

Evaluation of a Guided Nature and Forest Therapy Walk for Internal Medical Residents – A Brief Report

Global Advances in Integrative Medicine and Health

Volume 13: 1–7

© The Author(s) 2024

Article reuse guidelines:

sagepub.com/journals-permissions

DOI: 10.1177/27536130241228181

journals.sagepub.com/home/gam



Katherine T. Morrison, MD^{1,2}, Kristin M. Jensen, MD, MSc^{2,3}, Angela Keniston, MSPH⁴, Lauren McBeth, BA⁴, Amber L. Vermeesch, PhD, FNP-C⁵ , and Kerry “Nellie” O’Connor, MD^{1,2} 

Abstract

Background: Medical residents commonly face compassion fatigue, burnout, anxiety, and depression. Studies of nature-based interventions show improved mental and physical health; few focus on healthcare providers.

Objective: To explore potential benefits of forest bathing for medical residents’ wellbeing.

Methods: Using the Association of Nature and Forest Therapy’s framework, we piloted a forest bathing intervention among medical residents with pre/post-participation surveys assessing perceptions of mindfulness and psychological wellbeing. Responses were analyzed using a Fisher’s exact test and Student’s t-test for independent samples.

Results: Fourteen of fifteen participants completed both surveys. We observed significantly improved mindfulness scores and expressions of feeling calm, vital, or creative, as well as a decreased sense of anxiety and depression. Nonsignificant trends towards decreased burnout and irritability were seen.

Conclusion: This quality improvement pilot demonstrates trends that forest bathing can improve medical residents’ psychological wellbeing and mindfulness. Further exploration of this intervention for healthcare providers is warranted.

Keywords

nature and forest therapy, forest bathing, resident physician, wellbeing, burnout

Received June 7, 2023; Revised December 8, 2023. Accepted for publication January 2, 2024

¹Division of General Internal Medicine, Section of Palliative Care, Department of Medicine, University of Colorado Anschutz Medical Campus, Aurora, CO, USA

²Division of General Internal Medicine, Department of Medicine, University of Colorado Anschutz Medical Campus, Aurora, CO, USA

³Division of General Academic Pediatrics, Department of Pediatrics, University of Colorado Anschutz Medical Campus, Aurora, CO, USA

⁴Division of Hospital Medicine, Department of Medicine, University of Colorado Anschutz Medical Campus, Aurora, CO, USA

⁵School of Nursing, Advanced Nursing Education Department, University of North Carolina Greensboro, Greensboro, NC, USA

Corresponding Authors:

Katherine T. Morrison, MD, Division of General Internal Medicine, Section of Palliative Care, Department of Medicine, University of Colorado Anschutz Medical Campus, 12401 E. 17th Ave, Mailstop L 964, Room 8401, Aurora, CO 80045, USA.

Email: Katherine.2.Morrison@cuanschutz.edu

Kerry “Nellie” O’Connor, MD, Division of General Internal Medicine, Section of Palliative Care, Department of Medicine, University of Colorado Anschutz Medical Campus, 12401 E. 17th Ave, Mailstop L 964, Room 8401, Aurora, CO 80045, USA.

Email: Kerry.OConnor@cuanschutz.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>).

Background

Burnout and mental health issues continue to plague healthcare providers, including trainees.^{1,2} While organizational and system changes are crucial to reversing these concerns, interventions which improve mental health and overall personal wellbeing are needed in the interim.³ Mindfulness has been shown to improve wellbeing in healthcare providers, including medical residents.^{4,5} Shinrin Yoku (SY), or forest bathing, is a practice that encourages mindfulness through participants' interactions with nature through their senses. It was developed by the Japanese government in 1982 in response to the growing physical and mental health problems in the Japanese population thought to be due to their population's movement from rural to urban environments.⁶ As part of SY, participants are encouraged to simply spend time in nature, metaphorically 'bathing' in the atmosphere of the forest (hence the term "forest bathing").⁶ In many ways, forest bathing and mindfulness are conceptually-related therapies. For those who have difficulty achieving a mindful state, the sensory focus of forest bathing may feel more intuitive.⁷ SY has been studied in Japan since its inception and has shown improvements in cardiovascular, respiratory, and immune function, as well as benefits in mood.^{6,8}

The Association of Nature and Forest therapy (ANFT), founded by psychologist Amos Clifford in 2012, uses forest bathing as the basis of its framework and is both trauma-informed and relational with the forest.⁹ Clifford combined the Japanese concept of SY with his decades of experience in Zen meditation, psychotherapy, and wilderness guiding to create the framework for the practice of Forest Therapy (spending time in nature to invite healing interactions with nature). Forest Therapy incorporates five elements: an intention to connect with nature in a healing way, not rushing the experience, giving the experience full attention, practicing repeatedly over an extended period, and deepening the relationship with nature for the benefit of both humans and the non-human natural world. Participants are invited to partake in experiences that invite mindfulness, connection, and healing. While studies have shown a positive impact of using nature-based therapies similar to forest bathing in the general population, few studies have involved healthcare providers.

To explore the potential benefits of forest bathing on the anxiety, depression, and psychological stress experienced by healthcare providers, a quality improvement pilot program of forest bathing was conducted with a group of primary care-track Internal Medicine residents in the western part of the U.S.

Methods

As part of a quality improvement pilot program, 15 primary care-track Internal Medicine resident physicians participated in a 1.5 hour guided Nature and Forest

Therapy walk (forest bathing) guided by two ANFT-certified forest therapy guides outdoors in a local urban botanic garden. This guided walk was conducted as part of an afternoon wellbeing session for these medical trainees, during which they were excused from clinical work. The wellbeing half-day also included a group coaching session prior to the forest bathing exercise; attendance for both sessions was expected. The ANFT guides donated their time to the Internal Medicine residency program for this pilot program.

Participants were e-mailed beforehand with information on the walk, weather preparedness, and safety. The walk was conducted in the Denver Botanic Gardens in January 2023. The temperature that day was approximately 20°F, and there was snow and ice on the grounds. The ANFT guides began the experience in a grove of trees, after participants had been invited to fill out the pre-participation survey. Following introductions, participants were led through the ANFT framework-based walk, which includes a sequence of simple sensory invitations in different spaces in the garden (eg, sight, smell, hearing, touch, taste). Participants are given permission to opt out or adapt the invitation to their own comfort levels. Within each invitation, noticing and interacting with the natural environment was emphasized. After each invitation, participants gathered in a circle and were given an opportunity to share their observations. The last invitation led participants to sit near a natural element of their choice and observe their surroundings for 20 minutes. Insulated seating pads were offered to mitigate the impact of the weather and season. The session concluded with participants gathering in a circle to share tea, snacks, and final thoughts. The entire experience lasted 1.5 hours. Participants were asked to complete un-linked pre- and post-participation surveys that were relayed to them using a QR code immediately prior to and following the experience, respectively. Surveys included the Mindful Attention Awareness (MAAS-5) Scale and additional wellbeing questions (see [Appendix](#)).⁹ The MAAS-5 is an abbreviated mindfulness scale of the 15-element traditional MAAS and is felt to reliably assess the current experience of mindfulness in the participant.^{10,11} Surveys were housed in Formstack, which is a secure, web-based application for building and managing online surveys and databases.

To compare participants' perceptions of their emotional state before and after their experience, we used a Fisher's exact test. To evaluate whether participants' MAAS-5 Scale score improved before and after their experience, we used a Student's t-test for independent samples. Frequencies with percentages for categorical variables and means with standard deviations for continuous variables have been reported. Except where otherwise indicated, proportions discussed in the text refer to the composite of Strongly Agree/Agree or Strongly Agree/Somewhat Agree as appropriate. All data

analysis was conducted using SAS Enterprise Guide 8.3 (SAS Institute, Inc., Cary, NC).

If a participant endorsed feeling depressed, our protocol was for follow-up with the program director who would have met with participants individually to assess wellbeing and connect them with appropriate resources. This protocol was approved by the Colorado Multiple Institutional Review Board as a Quality Improvement Project and thus Non-Human Subjects Research (#23-0914).

Results

Fourteen of the 15 participants completed the pre-intervention survey with all (15/15) participants completing the post-intervention survey. Mindfulness (MAAS-5) scores improved from mean 3.83 (SD 1.16) to 4.71 (SD .91), $P = .03$. The percentage of participants who strongly agreed/agreed to feeling calm, vital, or creative significantly increased after the guided forest therapy session (calm: pre-participation 50%, post-participation 100%, $P = .01$; vital or creative: pre-participation 36%, post-participation 60%, $P = .02$) with a non-statistically significant increase in those who felt rested (pre-participation 29%, post-participation 60%, $P = .12$) (Table 1). After the guided forest bathing exercise, the proportion of participants who were feeling burned out or irritable decreased (burned out: pre-participation 21%, post-participation 0%, $P = .39$; irritable: pre-participation 21%, post-participation 7%, $P = .13$) with a statistically significant decrease in feeling anxious (pre-participation 36%, post-participation 0%, $P < .001$). The proportion of participants who strongly agreed/agreed to feeling depressed was unchanged (0%). However, we observed a significant change in the degree to which they disagreed with feeling depressed after the intervention (strongly disagree/disagree pre-participation 71.4%, post-participation 93.3%, $P = .04$).

All the participants (100%) would recommend this program to their colleagues.

Discussion

In this quality improvement pilot program, we explored the potential benefits of forest bathing on the personal wellbeing of Internal Medicine residents. Immediately after a 1.5 hour forest bathing exercise, we observed significant improvements in mindfulness scores and in expressions of feeling calm, vital, or creative. We also observed decreased expression of feeling anxious or depressed with a non-significant trend towards decreased burnout and irritability. The degree of these improved markers of personal wellbeing is very encouraging for their potential to positively impact resident physicians, especially given the small number of participants.

This pilot program is important given that factors related to burnout, compassion fatigue, and perceived stress are commonly experienced among healthcare providers, including

medical residents.^{1,2} There is a growing body of evidence that nature-related interventions benefit the general population; however few studies explore their impact upon healthcare providers or medical residents.^{6,8} Those studies that exist show mostly positive outcomes, such as improved immune function in nurses taken on forest bathing walks,¹² improved subjective wellbeing among Chinese frontline workers observing 2-minute nature video clips,¹³ and decreased cortisol and improved subjective mental health after healthcare workers participated in forest walks or woodworking.¹⁴ One randomized control trial by Noushad et al (2022) looking at the effect of nature-based physical activity and trauma in healthcare workers, showed that nature-based physical activity significantly improved outcomes as a result of post-traumatic growth and also reduced traumatic stress.¹⁵ Vermeesch et al. (2022) found that a nature-based intervention using electronic sensors and an application (NatureDose™) was a feasible intervention to reduce perceived stress and increase quality of life as it relates to burnout and compassion fatigue for undergraduate nursing students.³ Their results contribute to the literature for nature-based interventions and center on maximizing opportunities for feasible, affordable, and sustainable stress-reduction interventions for undergraduate nursing students.³

Another randomized controlled study looking at chronic burnout among health sciences faculty and medical residents by Kavanaugh et al (2022) showed that exposure to a nature and forest therapy walk showed conflicting results.¹⁶ While their quantitative results did not show a difference in burnout symptoms after participating in a single SY walk between the control and intervention group, the qualitative data they gathered suggested improvements in mood and mental health. The authors note that they had great interest in their study, but they struggled to schedule participants due to time constraints, as this was conducted during the participants' own time.¹⁶ Their study concluded that as burnout symptoms slowly accumulate, prolonged exposure to nature therapy over time may also function to gradually improve wellbeing outcomes.¹⁶

Limitations

While the trends observed in this quality improvement project demonstrate significant positive improvement upon the psychological wellbeing of medical residents after a brief respite from clinical work through forest bathing, it of course has limitations. Participation was mandatory for this cohort of medical residents and occurred in place of scheduled clinical work at the end of their workday, which may have limited their intrinsic desire to benefit from this exercise. However, mandatory participation may also have been a strength, as participants could not self-select for those who are more inclined to appreciate forest bathing over those who are not. For such a program to work among healthcare providers, carving dedicated time out of their work schedules to

Table I. Forest Bathing Walk.

N = 15	Pre-participation N = 14 (%)	Post-participation N = 15 (%)	P-Value
I am feeling calm.			P = .01
Strongly disagree	-	-	
Disagree	2 (14.3)	-	
Neutral	5 (35.7)	-	
Agree	5 (35.7)	8 (53.3)	
Strongly agree	2 (14.3)	7 (46.7)	
I am feeling burned out.			P = .39
Strongly disagree	-	-	
Disagree	6 (42.9)	8 (53.3)	
Neutral	5 (35.7)	7 (46.7)	
Agree	2 (14.3)	-	
Strongly agree	1 (7.1)	-	
I am feeling vital or creative.			P = .02
Strongly disagree	-	-	
Disagree	5 (35.7)	-	
Neutral	4 (28.6)	6 (40.0)	
Agree	5 (35.7)	5 (33.3)	
Strongly agree	-	4 (26.7)	
I am feeling anxious.			P = <.0001
Strongly disagree	-	4 (26.7)	
Disagree	-	7 (46.7)	
Neutral	9 (64.3)	4 (26.7)	
Agree	5 (35.7)	-	
Strongly agree	-	-	
I am feeling rested.			P = .12
Strongly disagree	-	-	
Disagree	5 (35.7)	1 (6.7)	
Neutral	5 (35.7)	5 (33.3)	
Agree	4 (28.6)	6 (40.0)	
Strongly agree	-	3 (20.0)	
I am feeling depressed.			P = .04
Strongly disagree	-	5 (33.3)	
Disagree	10 (71.4)	9 (60.0)	
Neutral	4 (28.6)	1 (6.7)	
Agree	-	-	
Strongly agree	-	-	
I am feeling irritable.			P = .13
Strongly disagree	2 (14.3)	6 (40.0)	
Disagree	6 (42.9)	8 (53.3)	
Neutral	3 (21.4)	-	
Agree	3 (21.4)	1 (6.7)	
Strongly agree	-	-	
I would recommend this experience in the Forest & Nature Therapy Program to a colleague.			
Strongly disagree	N/A	-	
Somewhat disagree	N/A	-	
Neutral	N/A	-	
Somewhat agree	N/A	3 (20.0)	
Strongly agree	N/A	12 (80.0)	

participate may be helpful and avoid ‘adding one more thing’ to their workdays. In addition, our surveys were taken immediately before and after the intervention and did not contain any linking variables unique to participants. As such, we are unable to directly assess changes within each participant. Rather, this analysis reflects changes across the group. Finally, this project reflects the immediate impact of one forest bathing experience; follow-up regarding the longitudinal impact upon participants should be further explored.

Conclusion

The results of this quality improvement pilot project of guided forest bathing among Internal Medicine residents are promising and signal the potential to improve medical residents’ psychological wellbeing and mindfulness. Further exploration of guided forest bathing amongst health care providers is warranted, including larger, longitudinal evaluation of this program.

Appendix

Pre- & Post-Participation Nature and Forest Bathing Survey

Welcome Message

Thank you so much for your participation in the WellDOM Nature & Forest Therapy program.

We appreciate your input!

Please designate if this is your pre- or post-participation survey.

Pre-Participation

Post-Participation

Pre-Participation = I have not started the Nature & Forest Therapy Program yet.

Post-Participation = I completed the Nature & Forest Therapy Program.

For the following questions, please designate your current experience of the emotions described.

I am feeling calm.

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

I am feeling burned out.

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

I am feeling vital or creative.

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

I am feeling anxious.

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

I am feeling rested.

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

I am feeling depressed.

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

I am feeling irritable.

Strongly Agree

Agree

Neutral

Disagree

Strongly Disagree

Pre Participation Logic

Using the scale below, please indicate to what degree you were having each experience below during the last time you were at work.

I was finding it difficult to stay focused on what was happening.

0 - Not at all

1

2

3 – Somewhat

4

5

6 – Very Much

I was doing something without paying attention.

0 - Not at all

1

2

3 – Somewhat

4

5

6 – Very Much

I was preoccupied with the future or the past.

0 - Not at all

1

2

3 – Somewhat

4

5
6 – Very Much

I was doing something automatically, without being aware of what I was doing.

0 - Not at all
1
2
3 – Somewhat
4
5
6 – Very Much

I was rushing through something without being really attentive to it.

0 - Not at all
1
2
3 – Somewhat
4
5
6 – Very Much

Post Participation Logic

Using the scale below, please indicate to what degree you were having each experience below during the Nature & Forest Therapy Intervention.

I was finding it difficult to stay focused on what was happening.

0 - Not at all
1
2
3 – Somewhat
4
5
6 – Very Much

I was doing something without paying attention.

0 - Not at all
1
2
3 – Somewhat
4
5
6 – Very Much

I was preoccupied with the future or the past.

0 - Not at all
1
2
3 – Somewhat
4
5
6 – Very Much

I was doing something automatically, without being aware of what I was doing.

0 - Not at all
1
2
3 – Somewhat

4
5
6 – Very Much

I was rushing through something without being really attentive to it.

0 - Not at all
1
2
3 – Somewhat
4
5
6 – Very Much

Post Participation Logic

I would recommend this experience in the Forest & Nature Therapy Program to a colleague.

Strongly Agree
Somewhat Agree
Neutral
Somewhat Disagree
Strongly Disagree

Post Participation Logic

(Optional) Please provide any feedback you would like to share on this program.

Acknowledgements

The authors would like to thank the Nature and Forest Therapy “Think Tank” and Drs. Stephanie Chang, Jonathan Kavanaugh, and Heidi Rogers for their insights and editorial input in the drafting of this manuscript.

Author Contributions

K.M., K.J., and K.O. all contributed to the conceptualization, methodology, investigation, resources, original draft preparation, review and editing, visualization, and supervision. K.J. additionally contributed to the data curation. A.V. contributed to draft review, revising, and editing. A.K and L.M. contributed to the methodology, original draft preparation, validation, formal analysis, draft review, editing. All authors have read and agreed to the published version of the manuscript. All authors listed have contributed sufficiently to the project to be included as authors, and all those who are qualified to be authors are listed in the author byline.

Declaration of Conflicting Interests

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

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: Support for this project was provided by the Department of Medicine at the University of Colorado Anschutz Medical Campus, Aurora, CO. The funding source had no influence on the study design, collection, analysis, or interpretation of the data; the writing of this report; or the decision to submit this report for publication.

Ethical Statement

Ethical Approval

Each author listed in this manuscript has seen and approved the submission of this version of the manuscript and takes full responsibility for the manuscript. Dr. Katherine Morrison wrote the first draft of the manuscript.

ORCID iDs

Amber L. Vermeesch  <https://orcid.org/0000-0002-7560-4787>

Kerry “Nellie” O’Connor  <https://orcid.org/0009-0000-3506-5021>

References

1. Rodrigues H, Cobucci R, Oliveira A, et al. Burnout syndrome among medical residents: a systematic review and meta-analysis. *PLoS One*. 2018;13(11):e0206840.
2. Dyrbye LN, West CP, Satele D, et al. Burnout among US medical students, residents, and early career physicians relative to the general US population. *Acad Med*. 2014;89(3):443-451.
3. Vermeesch AL, Coro A, Mattes K, Ostendorff D, Timko Olson E, Garrigues L. Nature-based feasibility intervention to influence mitigation strategies for perceived stress. *Int J Environ Res Publ Health*. 2022;19(19):12277.
4. Chmielewski J, Łoś K, Łuczyński W. Mindfulness in healthcare professionals and medical education. *Int J Occup Med Env*. 2021;34(1):1-14.
5. Aeschbach VM, Fendel JC, Schmidt S, Göritz AS. A tailored mindfulness-based program for resident physicians: a qualitative study. *Compl Ther Clin Pract*. 2021;43:101333.
6. Hansen MM, Jones R, Tocchini K. Shinrin-yoku (forest bathing) and nature therapy: a state-of-the-art review. *Int J Environ Res Publ Health*. 2017;14(8):851.
7. Clarke FJ, Kotera Y, McEwan K. A qualitative study comparing mindfulness and shinrin-yoku (forest bathing): practitioners’ perspectives. *Sustainability*. 2021;13(12):6761.
8. Nejade RM, Grace D, Bowman LR. What is the impact of nature on human health? A scoping review of the literature. *Journal of Global Health*. 2022:12.
9. Association of Nature & Forest Therapy Guides and Programs. <https://www.natureandforesttherapy.earth/>. Accessed April 05, 2023.
10. Brown KW, Ryan RM. The benefits of being present: mindfulness and its role in psychological well-being. *J Pers Soc Psychol*. 2003;84:822-848.
11. Caycho-Rodríguez T, Tomás JM, Ventura-León J, et al. Factorial validity and invariance analysis of the five items version of Mindful Awareness Attention Scale in older adults. *Aging Ment Health*. 2021;25(4):756-765.
12. Li Q. Effect of forest bathing trips on human immune function. *Environ Health Prev Med*. 2010;15:9-17.
13. Hu C, Zhu K, Huang K, et al. Using natural intervention to promote subjective well-being of essential workers during public-health crises: a Study during COVID-19 pandemic. *J Environ Psychol*. 2022;79:101745.
14. Kim Y, Choi Y, Kim H. Positive effects on emotional stress and sleep quality of forest healing program for exhausted medical workers during the COVID-19 outbreak. *Int J Environ Res Publ Health*. 2022;19(5):3130.
15. Noushad S, Ansari B, Ahmed S. Effect of nature-based physical activity on post-traumatic growth among healthcare providers with post-traumatic stress. *Stress Health*. 2022;38(4):813-826.
16. Kavanaugh J, Hardison ME, Rogers HH, White C, Gross J. Assessing the impact of a Shinrin-Yoku (Forest Bathing) intervention on physician/healthcare professional burnout: a randomized, controlled trial. *Int J Environ Res Publ Health*. 2022;19(21):14505.