U. High levels of SIRT1 expression as a protective mechanism against disease-related conditions. *Front Endocrinol (Lausanne).* 2018;9: 614.
17. Li Y, Ma J, Yao K, et al. Circadian rhythms and obesity: timekeeping governs lipid metabolism. *J Pineal Res.* 2020;69(3):e12682.
18. Noh J. The effect of circadian and sleep disruptions on obesity risk. *J Obesity Metabol Syndr.* 2018;27(2):78.
19. Farhud D, Aryan Z. Circadian Rhythm, Lifestyle and Health: A Narrative Review. Iran J Public Health. 2018 Aug;47(8):1068-1076.
20. Kinjal N, Kumar N, Kumar M. A Pilot Study on Impact of Naturopathic Treatment Protocol on Abdominal Obesity Patients. *IOSR J Dent Med Sci.* 2016;15(12):35-8.