

**Increasing provider utilization and understanding of Nature Based Interventions to improve  
mental wellbeing in pediatric patients: A quality improvement project.**

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### **Abstract**

The mental wellbeing of children and adolescents in the United States has been declining while rates of anxiety and depression in youth have been rising. Improvement of pediatric mental wellbeing is multifaceted and treatment from providers includes a variety of interventions ranging from nonpharmacological to pharmacological. Nature-based interventions (NBIs) are nonpharmacological interventions that can improve memory, cognition, and attention as well as decreasing anxiety, stress, and depression in pediatric patients. Many pediatric primary care providers (PCP) feel under-prepared to help pediatric patients meet their mental health goals. Furthering educational opportunities of pediatric PCPs to the treatment options such as NBI's can aid providers in growing their toolbox to help improve feelings of preparedness in PCPs to improve pediatric mental wellbeing.

This quality improvement (QI) project aimed to improve provider utilization and understanding of nature-based interventions through an educational intervention. Improvement was measured through pre- and post-survey results. Data revealed a statistically significant improvement to two of four survey categories ( $p < 0.5$ ). These categories were: 1) understanding of nature-based interventions and 2) understanding of available community resources. Survey results showed providers in both clinics had greater knowledge about the benefits of NBI's for pediatric mental wellbeing and were more equipped to recommend these interventions to their patients' post-intervention.

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## Introduction

### Problem Description

The mental wellbeing of children and adolescents in the United States has declined while rates of anxiety and depression in youth have risen. Since 2003, the number of children aged 6- to 17-years-old diagnosed with either anxiety or depression increased from 5.4% in 2003 to 8.4% in 2012 (Centers for Disease Control and Prevention, 2023). Treatment interventions for anxiety and depression can be pharmacological and non-pharmacological or in some cases a combination of both. Interventions are tailored to each patient, but some individuals wishing to remain unmedicated, or needing a multifaceted approach to treat their disorder, may wish to pursue alternative interventions (Tambayah, et al., 2022). One of these alternatives, nature-based interventions (NBI) revolve around nature-based experiences being used to promote mental, physical, and social well-being (Shanahan et al., 2019).

Nature based interventions can be used in multiple clinical scenarios, and spending time in nature has been proven to help treat mental health disorders such as anxiety and depression (Owens & Bunce, 2022). NBI's have multiple mental health benefits including spending time in nature can improve memory, cognition, and attention as well as decreasing anxiety, stress, and depression (Tambayah, et al., 2022). Other benefits include patients showing increased levels of confidence, self-worth, happiness, and feelings of safety (Tambayah, et al., 2022). Examples of nature-based interventions include, but are not limited to the following: Nature walking groups, community gardening, forest bathing, and talk therapy in a natural setting. These activities enable patients to process thoughts and emotions as they experience nature (Tambayah, et al., 2022).

Despite the efficacy of NBI's and the prevalence of mental health disorders in adolescents, many pediatric primary care providers (PCP) feel under prepared to help pediatric patients meet their mental health goals (Green et al., 2019). Furthering educational opportunities of pediatric PCPs to the

treatment options such as NBI's can aid providers in growing their toolbox to help improve feelings of preparedness in PCPs to treat pediatric anxiety and depression and improve patient mental wellbeing.

### **Available Knowledge**

Three themes were identified in the literature from mental health clinicians as to their perceptions of the benefits, supports and barriers to implementing NBIs. Three themes revealed mental health clinicians are: 1) Supportive of NBI's as treatment interventions, 2) Perceived benefit of NBIs for mental health patients, and 3) Perceived barriers to NBIs exist throughout the mental healthcare field (Tambayah et al., 2022). These three themes will be discussed in the following section of this paper utilizing evidence from Tambayah and colleagues (2022) and additional resources.

### ***Mental health clinicians are supportive of Nature-Based Interventions***

The utilization of NBI's as a nonpharmacological treatment for mental health conditions is supported by mental health clinicians (Tambaya et al., 2022; Bloomfield 2017). Tambayah and colleagues (2022) reported all providers, who were interviewed for a study, were supportive of NBI's. The providers recommended NBI programs to their patients, and some were already recommending them to patients (Tambayah et al., 2022). Another study stated "[providers] have also responded positively to the pilots; all 12 of the referrers into the scheme stated that they saw benefits to their patients and wished to continue to be able to send people to the service, or a similar extension" (Bloomfield, 2017, pg. 2). Although many providers are aware of NBI's and are supportive of them, there are many providers unaware of NBIs as a treatment technique as they are not yet mainstream treatment (Shanahan et al., 2019).

### ***Benefits of Nature-Based Interventions***

The perceived benefit of NBI's extend not only to mental health benefits, but also can improve physical health and social wellbeing (Shanahan et al, 2019; Owens & Bunce,2022). NBI's are a way to promote physical activity, which improves physical health while patients also experience the restorative

effects of spending time in nature can have on an individual (Shanahan et al., 2019). Spending time in nature can impact patients in multiple aspects including the reduction of both psychological and physiological stress, reductions in rumination in different contexts, and increased mindfulness (Owens & Bunce, 2022).

A systematic review compared two separate NBI studies. One study was a randomized controlled study while the other was a non-randomized study. However, both revealed NBI's can decrease depressive symptoms in both clinical and non-clinical samples (Owens & Bunce, 2022). Another study on the long- and short-term benefits of NBIs on anxiety and depression reported specific examples such as endorphin release from nature walks (Tambayah, et al., 2022). In a study with similar results, 69 percent of patients ( $n=33$ ) who participated in a 10-to-12-week program, had an increase in well-being (Bloomfield, 2017).

### ***Barriers to Nature-Based Interventions***

Much like any other treatment, NBI's have barriers that exist for accessibility. The most prevalent issues revolved around accessibility to outdoors space. Disadvantaged communities have reported less vegetation, fewer parks, and fewer trees. Physical ability to participate in some versions of NBI's can also be a barrier (Shanahan et al., 2019). Barriers also exist for activities such as group nature walks as coordination of groups may take time and waiting times may reach up to six weeks to arrange groups (Bloomfield, 2017). Other barriers include patients' feelings of skepticism about NBI's, poor physical health, lack of motivation, social anxiety, or lack of transportation (Tambayah, et al., 2022)

### **Rationale**

To improve provider knowledge and utilization of NBI in practice, the Institute for Healthcare Improvement (IHI) Model for Improvement (MFI) was utilized. This model supports change within the organization and has been utilized by many health care organizations to improve different processes and outcomes (Institute for Healthcare Improvement, 2023). This MFI utilized the Plan-Do-Study-Act cycle to

guide the change and ensure the change was an improvement. During the root cause analysis, lack of knowledge of NBI's and lack of knowledge of resources contribute to low utilization and understanding of NBI's to improve mental wellbeing (Appendix A). The efficacy of NBI's on mental wellbeing has been reported through a literature review and interest in furthering education on the subject was endorsed by two pediatric primary care clinics. The clinics were in Hillsboro, Oregon and Bellingham, Washington.

### **Specific Aims**

The goal of this Quality Improvement (QI) project was to improve provider knowledge and utilization of NBIs in each of the communities. The aim was to demonstrate a statistically significant increase ( $p$  value  $<0.5$ ) in response to at least 2 of the 4 survey questions that were asked before and after the intervention.

## **Methods**

### **Context**

This QI project utilized a quantitative description design, which was completed at two different pediatric primary care clinics. One clinic was in Hillsboro, Oregon and the other was in Bellingham, Washington.

The clinic in Hillsboro, Oregon was comprised of 18 providers, seven of which were physicians and 11 were advanced practice providers (APRN). The city of Hillsboro has a population estimate of 107,299 people with 22.7% are under the age of 18. The population density of the area was 4,146 people per square mile (United States Census, 2022). In Hillsboro, there were 30 parks that encompass 1,600 acres across the city (Hillsboro Oregon, n.d.).

The clinic in Bellingham was associated with a large hospital system located throughout the Pacific Northwest. It was comprised of a combination of pediatricians ( $n=23$ ), pediatric sub-specialty providers ( $n=10$ ) and one pediatric APRN. The city of Bellingham has a population of 93,896 people with 13.5% are below the age of 18. The population density of the area was 3,250 people per square mile

(United States Census, 2022). Bellingham has more than 40 parks and a multiple of trail systems (City of Bellingham, 2023).

### **Interventions**

The intervention for this QI project centered around an educational session of approximately 10-15 minutes in length that discussed the benefits and application of NBIs on pediatric patients. At this session, a printed informational brochure (Appendix B) was provided to the clinics that outlined what NBI's were and where patients could participate in them within the clinic's respective areas. The team for this QI project consisted of one Doctor of Nursing Practice (DNP) student, who was employed at one of the clinics. The student presented an educational session along with creating and providing the NBI resource brochures for each clinic. Each clinic received printed brochures, and a file to a pdf document of a list of local resources for their patients and families. The DNP student was assisted by a representative at each clinic, one Pediatric Nurse Practitioner, and one MD. To gather data on determining the understanding and utilization of NBI's a 4-question survey was developed and administered before and 1-month after the educational session. All surveys were anonymous.

### **Measures**

The surveys used a five-point Likert scale format (1 = never and 5 = always/expert). Higher scores indicate greater endorsements of the concept. The survey had 4 questions along with a demographic section (Appendix C).

### **Analysis**

Data were collected using Qualtrics®, an online survey tool. After the electronic survey was closed, data was downloaded into Microsoft Excel, then compared to the hard copy of each participant's data was checked for accuracy and analyzed. Sample demographics were summarized using means and standard deviations for continuous variables, and frequency counts and percentages for nominal variables. Pre- versus post-implementation data were compared quantitatively using unpaired t-tests,



which identified which results were statistically significant ( $p < 0.05$ ). After the pre- and post-intervention surveys were analyzed from each clinic, data were combined and analyzed using unpaired t-tests.

### **Ethical Considerations**

A request for determination from the Oregon Health Sciences University (OHSU) and PeaceHealth IRB was submitted. The Hillsboro clinic deferred to the OHSU IRB for oversight (Appendix D). Both OHSU and PeaceHealth IRBs determined the project was not human research. (Appendix E). The project posed a small risk for staff burden, but by making the survey short, the burden was minimal. No identifiable data was collected from the participants as the surveys were anonymous. Autonomy of providers was reserved through the right to participate or to not participate. Data from surveys were secured on a password protected device. Verbal and email consent was received from both clinics prior to starting the project.

## **Results**

### **Demographics**

Demographics were compiled in both clinics. The Bellingham demographics of the participants revealed there was a mixture of males and females, which were overwhelmingly white with 15 or more years of experience as a pediatric provider (Table 1).

**Table 1.**

*Descriptive Statistics of Bellingham Pediatric Clinic*

Variable	Pre-Intervention <i>N=10</i>	Variable	Post- Intervention <i>N=8</i>
Male	7 (70%)	Female	5 (62.5%)
White	8(80%)	White	6 (75%)
Experience: 15+ years	4 (40%)	Experience: 5-10 years	3 (37.5%) 3 (37.5%)

The Hillsboro data showed that participants were majorly female, overwhelmingly white, with 0-5 years of experience (Table 2).

**Table 2.**

*Descriptive Statistics of Hillsboro Pediatric Clinic*

Variable	Pre-Intervention N=12	Variable	Post- Intervention N=6
Female	11 (92%)	Female	6 (100%)
White	11 (92%)	White	5 (83%)
Experience: 0-5 years	4 (33%)	Experience: 5-10 years	3 (50%)

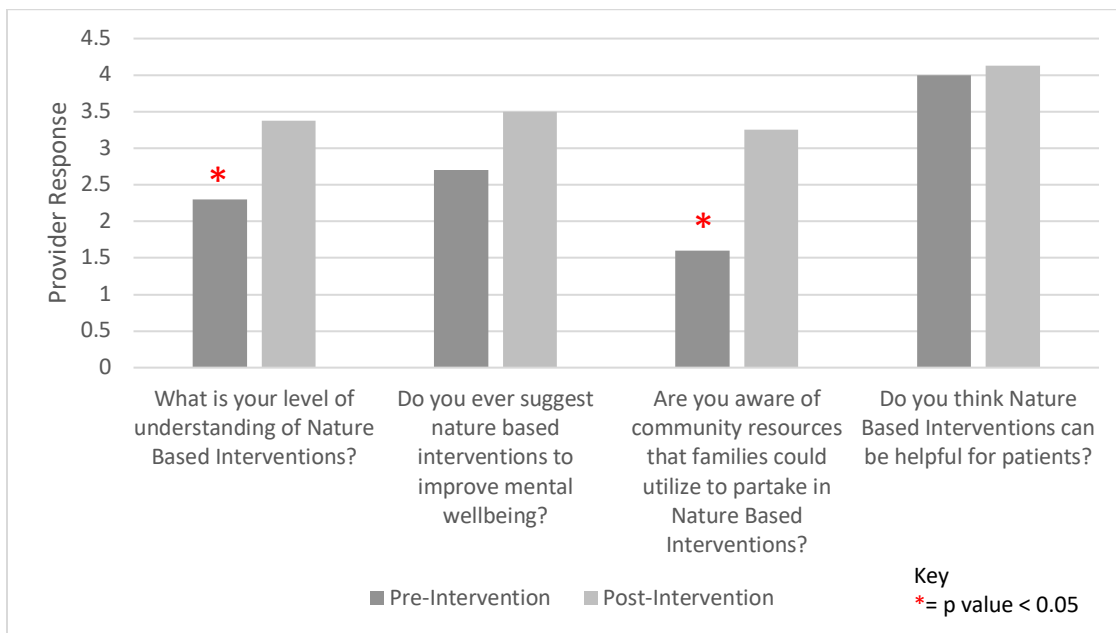
## Findings

Findings from the two clinics revealed similar themes in provider response to the intervention. Both clinics had statistically significant ( $p < 0.05$ ) increases in provider response to two of the four survey questions.

Bellingham data showed a statistically significant increase in provider understanding of nature-based interventions ( $p = 0.035$ ) and awareness of community resources that families could partake in nature-based interventions ( $p = 0.008$ ). (Figure 1). Hillsboro data revealed a significant increase in provider survey response in the same categories as the Bellingham data with 1) provider understanding of nature-based interventions ( $p = 0.0003$ ) and 2) awareness of community resources ( $p = 0.00004$ ) (Figure 2.)

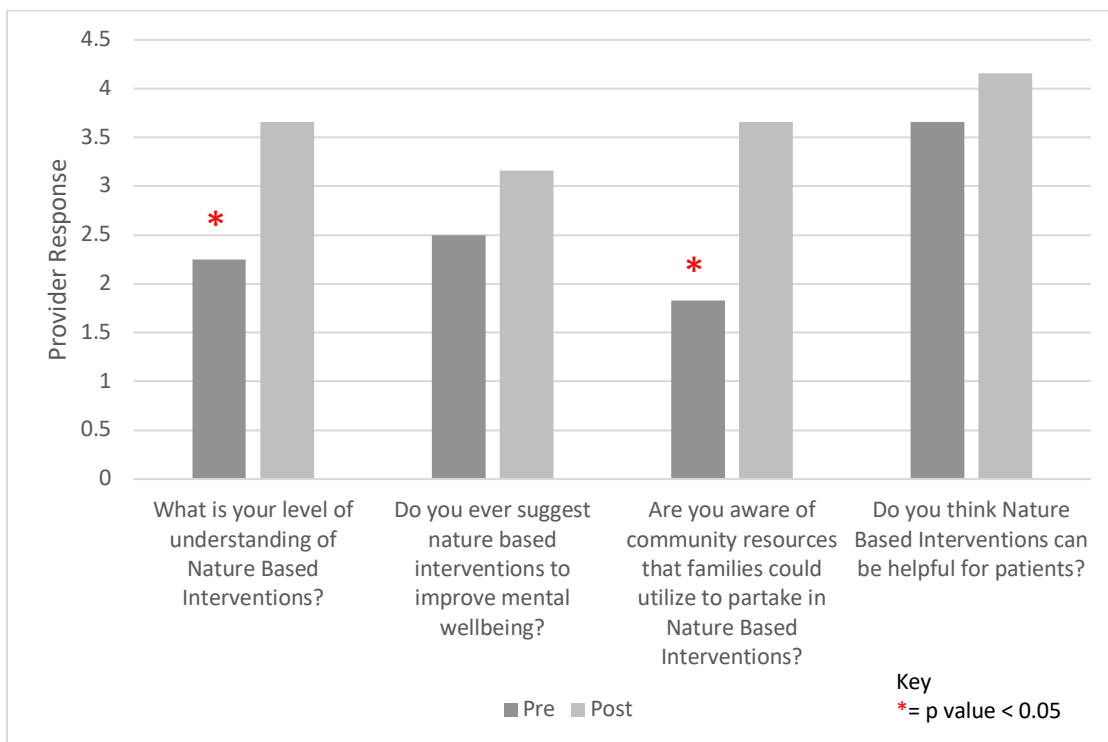
**Figure 1.**

*Survey Response Comparison Pre- and Post-Intervention in Bellingham Clinic*



**Figure 2.**

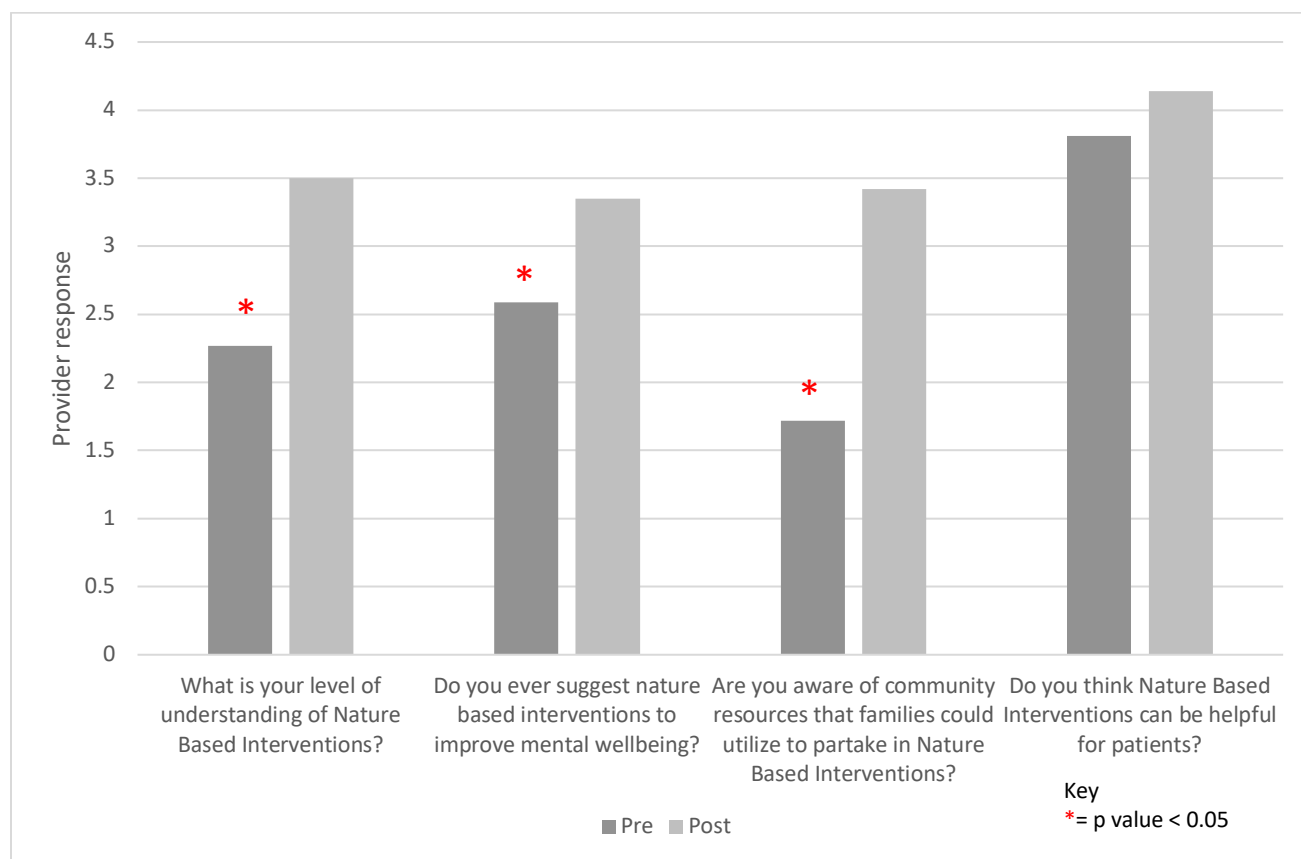
*Survey Response comparison Pre- and Post-Intervention in Hillsboro clinic*



Combined data from Bellingham and Hillsboro pediatric clinics revealed three statistically significant results: 1) level of understanding of nature-based interventions ( $p=0.0001$ ), 2) suggestion of nature-based interventions ( $p=0.006$ ), and 3) awareness of community resources ( $p=0.000016$ ) (Figure 3; Table 3).

**Figure 3.**

*Survey response Comparison Pre- and Post-Intervention Combined*



Of note, all three unpaired groupings showed little change if providers thought nature-based interventions could be helpful for patients. This is notable as both prior and after the educational session, providers thought NBI's could be helpful for patients.

**Table 3**

*Unpaired T-test of Pre- and Post-Interventions Results, Statistically Significant p-value results in Red*

	Bellingham	Hillsboro	Combined
What is your level of understanding of Nature Based Interventions?	0.035	0.0003	0.0001
Do you ever suggest Nature Based interventions to improve mental wellbeing?	0.057	0.063	0.006
Are you aware of community resources that families could utilize to partake in Nature Based Interventions?	0.008	0.00004	0.000016
Do you think Nature Based Interventions can be helpful for patients?	0.754	0.199	0.21

### Discussion

The aims of this project were achieved, both clinical sites showed positive improvement to two out of the four survey responses. The project data showed statistically significant ( $p < 0.05$ ) increases in multiple areas when comparing pre- and post- intervention survey data. Data showed statistically significant increases in all groups to 1) provider understanding of nature-based interventions and 2) awareness of community resources available for nature-based interventions. When data were combined a statistically significant increase was noted in a third response: Suggestion of nature-based interventions to improve mental wellbeing. Providers survey results showed they had greater knowledge about the

benefits of NBI's for pediatric mental wellbeing and were more equipped to recommend these interventions to their patients. Pediatric providers need to be willing to start conversations with children, adolescents and families about mental health and the benefits of nature. They need to be able to provide suggestions to families of different ways to participate in nature-based interventions regardless of their financial situation from walking a city trail or a trip to the beach for a day of fun in the sun and enjoying a picnic lunch outside rather than going to a restaurant. American's youth need to reconnect with nature and enjoy the benefits of nature.

These results are in line with other published data, such as the findings of Tambayah and colleagues (2022). Both clinics revealed providers believed NBIs could be helpful to patients. This QI project demonstrated an educational intervention could increase understanding and utilization of NBI in primary care settings.

#### **Limitations**

There were limitations to this QI project. The small sample size of survey participants being the largest limitation. Other limitations include only approximately 50% of intervention attendees completed the surveys. Additionally, there was a notable lack of response in post data collection at 1-month at both clinics (Bellingham  $n=10$  vs.  $n=8$ / Hillsboro  $n=12$  vs.  $n=6$ ) which may have skewed data results. The QI project was only completed at two clinics, both of which were in communities with above average access to parks and trail systems. The community emphasis on outdoor activity may have impacted data, as many individuals choose to live in these areas to recreate outdoors.

#### **Future Research**

This QI revealed the educational intervention was effective in improving provider utilization and understanding of NBI to improve mental wellbeing of pediatric patients. Further PDSA cycles should be completed to determine if the intervention could be effective in other settings such as large urban areas.

### **Conclusion**

Within increased knowledge about nature-based interventions, pediatric providers need to be willing to start conversations with children, adolescents and families about mental health and the benefits of nature. They need to be able to provide suggestions to families with different ways to participate in nature-based interventions regardless of their financial situation from walking a city trail to a trip to the beach for a day of fun in the sun. American's youth needs to reconnect with nature and enjoy the benefits of nature for their mental health.

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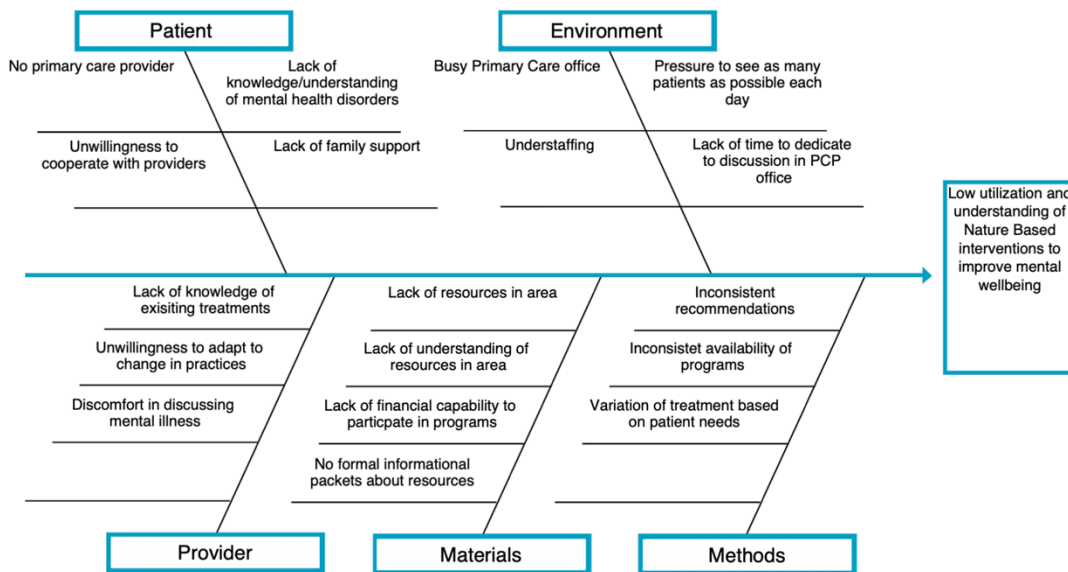
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### Appendix A

Cause and Effect Diagram of Low Utilization and Understanding of Nature Based Interventions to improve mental wellbeing



## Appendix B

### Bellingham Pediatric Clinic

### OVERVIEW

Caring for your body is much more than caring for your physical self- Mental Wellbeing matters!

- Rates of anxiety and depression in youth have been on the rise since 2003 (1).
- The COVID-19 Pandemic is thought to have caused a 25% increase in anxiety and depression (2).
- You can work with your child to help them achieve mental wellbeing.

Nature Based Activities have been proven through research to improve mental wellbeing (3).

- Research reveals spending time in nature can help treat anxiety and depression.
- Time in nature can also help your child feel more calm, self-regulated and and grow in resilience.

Nature Based Activities can include a wide range of activities for you and your child.

## NATURE BASED ACTIVITIES

What they are and where to find them



## LET'S

## GO

## OUT

## SIDE

### MORE

## RESOURCES

**Every Community has different outdoor opportunities- explore yours to find more!**

- Find a local park or trail in your area to explore.
  - <https://cob.org/services/recreation/parks-trails>
- Start a 1,000 hours outside tracker to get motivated.
  - <https://www.1000hoursoutside.com>
- Explore the children in nature network website- try a Vitamin N challenge!
  - <https://www.childrenandnature.org>
- Encourage your child to join a sports team to get out and stay active.
  - <https://cob.org/services/recreation/activities/sports>
- Find a Community Garden and get your child involved!
  - <https://cob.org/services/recreation/activities/gardens>
- Pick a local park or beach and Forest Bathe with your child (follow Children & Nature's guide on how to Forest Bathe).
  - <https://natureforall.global/wp-content/uploads/2021/08/Forest-Bathing-Final-compressed.pdf>

## HOW YOU CAN GET OUTSIDE



### FOREST BATHING

Forest Bathing can be practiced in many ways, turn off your electronics and practice spending mindful time outside with your child



### NATURE WALKS & COMMUNITY GARDENS

Bring your child and some friends to go for a walk in a local park, or explore your local community garden

## CURRENT

## BENEFITS

- Outdoor time can help improve mindfulness which can help children manage behaviors and reactions leading to better impulse control and self regulation (3).
- Outdoor play can increase a sense of belonging and connection which can help with children developing Self Identity (3).
- Nature-Based activities
  - Improve memory, mood, cognition and attention
  - decrease anxiety, stress and depression (4)
- Forest Bathing- or spending mindful time outdoors has been shown to improve anxiety and overthinking (5).

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Hillsboro Clinic

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- Forest Bathing- or spending mindful time outdoors has been shown to improve anxiety and overthinking (5)

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## Appendix C

### Survey

I would very much like to receive feedback on your opinions of Nature-Based Interventions and their utilization in your practice. The feedback you provide will be helpful in determining if our educational intervention helped increase understanding and utilization in your clinic. Thank you for taking the time to provide feedback!

1. How many years of experience do you have as a provider?
  - a. 0-3 years
  - b. 3-5 years
  - c. 5-10 year
  - d. 10+ years
  - e. Prefer not to answer
2. What gender do you best identify with?
  - a. Female
  - b. Male
  - c. Nonbinary
  - d. Prefer not to answer
3. Please specify your ethnicity
  - a. Caucasian
  - b. African American/Black
  - c. Latino or Hispanic
  - d. Asian
  - e. Native American/Alaska Native
  - f. Native Hawaiian or Pacific Islander
  - g. Two or More
  - h. Other/Unknown
  - i. Prefer not to answer
4. Where is your clinic located?
  - a. Oregon
  - b. Washington
5. What is your level of understanding of NBI's?
  - a. 1 (none)
  - b. 2 (minimal)
  - c. 3 (some)
  - d. 4 (moderate)
  - e. 5 (expert)
6. Do you suggest NBI's to improve wellbeing?
  - a. 1 (never)
  - b. 2 (rarely)
  - c. 3 (sometimes)
  - d. 4 (frequently)
  - e. 5 (always)
7. Are you aware of community resources that could be utilized to partake in NBI's?
  - a. 1 (none)
  - b. 2 (minimal)

- c. 3 (some)
  - d. 4 (moderate)
  - e. 5 (expert)
8. Do you think NBI's can be helpful to patients?
- a. 1 (never)
  - b. 2 (rarely)
  - c. 3 (sometimes)
  - d. 4 (frequently)
  - e. 5 (always)

## Appendix D

## Hillsboro Deferment to OHSU IRB

**Phone:** (503)640-2757  
**Toll free:** 1(877)300-6102  
**Fax:** (503)640-9753  
**Main Street Office:**  
**445 East Main Street**  
**Hillsboro, Oregon 97123**  
**Orengo Station Office:**  
**6125 Northeast Cornell Road, Suite 240**  
**Hillsboro, Oregon 97124**  
**www.HillsboroPeds.com**



**Gabriela Angler-Cortez, MD, FAAP; Greg Brown, MD, FAAP; Jessica Chaney, RN, DNP, CPNP-PC/AC, IBCLC; Kelcey Chilcott, RN, MSN, CPNP-PC, PPCMHS; Jenny Fedoroff, MD, FAAP, CLC; Monique Gutierrez, MD, FAAP; Christina Kellogg-Gratchner, RN, MN, PPCNP-BC, IBCLC; Kelsey-Jo Moss, RN, MSN, CPNP-PC; Beth Mossman, MD, FAAP, IBCLC; Emily Pratt, MD, PhD, FAAP; Erin Schmidt, RN, MSN, DNP, CPNP-PC/AC; Dawn Wardrip, RN, MSN, ND, CPNP-PC; Deborah Welts, RN, MSN, CPNP-PC; Tanna Winters, RN, MSN, CPNP; Liz Avalos, MS, LMFT; Allison Huntley, MSW, LCSW; Lynsey Lomell, MSW, LCSW**

### Caring for Infants, Children & Adolescents

Hillsboro Pediatric Clinic LLC complies with applicable Federal civil rights laws and does not discriminate on the basis of race, color, national origin, age, disability, or sex.  
 ATENCIÓN: Si habla español, tiene a su disposición servicios gratuitos de asistencia lingüística. Llame al 1-503-640-2757.  
 CHÚ Ý: Nếu bạn nói Tiếng Việt, có các dịch vụ hỗ trợ ngôn ngữ miễn phí dành cho bạn. Gọi số 1-503-640-2757.

To whom it may concern,

Hillsboro Pediatric Clinic is a small, privately owned clinic that does not have an Institutional Review Board. Hillsboro Pediatric Clinic will defer to OHSU regarding the Request for Determination for the QI project, *Increasing provider utilization and understanding of Nature Based Interventions to improve mental wellbeing in pediatric patients: A quality improvement project.*

Emily Pratt MD PhD  
 Medical Director

## Appendix E

OHSU IRB



## IRB MEMO

Research Integrity Office

3181 SW Sam Jackson Park Road - L106RI  
 Portland, OR 97239-3098  
 (503)494-7887 irb@ohsu.edu

### NOT HUMAN RESEARCH

September 7, 2023

Dear Investigator:

On 9/7/2023, the IRB reviewed the following submission:

Title of Study:	Increasing provider utilization and understanding of Nature Based Interventions to improve mental wellbeing in pediatric patients: A quality improvement project
Investigator:	<a href="#">Sandra Banta-Wright</a>
IRB ID:	STUDY00026236
Funding:	None

The IRB determined that the proposed activity is not research involving human subjects. IRB review and approval is not required.

Certain changes to the research plan may affect this determination. Contact the IRB Office if your project changes and you have questions regarding the need for IRB oversight.

If this project involves the collection, use, or disclosure of Protected Health Information (PHI), you must comply with all applicable requirements under HIPAA. See the [HIPAA and Research website](#) and the [Information Privacy and Security website](#) for more information.

Sincerely,

The OHSU IRB Office



## PeaceHealth IRB



## Institutional Review Board

DATE: August 21, 2023

TO: Alyse Watkins  
FROM: PeaceHealth System Institutional Review Board

PROJECT TITLE: [2092559-1] ~~Increasing~~ Provider Utilization and Understanding of Nature Based interventions to Improve Mental Wellbeing in Pediatric Patients - A Quality Improvement Project

SUBMISSION TYPE: New Project

ACTION: DETERMINATION OF NOT RESEARCH  
DECISION DATE: August 20, 2023

Thank you for your submission of New Project materials for this project. The PeaceHealth System Institutional Review Board (IRB) has determined this project does not meet the definition of human subject research under the purview of the IRB according to federal regulations.

This is not PeaceHealth administrative approval. You will still need departmental approval to proceed with your project.

We will retain a copy of this correspondence within our records.

If you have any questions, please contact the IRB. Please include your project title and reference number in all correspondence with this committee.

The IRB is covered under Human Subjects Assurance number FWA 00003906.