

Nature as Medicine and Classroom: Evaluating an Innovative, Outdoor Course for Medical and Dental Students

Global Advances in Integrative Medicine and Health

Volume 13: 1–14

© The Author(s) 2024

Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/27536130241246788

journals.sagepub.com/home/gam



Sierra M. Trudel, PhD, NCSP, LPC¹ , Emily L. Winter, PhD, NCSP² , and Mary P. Guerrero, MD¹

Abstract

Background: There is a growing, global awareness and recognition of the important, interdependent relationships between our natural world and human health. Several contemporary health organizations have placed calls to action and emphasize an urgent need for collaboration and interdisciplinary research, education, and clinical work to address the increasing degradation of our planetary and human health. With more research dedicated to nature's health impacts, health professions schools would benefit by including such training in their programs while also cultivating a comprehensive mind-body health perspective to support both the health of student practitioners and their future patients.

Objective: The present program evaluation investigates a five-day outdoor mini-course covering nature-based health techniques at a medical and dental school in the American Northeast. This unique outdoor course combines nature, creativity, and reflection within the context of modern medicine.

Methods: A concurrent mixed-method design using descriptive statistics, quantitative and qualitative data from students' anonymous final course evaluations and final reflection projects are evaluated.

Results: Data suggests that students benefitted from their experience during this five-day course. Students provided feedback reinforcing the enjoyment and transformative outcomes gleaned from the course experiences. Students entered the course describing feeling stressed, overwhelmed, and overextended, not uncommon for learners in medical and dental school, and completed the course describing the acquisition of applicable skills, increased attention and mindfulness, creativity, and connection to the natural world.

Conclusions: Students described a positive experience of the course. Several areas of personal and professional development were also described, such as improvements within cognitive domains, enhanced connection with nature, others, and themselves, increased mindfulness, and overall improved well-being. Findings have implications for medical and dental programs on how such innovative training may lean into the work of nature-based care to provide for the whole person.

Keywords

mind-body health, medical education, nature, medical students, dental students, burnout, mindfulness, nature therapy, art expression

Received June 8, 2023; Revised February 14, 2024. Accepted for publication March 25, 2024

Around the world, people are spending most of their lives indoors,¹ with individuals living up to 93% of their lives inside.² The dramatic rise in urban living globally (approximately 55% of the population)³ indicates that more people

¹University of Connecticut School of Medicine, Farmington, CT, USA

²Touro University, New York City, NY, USA

Corresponding Author:

Sierra M. Trudel, University of Connecticut School of Medicine, 263 Farmington Ave, MC-2918, Farmington, CT 06030 1912, USA. Email: sierra.trudel@uconn.edu



Creative Commons Non Commercial CC BY-NC: This article is distributed under the terms of the Creative Commons Attribution-NonCommercial 4.0 License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits non-commercial use, reproduction and distribution of the work without further permission provided the original work is attributed as specified on the SAGE

and Open Access pages (<https://us.sagepub.com/en-us/nam/open-access-at-sage>).

are working longer hours away from natural environments (e.g., green open-spaced nature areas and blue water-body spaces) with increased workloads and career-related stress.⁴ Being divorced from the outdoors can lead to a plethora of problems, including poor sleep,⁵ increased mental distress,⁶ and higher exposure to airborne pollutants.² Lack of consistent access to nature may ultimately lead to significant declines in the mental and physical health of the general population. Compounding these conditions is the overuse of technology⁷ (e.g., technology use at bedtime impacting sleep) which has been further impacted by the COVID-19 pandemic leading to increased internet addiction⁸ and video game consumption over in-vivo play.⁹ All of this is exacerbated by social media's negative effects on society and healthy development,¹⁰ quickly becoming a recipe for a human health and well-being disaster. Inevitably these individuals will find themselves seeking medical support.

Although our fast-paced and technology-infused modern life makes getting outside and into nature challenging, the population's current trajectory of increased time indoors can be mitigated. There is a growing, global awareness and recognition of the important, interdependent relationships between our natural world and human health.^{11,12} In a recent review of the effects of nature exposure on health, Jimenez and colleagues¹³ found both protective functions (e.g., mental health, cognitive functioning) and positive outcomes (e.g., improved brain activity and sleep, decreased stress, improved blood pressure and heart rate, decreased anxiety and increased positive affect) associated with nature exposure. As such, several contemporary health organizations have placed urgent calls to action for collaboration and interdisciplinary research, education, and clinical work to address the increasing degradation of our planetary and human health. Such organizations include the Centers for Disease Control and Prevention's *One Health* initiative¹⁴ calling for, "... a collaborative, multisectoral, and transdisciplinary approach - working at the local, regional, national, and global levels - with the goal of achieving optimal health outcomes recognizing the interconnection between people, animals, plants, and their shared environment,"¹⁵ and *Clinicians for Planetary Health*, a group seeking "...to mobilize clinicians and clinicians' groups around the world, recognizing their importance in protecting our health, their authority as trusted sources of information spanning political and cultural divides, and their reach across geographical contexts, languages, and practice settings."³⁸

The inclusion of integrative medicine principles and practices in health professions training and clinical care continues to emerge and reaffirms "...the importance of the relationship between practitioner and patient, focuses on the whole person, is informed by evidence, and makes use of all appropriate therapeutic and lifestyle approaches, healthcare professionals and disciplines to achieve optimal health and healing".¹⁷ Although the inclusion of nature in this movement is nascent, research is emerging.¹⁶ Various institutions across

the country have received funding to examine this novel and important topic: the National Cancer Institute (2016, 2019), the National Heart, Lung, and Blood Institute (2019), and the National Institute for Environmental Sciences (2018, 2019).¹⁶ As more funding is dedicated to studying nature and health, schools have an opportunity to include these findings into their curriculum, educating the next generation of health professionals in ways that address pressing public health needs, as well as student well-being.

The benefits of being outside and in nature are innumerable. From increased attention,¹⁸ enhanced cognitive development,¹⁹ reduced stress,²⁰ and overall improvement to personal well-being.²¹ Positive effects from interacting with nature can be experienced in approximately 120 minutes per week²² or as little as five minutes a day exercising in a green space,²³ indicating a simple and cost-effective public health prescription.²⁴ A growing body of research on the health benefits of nature exposure on human well-being is emerging, most notably via practices such as 'Forest Bathing'^{1,25,26} and other forms of 'Rewilding'.²⁷ In addition, with the advent of the COVID-19 pandemic in 2020, many people re-discovered the benefits of being outdoors and the mitigating effects that nature connection has on stress and isolation.

Overwhelmingly, current research suggests that medical professionals face high levels of burnout, a trend that includes those currently in training.²⁸⁻³⁰ Further, recent findings suggest that this high level of burnout may impact the delivery of care, and thus erode patients' quality of their care.²⁸ In 2019, the National Academies of Sciences, Engineering, and Medicine, the National Academy of Medicine, and the Committee on Systems Approaches to Improve Patient Care by Supporting Clinician Well-Being, released a comprehensive report targeting how medical systems can tackle clinician burnout, including an entire chapter dedicated to supporting the well-being of medical student trainees. Additional research focusing on the medical student experience discusses the importance of their learning environment in medical school and how positive environments and learning experiences have translated to lower levels of burnout, higher levels of empathy, and less career regret throughout their medical school tenure.²⁹ Given these findings, especially those focused on creating high-quality, positive school ecosystems, medical schools would be wise to take a vested interest in novel approaches that cultivate their student's well-being. In doing so, the medical profession would foster a culture of lifelong health and resilience for those committing to a career in medicine, ultimately retaining clinicians and the quality of patient care provided.^{29,30}

Considering the confluence of these events, one of the authors (*initials removed for review process*) was inspired to create a new, innovative course, making a pivot to the outdoors as a living laboratory and classroom for learners to directly experience the effects of nature on human health. The course also afforded a way to address the ever-growing issues of burnout amongst medical students²⁸⁻³⁰ and to introduce

various practices of mindful nature immersion as a source of resilience and refuge.

Evaluation Purpose

A foundational component of the first stage of the medical and dental training for the University included in the present evaluation is a team-based learning experience focused on current healthcare practice. During five, 10-week blocks first- and second-year medical and dental students participate in a cohort model, learning together in several different courses. Each 10-week block is followed by a 2-week integrated assessment period called the Learning Enhancement and Assessment Period (LEAP). During LEAP, students take an exam and are either required to engage in course content remediation of the previous block's curriculum or if they pass, participate in an Individualized Learning Opportunity (ILO). ILOs are five-day specialized mini-courses designed to personalize the learning experience. Most students participate in one of the specialized ILOs. ILOs provide the opportunity for students to immerse themselves into unique topics designed by faculty to promote an in-depth exploration of specific curricular content while supporting skill building and considerations for career exploration.

The purpose of this study is to conduct a program evaluation of a new ILO *Nature as Medicine: Exploring the Health & Healing Benefits of Rewilding* (herein referred to as *Nature as Medicine*) to better understand medical and dental students' experiences of the multidimensional aspects of the course, and to share our findings with other educators seeking to develop such programs. *Nature as Medicine* is an innovative ILO created and launched in 2020 that focuses on the integration of nature and health benefits by offering learners a direct, outdoor experiential approach to nature as a healing force – a nontraditional offering for medical school training. The course foundation is based on learning and practicing *Rewilding* skills, namely *Forest Bathing*, as inspired by the Japanese tradition of *Shinrin-Yoku*. The course also includes an Expressive Art Workshop as a way to explore creativity and to provide students with an example of a therapeutic process where mediums such as drawing, painting, collage, clay work, dance, movement, sound, music, and writing, as well as visualization and body awareness techniques, can be engaged to express emotions. Expressive Art is known to alleviate stress by activating the relaxation response, in turn supporting the immune system functioning.³¹

Nature as Medicine provides experiential learning for students in which the following course objectives are covered:

1. Directly experience and learn practices for Rewilding, especially Forest Bathing;
2. Understand the physical and mental benefits that connecting with nature has on human health and healing;

3. Enhance observational skills, which are fundamental to the practice of medicine and dentistry;
4. Learn mindful movement practices known to decrease stress and burnout (e.g., qigong, mindful walking, labyrinth walk);
5. Deepen their appreciation of the natural world;
6. Experience “Expressive Art” as a modality of connecting to and enhancing one’s creativity and intuition;
7. Share their class experiences with course participants.

Together, these direct experiences promote the connection between nature and potential improvements in human health, which may be beneficial to the needs of future patients as well as supporting the health professional student’s well-being. Results from this study may inform other medical and dental school programs, as well as have the potential to be piloted in other health professions schools. Our curricular evaluation answers the following questions:

- What do students identify as the strengths and areas for improvement of the course?
- What aspects of the course did students identify as providing the greatest benefit?
- What outcomes did students describe as a result of the course?
- To what extent does the Nature as Medicine ILO demonstrate the importance of integrative care with a specific focus on the healing impacts of nature?

Method

Evaluation Approach and Design

The current curricular evaluation utilized a concurrent mixed-method design to understand medical and dental student perspectives of the *Nature as Medicine* ILO to examine the course process and effectiveness. Quantitative and qualitative data were collected at the conclusion of the course (offered in the fall/November and spring/June) from five cohorts of students from November 2020 to November 2022. Quantitative data from standard, anonymous ILO course evaluation surveys were collected and analyzed to examine how students rate to what extent the course accomplished stated goals and objectives, suitability of course content, and educational benefits. Qualitative data from course evaluation surveys and final reflection projects were collected and analyzed to identify themes regarding notable course experiences, personal and professional impact, and course feedback on strengths as well as areas for improvement. Of note, the authors who performed the curricular evaluation (XX, XX – blinded for review) were not involved with course development or instruction. This study was approved by the University of Connecticut Health Center Institutional Review Board.

Procedures

Upon completion of LEAP, medical and dental students who did not require curricular remediation participated in a five-day ILO. Approximately one week prior to the exam, students selected and ranked their ILO choices, and via a matching process were enrolled in an ILO course. If a student did not select an ILO, they were automatically assigned one. For the *Nature as Medicine ILO*, class size was set to a maximum of 12 students for the first and second cohorts, then increased to 14 thereafter based on students' feedback. Students received a syllabus with the course description, objectives, readings and resources, outline of activities, anticipated weekly schedule, assignments, and assessment guidelines. The class met daily in the morning for approximately 3-hours with the exception of the Expressive Art Workshop day where the class met in the morning for approximately two hours and in the afternoon for three hours. All classes were described as experiential and outdoors, with the exception of the Expressive Art Workshop which was conducted indoors. Students were provided recommendations and a checklist for dressing appropriately in the outdoors (e.g., wearing a jacket, sturdy shoes/boots, hat) and were recommended to bring a light day pack to carry items. Walks in nature were on dirt or paved trails. The landscapes explored during the course were local and a short driving distance from the University with access to free parking. Examples of landscapes and walks in nature included a local nature preserve, community walking paths, a labyrinth at a community mindfulness center, and a local museum with hiking trails and outdoor gardens. See [Appendix A](#) for supplemental course materials. Upon completion of the course, an optional course evaluation survey was electronically disseminated by the ILO administration staff and completed by 100% of the students in our study. The course evaluation survey was released on the last day of the course and students had up to two weeks to complete the survey. Each student's 'final course reflection project' was due and emailed to the course instructor on the last day of the course. Final course reflection projects were also presented in person during the final class day. A detailed outline of the class process, aligned with the course objectives follows:

Day One: Students meet at a local reservoir that has ample, free parking, with easily accessible woodland trails.

9am – 12pm

- **Arrival:** When the students arrive, the checklist of items is reviewed (see [Appendix A](#)) to ensure everyone is dressed appropriately for the weather conditions (the course instructor brings extra items to have on hand if needed). They are invited to turn off or leave in their car, any phones or digital devices to experience being 'unplugged' and to minimize distractions. In this first class, each student is given a journal to use for reflections and sketching (Objective #3,4,5), as well as copies of key articles to read (Objective #2). The class

then embarks on a short 5-10-minute walk in silence through a woodland trail to begin the process of immersing into the forest atmosphere with the aim of opening senses and bringing attention to the present moment (Objective #1,2,5). At the end of this walk, the class pauses to reflect on the experience and then proceeds to another location that is further into the woods. On the way, talking is welcome, as the students usually like to chat with each other. Alternating from silence to talking is intentionally woven into the span of the 3-hour class time, as it allows a juxtaposition in the change of focus from engaged dialogue vs attention to one's environment (Objective #3,7).

- **Welcome, course review, and guidelines:** The course instructor chooses an open, naturally beautiful spot to form a circle and provides a brief introduction with the use of a "talking stick" picked up from the area, sharing how many indigenous peoples used a talking stick/ piece for a speaker to hold when in a group, to enhance attention and focus. After formally welcoming the class, the talking stick is passed around the circle and each student is invited to share their name and why they were interested in/signed up for this course. Class guidelines for small group interactions, such as confidentiality, agreeing to disagree, speaking in the first person, and practicing generous listening skills with each other are discussed (e.g., it is ok to speak up when the class is in silence). Additionally, safety protocols are reviewed, and students are informed that the instructor carries a first aid kit. Before moving to the next activity, the instructor reads the Mary Oliver poem, "Invitation." (Objective #6).
- **Introduction to Mindful Walking:** The students are invited to begin the practice of mindful walking by focusing their attention on the physical act of moving; the sense of their feet on the ground, what the ground may feel like, the motions of their legs, arms, and their breath (Objective #1,3,4). The class proceeds along a woodland path next to a stream; the course instructor has found water, especially flowing and gurgling, enhances the overall sensory experience. After this 10-15-minute experience, we gather and pass a 'talking stick' to share what the experience was like (Objective #7).
- **Qigong and gentle movement in nature:** In an open area of the woodlands, the class spreads out and is invited to try qigong. During warm-up movements, the instructor shares general information about qigong, and then the class is led through a "Five Element" form, with each movement associated with an element: water, wood, air, earth, and metal. After a few rounds, breathwork is added and associated with the motions (Objective #4). After this experience, the 'talking stick' is passed around and students are invited to share what the experience was like for them (Objective #7).

- **Shinrin-Yoku (Forest Bathing):** Further along in class, the instructor brings the students to a part of the forest that is older and more densely wooded with great white pines. Here the practice of Forest Bathing is introduced. The class then practices Forest Bathing by walking slowly through the forest atmosphere, opening all their senses (e.g., hearing the forest sounds, feeling the flow and temperature of the air, smelling the scents of the woods, seeing the various plants and animals; Objective #1,3,4,5).
- **Sit-spot:** After practicing Forest Bathing, students are invited to ‘wander’ about the areas they have been walking to find a spot to sit quietly for 15-20 minutes, which will be their *sit-spot*. A sit-spot is an outdoor space where the students sit still and quietly to observe the natural setting. They may sit on the ground, a rock, a fallen tree, or a stump, and may sit on a plastic bag or towel if the area is damp. The students are invited to sit quietly with as little movement as possible and to observe their surrounding environment with all their senses; to *be present* in their spot, and in the moment as best as possible (Objective #1,3,5). Of note, if a student is unable to sit comfortably, they are invited to stand, or if they develop a cramp, etc. during the timeframe, may get up and walk if need be. If judgments or busy thoughts arise, students are prompted to gently and non-judgmentally bring their attention back to the present moment. The instructor keeps time and calls the students back together using an owl whistle, which works well as a natural-sounding device. The class then sits in a circle on the ground and is invited to write some reflections or sketches in their journals (Objective #6). While they are reflecting for 10-15 minutes, they are served organic hot, herbal tea with local honey (the instructor brings a large thermos and compostable cups) in the tradition of ‘trail tea.’ Students are then invited to pair and share their experience with a peer, and after 10-15 minutes we share as a large group using the talking stick, inviting any reflections or observations on the overall class experience (Objective #7).
- **Closing:** The instructor reviews the plans for the next day’s class, addresses any questions, and closes the class. Students are invited to share their reflections on activities and observations. Students then walk back to their cars.

Day Two: The class meets at a different outdoor location and follows a similar format to practice skills.

9am – 12pm

- **Check-in:** The class meets at the determined outdoor location. A check-in is offered at the beginning of each class and is done in a circle by passing the talking stick to each student and inviting them to share any thoughts, reflections on the prior day’s class, how they are doing/feeling, or anything else they would like to share in group (Objective

#7). A nature-related poem is usually read at a given point during the class (Objective #6).

- **Practice of rewilding skills:** Students are introduced to and practice rewilding skills in action: Breathe, Relax, Feel, Watch, Allow (BRFWA).²⁷ This technique is used to teach students how to be present in the moment (Objective #1,2).
- **Shinrin-Yoku (Forest Bathing):** Described above. On Day 2, students are introduced to phytoncides (Objective #1,2). The instructor picks up a fallen pine bough and breaks open the stem to release the fresh pine scent and demonstrates inhaling the scent of the pine terpene, passing the bough for the students to try, and sharing with the class how such ‘phytoncides’ have been shown to enhance our immune system.
- **Mindful walking:** Different trails are explored, and students practice the skills described above. On Day 2, students are introduced to noticing animal tracks.
- **Qigong:** Described above.
- **Sit-spot:** Described above.
- **Closing:** Described above.

Day Three: Students Meet at a Local Museum with Natural Grounds and Hiking Trails.

9am – 10:30am

- **Check-in:** Described above.
- The class explores the museum grounds which include a sheep flock/pasture, woodland trails (often noting bear scat), and the more built environment of a maintained sunken garden. Depending on the season (Fall or Spring), different flowers and vegetation are present. There is also a pollinator garden, and many times the local Master Gardeners who maintain the plot are present when the class visits and give impromptu lessons on pollinators to interested students. During these activities, students continue the practice of rewilding skills (Objective #3,5).
- **Closing:** Described above.

Note Afternoon class Also

1:30pm – 4:30pm

- **Expressive Art Workshop:** This workshop is led by an expressive art facilitator with a BFA. The Expressive Art workshop is included in the *Nature as Medicine* ILO to offer students an experience of connecting to and enhancing their creativity and intuition (Objective #6). The session provides students a way of expressing their experiences of connecting with nature in a non-verbal medium. The three-hour Expressive Art session is held indoors, as holding the workshop outdoors was logistically too complex due to materials, workspace, and weather. We intentionally select a spacious room with large windows for natural lighting and views of

trees. Students create two pieces on large paper; one using oil pastels, and another with any art supplies provided (e.g., oil pastels, watercolors, acrylic paint, colored/decorative paper, scissors, glue sticks). After viewing all the pieces created, students form a circle and share reflections on the session. Students are provided a 3-page *Expressive Art for Transformation & Wellness* summary at the end of class. Students are encouraged to take their creations home to view them again over the next few days (Objective #6).

Day Four: Students meet at a local mindfulness center which hosts public walking trails and a labyrinth.

9am – 12pm

- **Check-in:** Described above.
- Students continue to practice rewilding skills through forest bathing, sit-spot, and mindful walking as practiced by having the experience of walking a large labyrinth.
- **Closing:** Described above.

Day Five: Students Meet at the same Location as the first or third day of class as it Offers easy, Quick Access to Woodland Trails.

9am – 12pm

- **Check-in:** Described above.
- **Brief rewilding practice:** This is intended to be a short 5-10 minute “mini” woodland walk and forest bathing experience to show how a shorter time frame can be utilized for this practice (Objective #1,2,5).
- **Group share of final course projects and reflections:** On the last day, students share their final projects and the process of creating their project (Objective #3,6,7). Tea is also served. This portion of the class is held in either a partially open woodland area with several fallen trees that are arranged to form benches for the class to sit on (Day 1 location), or a large gazebo in the center of the sunken garden at the museum (Day 3 location).
- **Close of Course:** After all the projects are shared, the students are thanked and are invited to form a small circle, elbow-to-elbow, and share one word out loud that describes an aspect of the course that comes to mind (Objective #7).

The course was developed and taught by Dr [professor name omitted for review process], a Professor Emeritus of Family Medicine who completed fellowship training in Integrative Medicine, as well as training in mind-body medicine and qigong.

Participants

The study population included first and second-year medical and dental students attending a large, suburban medical and

dental school in the American Northeast. Analysis of students’ course evaluation surveys (n = 65) and final reflection projects (n = 55) was undertaken to conduct a program evaluation of the newly developed *Nature as Medicine* course. Average class size ranged from 12 to 14 students (M = 13). Regarding medical and dental student overall distribution, more medical students enrolled in the course (n = 36) as compared to dental (n = 24). Looking at the year of participation, more first-year students (n = 50) enrolled as compared to second-year students (n = 15). The total class size at the University for medical and dental students is approximately 110 and 50, respectively. The details of student membership are found in [Table 1](#).

Data Collection

Course Evaluation Survey

The final course evaluation survey was electronically disseminated to each student in the class through the University to obtain student feedback on course effectiveness. Completion of the survey is optional and 100% of students who participated in the course provided anonymous feedback. The survey included five quantitative questions that were rated on a five-point scale (1 - strongly disagree to 5 - strongly agree). Students were invited to respond to the following five questions: (1) The goals and objectives of the course were clearly stated, (2) The goals and objectives of the course were achieved, (3) The course design was appropriate for the material presented, (4) The lectures/presentations were appropriate for the student level, and (5) The assigned reading was suitable in terms of level and amount. A sixth quantitative question asked about the educational benefit of the final project/paper which was rated on a five-point scale (1 - poor to 5 - excellent). Four qualitative questions were asked to provide anecdotes relating to instruction of the course, course strengths and suggestions for improvement, and course content. Example questions include “Please comment on the quality of instruction in this course. Be sure to specify by name when commenting on a specific preceptor/lecturer” and “Are there topics you would like to see covered in more/less detail?” See [Appendix B](#) for the course evaluation survey.

Final Reflection Project

Final course reflection projects provided a summative evaluation of the student’s experience of the course which could be in the format of their choosing. Final reflection projects could include a short exploration or summary of a course topic, essay, poem, artwork of any medium, or other creative venue as discussed with the instructor. Students created a range of types of final reflection projects which included acrylic and watercolor paintings, pencil drawings,

Table 1. Demographic Information by Class Year for Medical and Dental Students Enrolled in the *Nature as Medicine* ILO Course, Fall 2020 to Fall 2022.

Group	N
Medical Student total	36
Medical Student year 1	26
Medical Student year 2	10
Dental Student total	29
Dental Student year 1	24
Dental Student year 2	5
First year Student	50
Second year Student	15
Total students	65

collages, photographs, mini-terrariums, needlepoint and cross stitch work, wire sculpture, baked goods, singing of songs, preparation of traditional tea, poems, and essays. See [Appendix C](#) for examples of student projects.

Results

The analysis involved using a mixed methodology approach, combining quantitative descriptive statistics and qualitative analysis. Descriptive statistics analysis (means, standard deviations, confidence intervals) for the six, quantitative five-point Likert-type scale questions (strongly agree to strongly disagree) were examined. Qualitative analysis through thematic analysis of the student projects and reflection as well as the four, qualitative open-ended questions from the surveys were conducted. Results are presented by evaluation questions.

What do students identify as the strengths and areas for improvement of the course?

On average, students were pleased with the goals and objectives of the course in terms of clearness and accessibility (Question 1; $M = 4.78$, $SD = .48$) as well as said goals and objectives being achieved by the end of the course (Question 2; $M = 4.78$, $SD = .48$). Students had a strong understanding of what the course would present and were satisfied with the content explored by the end of the course. Further, students were content with the design of the course as related to the presentation of material (Question 3; $M = 4.74$, $SD = .54$) as well as the lectures and presentations that were presented by the instructor (Question 4; $M = 4.80$, $SD = .46$). Students were pleased with the distribution of material and the way by which the instructor disseminated information (Question 5; $M = 4.84$, $SD = .42$). Finally, students were offered a chance to reflect upon their experiences with the final project, which was a hallmark piece of the ILO course, with students noting that on the whole, the project-based learning experience was quite meaningful, (Question 6; $M = 4.72$, $SD = .46$).

Interestingly, data indicate that over time, students reported higher scores with each semester, revealing that as the course refined and the instructor incorporated student feedback, student satisfaction may have increased (see [Figure 1](#)).

Note. 1 = The goals and objectives of the course were clearly stated, 2 = The goals and objectives of the course were achieved, 3 = The course design was appropriate for the material presented, 4 = The lectures/presentations were appropriate for the student level, 5 = The assigned reading was suitable in terms of level and amount, 6 = Please rate the educational benefit of your final project/paper.

Similarly, student written responses were positive and revealed several themes for course strengths. Students highlighted quality instruction and content, applicable skills for themselves and in their medical practice, and personal development gain. Of note, written responses were not required on the final course evaluation survey. A total of 35 students provided written feedback on the strengths of the course. The frequency of mention based on theme and associated student quotations is found in [Table 2](#).

Student feedback for course improvement included themes around course availability, activity suggestions, and timeliness. A total of 16 students provided written feedback on course improvements. [Table 3](#) provides key themes, frequency of mention, and student quotations.

What aspects of the course did students identify as providing the greatest benefit?

Over the week, students participated in a variety of experiences in nature. Through written responses, most students noted that the overall experience of the course was impactful to them, acknowledging their satisfaction with the variety of activities included and locations visited throughout the course. In final reflection projects and written responses to strengths of the course, several experiences were explicitly stated as beneficial. These experiences included forest bathing, hiking, mindfulness, and meditation exercises (e.g., guided meditation, sit spot), expressive art, applied skills (e.g., traditional healing practices, healing elements of nature), walking a labyrinth, practicing qigong, participating in discussion and reflective work, and specific course content (e.g., course readings, *Fantastic Fungi* documentary, the class ritual of drinking tea together). [Table 4](#) provides a selection of student commentary regarding course experiences and the frequency of explicit mention of specific activities.

What outcomes did students describe as a result of the course?

Prior to starting the course, student responses revealed two key themes: (a) feelings of stress and overwhelm and (b) feeling overextended and continuously on the go. The rigors of medical and dental school and the completion of their exam period left many students stuck indoors studying, feeling exhausted, and just trying to keep up with demands. Students

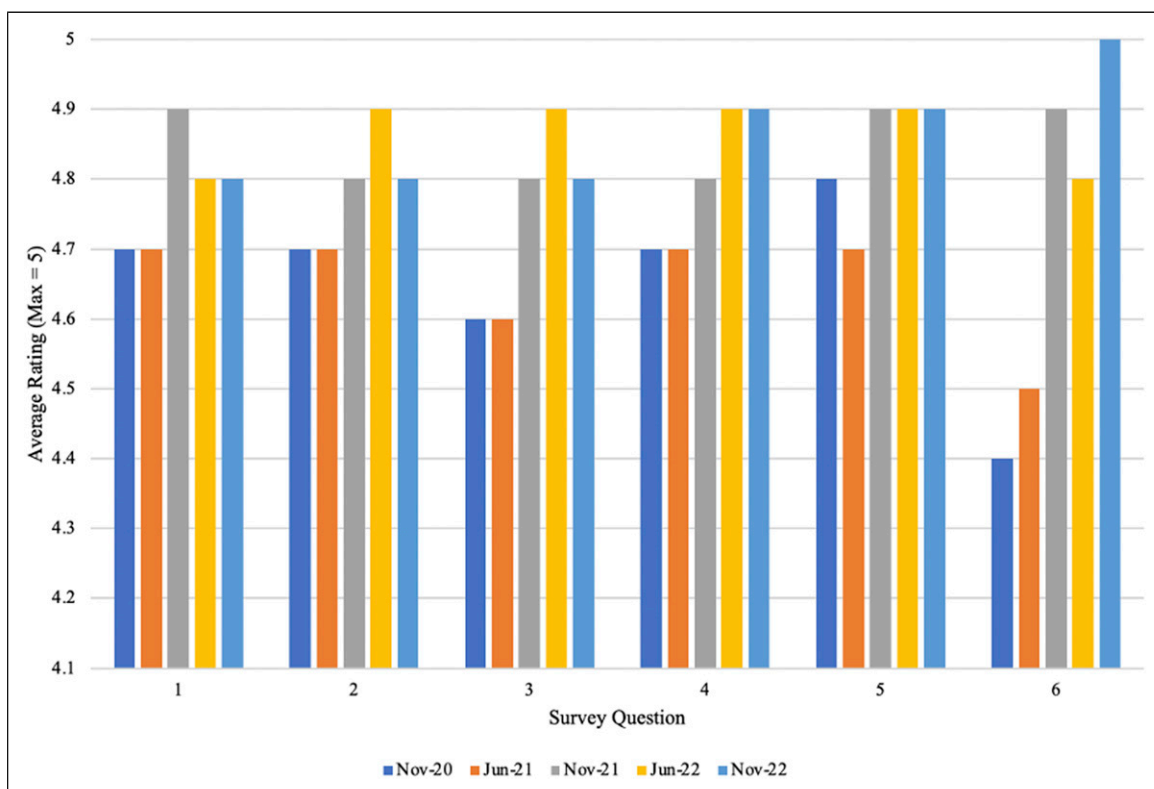


Figure 1. *Nature as Medicine* course evaluation data by question type for each cohort class.

Table 2. Course Strength Themes and Student Quotations.

Key Theme (Frequency of Mention)	Student Quotations
Applicable skills for self and medical practice (n = 14)	It taught me important techniques for relaxation, meditation, and overall wellness that I will definitely implement throughout the remainder of my career. Furthermore, it helped me to take a step back, whether that be in nature or in a clinical setting, and appreciate the details that might normally go unnoticed Great course that forces you to think more about the role of nature in your own health and well being and how that can be translated to others and your future patients
Quality instruction and content (n = 12)	Excellent facilitation by [professor], who is so clearly knowledgeable and passionate about mindfulness practice and the outdoors. She consistently checked in with students and monitored our progress [Professor] goes out of her way to make this course as amazing as it is. From providing the class with our own reflection notebooks, pens, bug/tick spray, etc. She is extremely knowledgeable on these topics and it was very interesting. I loved the various locations we were able to visit as well
Personal development (n = 10)	Great course, I genuinely had a transformational experience. It was a nice change of pace As a student, I left LEAP feeling anxious, depressed, and frustrated. By offering a course that allows us to get outside, move our bodies and connect with nature and our souls, it was essential to my recovery post leap. From this class, I learned how to heal myself in order to heal patients, and [professor] was critical for this healing process. She guided students toward connection through nature, and taught us valuable skills in order to de-stress, be attentive, and heal ourselves, our patients, and the world we share

Note: frequency of mention may exceed the number of students responding.

expressed feeling anxious, that life felt chaotic, and that they were constantly thinking about the future, stuck in tunnel vision – unable to focus on the here and now. After completing the course, students reported impactful outcomes related to

connection (n = 53), mindfulness (n = 48), improved cognitive functioning (n = 29), and overall well-being (n = 74).

Students noted improved cognition with increased attentional capacity, feeling more focused and alert, increased

Table 3. Course Feedback for Improvement and Student Quotations.

Key Theme (Frequency of Mention)	Student Quotations
Activity suggestions (n = 10)	I would perhaps like to have more discussion of the readings that were assigned to us during class Have more structured time for socializing, so we can connect with each other I think making us journal would be nice An event in which we pot our own houseplant More intense hikes would have been fun I did not enjoy the fire ceremony
Timeliness (n = 3)	I loved the course. I only wish that the hours of the course were followed a little bit better since there were several days that we went over the designated time
Course availability (n = 2)	Incorporate this class in the curriculum especially for first years! I would add another section of this extremely popular course. The size is perfect - any bigger it would be more intimidating to share as an individual

awareness of themselves and their surroundings, and improved perspective-taking. Additionally, students described increased curiosity, creativity, patience, and motivation. Students specifically described reconnection with and the cultivation of their capacity for creativity and enhanced observational skills. Connection was described through stronger connections with themselves, others, nature, and their careers. Specifically, feelings of harmony and interconnectedness were described adding appreciation for nature's resilience, reciprocity, and the relationship between traditional roots and contemporary medical practice. Anecdotes of the grounding sensory experiences of nature provided insight into how course experiences supported students in fostering mindfulness. Students made connections between meditation and mindfulness practices and their ability to remain in the present moment and enjoy the process. Notably, students described overall increases in their well-being. Students expressed increased feelings of gratitude, calm, peace, and overall transformation. They felt as though the course experience was healing and they would include the strategies explored during the course into their daily routines. Reduced burnout, being able to reflect and digest personal feelings, finding joy, and feeling rejuvenated were also noted. Table 5 provides student quotations for each outcome theme.

To what extent does the Nature as Medicine ILO demonstrate the importance of integrative care with a specific focus on the healing impacts of nature?

As noted above, students describe applicable skills learned from the course, the personal impact of nature-based experiences, and the importance of including these practices in their practice as medical professionals. Throughout final reflection projects and written responses on the course evaluation survey, students identified the course readings and resources as important links between course experiences and transferring class skills to medical practice. It will be important for future research to address the extent students

incorporate nature-based practices into their personal and professional lives after the course ends.

Discussion and Recommendations for Medical, Dental, and Other Health Professions Schools

Data suggest that students benefitted from their course experience during this five-day experience. Given the brevity of the course, the course feedback was highly rated, revealing the impact made over a brief period was quite substantial. Of note, during the study period, ILOs were generally rated high. Aggregated student ILO satisfaction for the research period ranged from 3.40 to 5.00 (n = 1418; m = 4.58) across the six course evaluation questions reported above on 18 different ILO courses. For all questions assessing the content of the course, the way the subject matter was explored and communicated (i.e., interactive) down to the final project (i.e., experiential), students ranked the course highly across all marks. Consistently, students provided feedback reinforcing the enjoyment and transformative outcomes they took from the course experiences. Students entered the course describing feeling stressed, overwhelmed, and overextended, not uncommon for students in medical school,²⁷⁻²⁹ and left the course describing the acquisition of applicable skills, increased attention and mindfulness, creativity, and connection to the natural world. Medical and dental students are often required to engage in rigorousness and memory-based skills in their training;³² this is especially true for the students included in this evaluation who are completing the ILO after a 10-week semester and comprehensive exams. Perhaps the integrative, experiential, and reflective nature of the course and assignments provided students with the necessary respite and healing often associated with nature-based healing strategies.¹⁸⁻²¹

Lessons learned from one of the author's (initials removed for review process) generative experience of offering the course to all five cohort classes over the past three years have led to the following ideas for further development. First,

Table 4. Course Experiences and Student Quotations.

Course Experience (Frequency of Mention)	Student Quotations
Forest bathing (n = 12)	Prior to taking the Nature as Medicine ILO, I had not heard of the term “forest bathing” or considered the idea of using nature to heal others. Through this course, It was able to gain an understanding of how to become immersed in nature. As the course progressed I noticed that I became more aware of my surroundings and appreciated the small details in the different locations we visited. The course also opened my mind to consider using all of the senses when exploring nature. Prior to this course, I did not often pay attention to the senses of smell or touch when visiting a natural environment. I found that when I used all five senses during class I was able to connect with the environment fully. In addition to learning how to observe more closely, I also noticed a heightened sense of energy and alertness after each session. Taking a few minutes every day to enjoy nature is a great way to feel refreshed and reduce the chance of burnout which often occurs in the fields of medicine and dentistry
Hiking (n = 11)	I was able to connect with nature through the aromatic scent of the pine, the soft trail beneath my feet, the greenery of the vegetation, and the sound of the birds chirping
Mindfulness and meditation (n = 11)	I have always been able to easily connect with nature and am naturally driven to it; the outdoors are my favorite place to be. Something I did not realize before taking this course was how powerful of a force nature can be for achieving mindfulness. I realized this because clearing my mind seemed easier when meditating outdoors as compared to my previous indoor attempts. Something that struck me during this process was the experience of feeling and acknowledging the transition from alert to calm. After sitting for a few minutes with my eyes closed, acknowledging stray thoughts, and letting them go, it felt like a switch went off in my head. I was no longer having any of these random thoughts and my body felt substantially calmer. I could tell I was physically calmer because my eyes were twitching less. The experience of achieving this inner peace was moving. Meditation and mindfulness are things I have been working on for a while. Through this course, I realized that nature may have been the missing piece for me
Expressive art (n = 7)	The most meaningful experience I had in this whole session is finding joy in painting again. I used to do a lot of artwork with my twin growing up. Somehow, I convinced myself that I wasn't good enough. But during the expressive art session on Wed, I realized that it was more about the process itself and not the outcome. It was a struggle in the beginning not to think too much about how I wanted my final painting to look like but as I kept drawing, I noticed that my thoughts were slowing down, and I wasn't in a thinking state but more so in a doing state. I was in a state of flow and time flew by so quickly! It was amazing to kind of lose yourself in the process and not be in your head all the time. This is the first painting I did without an end goal in mind and even though it's not the prettiest, I think it's really meaningful to me
Applied skills (n = 7)	Another aspect of the course that I found very interesting was the connection between plants and human health. I was unaware that plants produce phytoncides and how these oils may protect the plants from viruses, bacteria, and fungi. I found it particularly interesting that these oils have anti-inflammatory properties and can increase the number of natural killer cells in our body in order to fight cancer. This illustrates the innate connection between humans and nature and shows that there are physical benefits to nature along with the mental benefits
Labyrinth walk (n = 6)	The pathways of the labyrinth felt like a separate realm from the surrounding forest. While I could see the trees and green leaves dancing in the wind, I was very locked in on my trip to the center of the labyrinth. I bought into the idea that some people used labyrinths to make ‘pilgrimages’ and took a journey of my own. Along the way, I reflected about some personal experiences in my mind and got lost in the twists and turns of the labyrinth. I also enjoyed the presence of my classmates; even though we were following the same path, it felt like we were on our own journeys. In the center of the labyrinth it felt like we reached the same destination
Diverse locations (n = 6)	The places we hiked were completely new to me, and taught me that [State] has so many outdoor places to offer
Qigong (n = 3)	Throughout the week one of my favorite activities we did was Qigong. I have always been someone who is anxious and I often look for something that may help me to relax. Typically techniques such as meditation have not worked because I am unable to turn my mind off. When I am sitting still in one place my mind just seems to wander, but this changed when we began doing Qigong. Because Qigong incorporates movement along with breathing I was able to focus on the movements which kept my brain occupied and allowed me to breathe deeply and feel relaxed

(continued)

Table 4. (continued)

Course Experience (Frequency of Mention)	Student Quotations
Discussion and reflection (n = 3)	I found myself always looking forward to tea after our sessions. I will admit part of it had to do with the cold temperatures this week and wanting a drink that would keep me warm. Though, the other part of it has to do with what we were doing while we were drinking the tea. Every time tea was poured, we all had the opportunity to write in our journals and reflect on the experiences we just had
Course content (n = 3)	I wanted to share what I learned about the “Fantastic Fungi” documentary on Netflix and some reflections I had on it in light of this week. While re-watching the documentary, I wanted to relax and draw some of the mushrooms that I saw in it, employing what we learned in the expressive art workshop. What spoke to me most was how fungi help nature connect and create a harmonious ecosystem. This reminded me how we are a part of nature and should be equally as connected. I was also fascinated by how much untapped potential there is in fungi. There are so many uses, especially medicinal, that can truly change peoples’ lives. I feel like some people in western medicine may view this as “fake” medicine, which is absurd considering penicillin was discovered from fungi. Just opens my mind up to how much breadth and amazing potential nature has to offer

considerations for enhancing the facilitation of the course are provided. The course may benefit from including additional faculty facilitators to expand the breadth and diversity of the learners’ experience as well as expand the capacity to offer more than one course per LEAP period given students self-reporting an increasing desire to enroll. Since students reported high levels of enjoyment in the course, consider inviting near-peer, co-facilitators, i.e., third or fourth-year students who completed the course to return. The addition of student co-facilitators may provide the added benefit of their capacity to share perspectives and methods for maintaining nature connections as part of self-care and well-being strategies. Second, since students expressed interest in incorporating nature-based practices into their medical practice, the course may benefit from explicit guidance on how to prescribe these strategies to future patients. Third, considerations for environments and activities are provided. Exploring new locations to host the course can expand options and the range of biodiversity offered during the classes, such as locating local greenhouses or indoor gardens for options during extreme weather conditions. To bring the expressive art workshop outdoors, locate off-campus and possible outdoor venues to host this workshop. Specifically at our current university, consider collaborating with the University’s “One Health” and/or botanical and environmental faculty to explore curricular synergies and scholarship opportunities. Another activity to consider would be adding an animal-assisted therapy session. Lastly, to understand the long-term impacts of the course, it would be beneficial to develop additional evaluation tools and follow-up assessments (6, 12, or more months) for longitudinal analyses. It will be important to understand to what degree students integrate and prescribe nature-based principles into their professional practice. Additionally, understanding the potential dual-health benefit to both students and their patient’s physical health and mental well-being from engagement with nature-based practices will be critical to capture.

Due to the overall well-received and positive outcomes of the course, the authors wish to share these preliminary findings and course materials with other health professions educators interested in developing or piloting such a program at their schools. We feel such collaboration is especially important in light of the urgent need to implement effective ways of addressing the alarming and rising rates of burnout, compassion fatigue and detrimental effects of moral injury on the next generation of health professionals entrusted to our lineage of healing.^{33–38}

Limitations

Several limitations exist for this course evaluation. Students who participate in the *Nature as Medicine* ILO are self-selected. The course is not a requirement for all medical and dental students, and this selection bias may lead to inflated satisfaction and perceived outcomes due to the student’s preference for the course. Additionally, the course is not offered to students who need to remediate previous required course content. Students enrolled in the course have demonstrated academic success in their first- or second year of medical or dental school. Though many students described experiencing anxiety, stress, and continuous studying from being in school, this evaluation does not include the perspective of students who are struggling academically and the possible outcomes this course may have on that population of students. A control group of students was also not included. The course curriculum also varied at times across and within each of the five cohorts due to such factors as weather conditions, spontaneous encounters with beings in nature, and students’ illness symptoms. For example, class locations varied at times with 1-2 of 5 locations based on weather. Though this is considered a limitation for research purposes, the course’s flexibility is a strength, and differences in environments did not appear to impact course satisfaction. One limitation of the quantitative analysis in this study is the use of

Table 5. Course Outcomes and Student Quotations.

Key Theme	Student Quotations
Well-being (n = 74)	This week has been really great in helping me to reconnect with nature. If there's one thing this course has taught me, it's that nature has such a tremendous power to heal. This previous block was very chaotic and stressful for me, so being out in nature everyday for the past week was extremely cathartic
Connection (self, others, nature) (n = 53)	When I was sitting for our first sit spot, I was struck by a sudden change in perspective. Sitting with my eyes closer to eye level allowed me to see the forest from the perspective of a resident, rather than a visitor. As I continued to sit, I slowly noticed more and more of the immense diversity and beauty available, which had previously gone unnoticed. This led me to a few epiphanies/realizations. My first realization was that for the residents of the forest, there is nowhere else to go; this forest is a complete home and world – it awakened an experience of great awe and patience within me There are so many small details of the forest that I would previously have not noticed but this week, I felt like I was able to be more connected and really appreciate all the different parts This class provided an alternative view of health and medicine than that which we typically see in the classroom, as well as a unique, hands-on way to experience it
Mindfulness (n = 48)	For my final project, I wanted to create something that reflected the sense of calm I achieved this past week through my experiences out in nature. I started with a drawing of the labyrinth we walked through on our final day, which I found especially soothing. By providing a set path with no time limit or important destination that had to be reached, the labyrinth allowed me to stop planning my next step and worrying about the future, and instead just exist in the moment. This helped me embrace the concept of "being, not doing" in the forest To me, my drawing represents the different moments that captured my attention throughout this class, and lessons that I can hold onto and remember going forward: staying mindful and present in my day to day life, and appreciating the small moments of beauty that we often overlook
Cognitive (n = 29)	This course has really helped me connect more to the arts. Whether we were forest bathing, labyrinth walking, or journaling, I found myself perceiving my surroundings through images rather than words, preferring to sketch instead of write. The expressive art workshop inspired me even more to tap into my artistic side Attention – Student poem Have no hesitation – stroll outside Nature welcomes you back As if you had never left Take each invitation To pay Attention To all that surrounds you You may stare at your feet And happen to notice Frost at the tips of grass That look like your fingers feel Even the dirt has frost And where did the water come from Who knew something we wash off Could capture our undivided Attention You hear a bird call And happen to look up To notice massive cliffs outlining the reservoir You feel small for a moment But then you notice the earthworm With such clear Attention To find moisture after the rain Hoping to avoid anything with wings What would life be like If we shift our Attention From eye-level To above and below As focused as we are We are surely not paying Attention To all the beauty right outside our door We must be intentional to not ignore

descriptive over inferential statistics. This, taken with the relatively small sample size, as well as the specific experience of the medical and dental students from a large, suburban university in the American Northeast may also impact the generalizability of the findings.

Conclusion

In short, medical and dental students who have participated in the *Nature as Medicine* ILO describe a positive experience of the course. Several areas of personal and professional development were also described. Students noted improvements within cognitive domains such as increased focus, creativity, curiosity, motivation, and perspective; enhanced connection with nature, others, and themselves through appreciation of nature's benefits, nostalgia for childhood experiences in nature, and connecting benefits of nature to medical practice; increased mindfulness through grounding in sensory experiences within nature and broadly enjoying the process over the outcome; and improved well-being through feelings of calm, gratitude, healing, and notably personal transformation. This preliminary evidence provides a compelling argument for the importance of offering such a course to medical and dental students. Still, it will be important to examine the impacts of the course on medical and dental students across various schools to obtain a representative understanding of course outcomes. Future program evaluations would also benefit from understanding if and how course experiences may vary based on environment (e.g., American South, American Northwest). Additionally, future research would benefit from examining the extent to which students incorporate nature-based practices into their personal lives after the course ends, and to what extent students incorporate nature-based strategies into their professional practice.

Acknowledgements

We would like to express immense gratitude to the First Nations peoples of the Tunxis and Sicaogs tribal communities who have stewarded the land for generations for which this project took place. The authors also thank the following organizations for maintaining open, public access to the natural environments we visited within our local communities: West Hartford Reservoir, Hill-Stead Museum, Copper Beech Institute, McLean Wildlife Refuge, and Avon Fisher Meadows.

Declaration of Conflicting Interests

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

Funding

The authors received no financial support for this research, authorship, and /or publication of this article.

ORCID iDs

Sierra M. Trudel  <https://orcid.org/0000-0001-6093-8832>

Emily L. Winter  <https://orcid.org/0000-0003-2818-684X>

Supplemental Material

Supplemental material for this article is available online.

Note

1. Forest bathing or Shinrin-Yoku, originated in Japan and the term was coined by Tomohide Akiyama, the director of the Japanese Forestry Agency meaning immersing into the forest atmosphere with all five senses.²¹

References

1. Diffey BL. An overview analysis of the time people spend outdoors. *Br J Dermatol (1951)*. 2011;164(4):848-854. <https://api.istex.fr/ark:/67375/WNG-3VXSS773-Q/fulltext.pdf>. doi:10.1111/j.1365-2133.2010.10165.x
2. Klepeis NE, Nelson WC, Ott WR, et al. The national human activity pattern survey (NHAPS): a resource for assessing exposure to environmental pollutants. *J Expo Anal Environ Epidemiol*. 2001;11(3):231-252. doi:10.1038/sj.jea.7500165.
3. United Nations Department of Economic and Social Affairs. *2018 revision of world urbanization prospects*. <https://www.un.org/development/desa/publications/2018-revision-of-world-urbanization-prospects.html> Updated 2018.
4. Facey AD, Tallentire V, Selzer RM, Rotstein L. Understanding and reducing work-related psychological distress in interns: a systematic review. *Intern Med J*. 2015;45(10):995-1004. doi:10.1111/imj.12785. <https://api.istex.fr/ark:/67375/WNG-BN6HKRJ6-P/fulltext.pdf>
5. Flores-Villa L, Unwin J, Raynham P. Assessing the impact of daylight exposure on sleep quality of people over 65 years old. *Build Serv Eng Res Technol*. 2020;41(2):183-192. doi:10.1177/0143624419899522. <https://journals.sagepub.com/doi/full/10.1177/0143624419899522>
6. Bratman GN, Anderson CB, Berman MG, et al. Nature and mental health: an ecosystem service perspective. *Sci Adv*. 2019;5(7):eaax0903. doi:10.1126/sciadv.aax0903. <https://www.narcis.nl/publication/RecordID/oai:library.wur.nl:wurpubs%2F552431>
7. Silva MPFN, Cardoso GMS, Priolo Filho SR, Weber SAT, Corrêa CC. Technologies and mental health in university students: an unhealthy combination. *Int Arch Otorhinolaryngol*. 2023;27(2):e324-e328. doi:10.1055/s-0042-1748807
8. Sun Y, Li Y, Bao Y, et al. Brief report: increased addictive internet and substance use behavior during the COVID-19 pandemic in China. *Am J Addict*. 2020;29(4):268-270. doi:10.1111/ajad.13066. <https://onlinelibrary.wiley.com/doi/abs/10.1111/ajad.13066>
9. Montag C, Elhai JD. Discussing digital technology overuse in children and adolescents during the COVID-19 pandemic and beyond: on the importance of considering affective neuroscience theory. *Addict Behav Rep*. 2020;12:100313. doi:10.1016/j.abrep.2020.100313.

10. Akram W, Kumar R. A study on positive and negative effects of social media on society. *Ijcse*. 2017;5(10):351-354. doi:10.26438/ijcse/v5i10.351354
11. Kimmerer RW. *Braiding Sweetgrass*. London: Penguin Books; 2020.
12. Tapestry Institute. *Relationship and reciprocity*. <https://tapestryinstitute.org/ways-of-knowing/key-concepts/relationship-reciprocity/>
13. Jimenez MP, DeVille NV, Elliott EG, et al. Associations between nature exposure and health: a review of the evidence. *Int J Environ Res Public Health*. 2021;18(9):4790. doi:10.3390/ijerph18094790. <https://www.ncbi.nlm.nih.gov/pubmed/33946197>
14. One Health Commission. *One health: a ray of hope*. Updated 2017. https://www.onehealthcommission.org/index.cfm/37525/43718/one_health_a_ray_of_hope
15. Centers for Disease Control and Prevention. *One health basics*. <https://www.cdc.gov/onehealth/basics/>
16. Victorson D, Luberto C, Koffler K. Nature as medicine: mind, body, and soil. *J Altern Complement Med*. 2020;26(8):658-662. doi:10.1089/acm.2020.0221. <https://www.liebertpub.com/doi/abs/10.1089/acm.2020.0221>
17. Academic Consortium for Integrative Medicine & Health. *Definition of integrative medicine and Health*. 2022. <https://imconsortium.org/about/introduction/>
18. Berman MG, Jonides J, Kaplan S. The cognitive benefits of interacting with nature. *Psychol Sci*. 2008;19(12):1207-1212. doi:10.1111/j.1467-9280.2008.02225.x. <https://www.jstor.org/stable/40064866>
19. Schertz KE, Berman MG. Understanding nature and its cognitive benefits. *Curr Dir Psychol Sci*. 2019;28(5):496-502. doi:10.1177/0963721419854100. <https://journals.sagepub.com/doi/full/10.1177/0963721419854100>
20. Hartig T, Evans GW, Jamner LD, Davis DS, Gärling T. Tracking restoration in natural and urban field settings. *Journal of environmental psychology*. 2003;23(2):109-123. doi:10.1016/S0272-4944(02)00109-3
21. Pretty J, Peacock J, Hine R, Sellens M, South N, Griffin M. Green exercise in the UK countryside: effects on health and psychological well-being, and implications for policy and planning. *J Environ Plann Manag*. 2007;50(2):211-231. doi:10.1080/09640560601156466. <https://www.tandfonline.com/doi/abs/10.1080/09640560601156466>
22. White MP, Alcock I, Grellier J, et al. Spending at least 120 minutes a week in nature is associated with good health and wellbeing. *Sci Rep*. 2019;9(1):7730-7811. doi:10.1038/s41598-019-44097-3. <https://www.ncbi.nlm.nih.gov/pubmed/31197192>
23. Barton J, Pretty J. What is the best dose of nature and green exercise for improving mental health? A multi-study analysis. *Environ Sci Technol*. 2010;44(10):3947-3955. doi:10.1021/es903183r
24. La Puma J. Nature therapy: an essential prescription for health. *Altern Complement Ther*. 2019;25(2):68-71. doi:10.1089/act.2019.29209.jlp
25. Antonelli M, Barbieri G, Donelli D. Effects of forest bathing (shinrin-yoku) on levels of cortisol as a stress biomarker: a systematic review and meta-analysis. *Int J Biometeorol*. 2019; 63(8):1117-1134. doi:10.1007/s00484-019-01717-x. <https://link.springer.com/article/10.1007/s00484-019-01717-x>
26. Clifford MA. *Your guide to forest bathing*. Newburyport: Red Wheel/Weiser; 2018. [https://ebookcentral.proquest.com/lib/\[SITE_ID\]/detail.action?docID=5313207](https://ebookcentral.proquest.com/lib/[SITE_ID]/detail.action?docID=5313207)
27. Mortali M. *Rewilding: Meditations, Practices, and Skills for Awakening in Nature*. Sounds True; 2019.
28. National Academies of Sciences. *Engineering, and Medicine, Medicine NAo, Well-Being, Committee on Systems Approaches to Improve Patient Care by Supporting Clinician. Taking Action against Clinician Burnout*. Washington, D.C: National Academies Press; 2019. <https://www.nap.edu/25521.10.17226/25521>
29. Dyrbye LN, Satele D, West CP. Association of characteristics of the learning environment and US medical student burnout, empathy, and career regret. *JAMA Netw Open*. 2021;4(8):e2119110. doi:10.1001/jamanetworkopen.2021.19110
30. Dyrbye L, Satele D, West CP. A longitudinal national study exploring impact of the learning environment on medical student burnout, empathy, and career regret. *Acad Med*. 2021; 96(11S):S204-S205. doi:10.1097/ACM.0000000000004285. <https://search.proquest.com/docview/2587753947>
31. Lipton BH. *The Biology of Belief*. 1st ed. Santa Rosa, CA: Mountain of Love/Elite Books; 2005. <https://www.loc.gov/catdir/toc/ecip053/2004026115.html>
32. Augustin M. How to learn effectively in medical school: test yourself, learn actively, and repeat in intervals. *Yale J Biol Med*. 2014;87(2):207-212. <https://www.ncbi.nlm.nih.gov/pubmed/24910566>
33. Hansen SB, Virden T. An assessment of burnout among graduate students in health professional programs. *Ij-Sotl*. 2022;16(2). doi:10.20429/ijsoftl.2022.160210. <https://doaj.org/article/d59f6722e1e54b09b98449d9d2316088>
34. Murray E, Krahe C, Goodsmann D. Are medical students in prehospital care at risk of moral injury? *Emerg Med J*. 2018; 35(10):590-594. doi:10.1136/emered-2017-207216.
35. Rozario D. Burnout, resilience and moral injury: how the wicked problems of health care defy solutions, yet require innovative strategies in the modern era. *Can J Surg*. 2019; 62(4):E6-E8. doi:10.1503/cjs.002819. <https://www.ncbi.nlm.nih.gov/pubmed/31348630>
36. Nair M, Moss N, Bashir A, et al. Mental health trends among medical students. *SAVE Proc*. 2023;36(3):408-410. doi:10.1080/08998280.2023.2187207. <https://www.tandfonline.com/doi/abs/10.1080/08998280.2023.2187207>
37. Chachula KM. A comprehensive review of compassion fatigue in pre-licensure health students: antecedents, attributes, and consequences. *Curr Psychol*. 2022;41(9):6275-6287. <https://link.springer.com/article/10.1007/s12144-020-01122-3>
38. Veidis EM, Myers SS, Almada AA, Golden CD. A call for clinicians to act on planetary health. *The Lancet (British Edition)*. 2019;393(10185):2021.