

Improving child & adolescent mental health through outdoor programming

ENGAGING THE LAND CONSERVATION COMMUNITY



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ABOUT THIS REPORT

Rates of mental health concerns for children and adolescents are high across the United States and potentially rising as, simultaneously, young people are spending less time outdoors than ever before. These trends are especially pronounced for children of color and low-income urban youth, who face multiple barriers to accessing nature and gaining treatment for mental health concerns.

The land conservation community has a unique opportunity to help reverse these trends. Time spent in nature has been associated with improved psychological functioning, overall mental health, and connection to place for children, teenagers, and parents. Conserved lands, both publicly and privately held, can provide a supportive, welcoming, and safe space for children and adolescents to engage with nature and experience the mental health benefits it provides. Such engagement also holds the potential to increase the community-relevance of conserved lands, secure a broader population of stewards and donors, and assist in managing and protecting land in perpetuity.

Based on the hypothesis that land trusts, land managers, and parks professionals could be partners in the effort to improve child and adolescent mental health in the United States, and more active participants in the growing nature-health movement, we surveyed existing outdoor programming, nature-health literature, and youth-mental-health experts to generate recommendations for the next generation of nature-health programming in America.

This report reviews the state of pediatric mental-health in the US, considers what role nature-experiences can play, and provides a list of insights and recommendations gathered from interviews with leaders from existing programs. We end with a menu of potential pilot actions that organizations can take to begin offering nature-based programming for America's youth aimed at bringing the mental health benefits of the outdoors to new, diverse audiences, who may need it now more than ever.

EXECUTIVE SUMMARY

Why should the conservation community think about youth mental health?

- **Child and adolescent mental health needs are high across the US.** One in six children under the age of 8 are currently considered to meet criteria for an emotional, behavioral, or developmental disorder. Meanwhile, rates of depression, anxiety, suicidal ideation, and body dysmorphia have all modestly increased among adolescents over the last two decades, despite expansions in mental healthcare provision and national awareness of mental health concerns. Children from rural, low-income, uninsured, and minority families have the greatest risk of developing psychiatric conditions and the least access to mental health resources and care.
- **Nature-based interventions may be part of the solution.** A typical child in America spends less than 40 minutes per week outdoors. Even as today's children spend less time outside than previous generations, new evidence suggests that time in nature can provide distinct psychological benefits. In empirical studies, youth exposure to natural spaces has been associated with improved cognitive function, stress resilience, emotional regulation and stress coping, restoration of attention, increased imagination and creativity, and the development of motor, communication, and decision-making skills.
- **Conserved lands can provide new opportunities for "healthcare."** Getting kids outside again holds promise as a low-cost pediatric mental health intervention. As land trusts directly own > 8 million acres of US land and indirectly protect > 48 million acres through easements and agreements, often in low-income and rural communities, there is a unique spatial overlap between America's mental health needs and its conserved lands. This creates an opportunity for the conservation community to help improve youth mental health while bringing new users to preserved lands, increasing the community relevance of land holdings, and engaging a wider pool of future community stewards.

How should the conservation community get involved?

From January to June 2020 we surveyed existing outdoor-based child and adult health-focused programs and experts across the US to collect recommendations for potential nature-based youth mental health programming. 27 experts were consulted, including mental-health clinicians and practitioners, parks and health-program managers, land trust employees, and researchers in psychology and physiology. Recommendations fell within 5 themes:

1. **Be willing to start the conversation about mental health and nature within your community.** Kids with mental health concerns can face rejection, bullying, discrimination, and isolation. Experts agreed that organizations that connect youth to land or to nature-based experiences likely

provide mental health benefits. A good place to start is to recognize this service and be willing to talk about mental health problems and how nature experiences can help — in promotional materials, brochures, programs, activities, and any engagements with the community.

- 2. Recognize the limitations of your organization.** Experts noted both excitement and trepidation about engaging with mental health. A key recommendation was the need to work through partnerships to avoid redundancy with existing community groups and to leverage what the conservation community offers best — welcoming, safe, natural spaces — by partnering with existing local and national groups and resources aimed at programming for youth. A list of such resources is included at the end of this report.
- 3. Engage the community in program development.** Great programming and engagement takes time. Most experts noted the need to start any programming ideas with community engagement first, either by attending community events, town halls, and planning meetings or by inviting leaders to share their perspective. The key insight was to listen first and learn about existing needs and program gaps in the community. Local Community Health Needs Assessments, which hospital systems are required to undertake every three years, offer one unique health-focused opportunity for this kind of engagement.
- 4. Provide a safe, accessible, and welcoming space for program participants that builds comfort over time.** Nature-based activities can be intimidating for new users, particularly for youth with mental health concerns, from at-risk populations, or from disadvantaged communities. Program managers described many strategies for increasing accessibility, including starting outings at places of existing comfort (e.g., local pediatric clinics), staffing for diversity, welcoming back former participants as leaders, mentors, or volunteers, striving for consistency in meeting location and times, and accommodating transportation access into the program design.
- 5. Create programming that is flexible, adaptable, and grows in challenge over time.** When working with youth it is important to recognize that not everything goes according to plan. Programs that are flexible and adaptive reported the most success, with incremental programming that builds participant confidence and skill over time being more likely to generate lasting connections to the land and behaviors that can become habits. In this regard, collecting participant feedback is critical, as is monitoring participant demographics to see who is sticking with or dropping out of programming.

What are some specific program and activity ideas?

While it is important to develop programs with community needs in mind, the following ideas were generated to supply a starting point for organizations to begin engaging with youth and the mental-health benefits of nature.

- 1. Low-input ideas involved raising awareness about the health benefits of nature.** These ideas included: promoting the mental-health benefits of nature in communication materials, encouraging staff to engage in mental-health awareness training, providing staff with diversity and anti-racism training, create space in existing programs for mental-health discussions, engaging with stigma-fighting events like World Mental Health Day and the National Alliance on Mental Illness's StigmaFree Campaign, and hosting a "Walk with a Doc" outing focused on mental-health.
- 2. Medium-input ideas involved partnering with outside organizations to offer new outdoor experiences.** These ideas included: hosting forest bathing workshops or nature-meditation sessions, engaging with local arts organizations, connecting with local pediatric mental-health clinics or youth skills-groups, engaging with external, existing outdoor programs, becoming a nature-prescription partner, and recording and evaluating outcomes from participants in programs.
- 3. High-input ideas involved developing a new program.** These ideas included: partnering with a hospital or clinic to host a 1–2-week summer camp, piloting an interactive multi-week nature therapy initiative, and developing a network of organizations in the community interested in nature and health.

Conclusion

Evidence suggests that nature-based programming can help manage symptoms for children with underlying mental health concerns or at-risk for later illness. Conserved lands and their managers have a unique opportunity to improve the mental health of America's youth through the expansion of opportunities for kids to get outside and have high quality, regular experiences in nature. Numerous programs across the country are already engaged in this work. Expansion of such programming could result in a healthier, happier generation of American children more connected to land and land conservation.

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INTRODUCTION

Diverse and growing evidence suggests that nature exposure can benefit child and adolescent physical and mental health. Programs affording youth new experiences in nature that emphasize mental health benefits could represent a win for both children and the land conservation community across the US: such programs can help meet existing healthcare needs while connecting new communities to natural spaces and conservation. This report is designed to support people and organizations who interact with conserved land who are interested in learning more about the health benefits of natural areas and in identifying ways to get involved in the growing nature-health movement. To gather knowledge and lessons-learned about potential nature-based child mental health programming, we conducted an informal literature review, interviews, and follow-up program surveys from February to June 2019. The sections that follow:

1. Review the existing evidence about youth mental health needs in the US and the potential for nature-based programming to play a role in addressing unmet needs,
2. Present recommendations for program success and examples from our informal review of existing US-based youth-health or general mental health programs with outdoor components, and
3. Outline a portfolio of potential programming steps organizations can take to get involved, from low-input one-off events to high-input on-going programs with multiple partners.

This document aims to be a starting point for environmental institutions hoping to explore the nature-health connection, with a focus on a priority population (youth in America) and a critical health domain (mental health). Resources provided at the end support deeper engagement to potentially catalyze the development of new programs or the expansion of existing programs into new regions or communities.

BACKGROUND

Child and adolescent mental health needs are high across the US

Youth in the United States suffer from mental health disorders at a high and increasing rate. Currently, one in six children ages 2–8 years old are considered to meet criteria for an emotional, behavioral, or developmental disorder (Robinson, 2017). Among older children, rates of depression, anxiety, suicidal ideation, and body dysmorphia have all modestly increased over the last two decades (Mojtabai et al., 2016; Ruch et al., 2019; Twenge et al., 2019), with 6–8% of American youth diagnosed with an anxiety or depression disorder by 2012. Transient mental health problems are also increasing. According to the latest National Survey on Drug Use and Health (N = 611,880), 52% more children ages 12–17 experienced major depressive episodes in 2017 than in 2005 (rising from 9% of US children to 13%) (Twenge et al., 2019).

Unfortunately, many treatable conditions go undiagnosed and untreated. While treatment rates have improved over the past decades, 20% of children with depression still do not receive treatment, 40% with anxiety do not, and 50% with a behavioral disorder, like ADHD, do not (CDC, 2020). Barriers to treatment include lack of affordable care, lack of transportation, shortages of mental health professionals, social stigma, limited awareness of mental health issues, and lack of culturally competent care (Blackstock et al., 2018; Polaha et al., 2011; Robinson, 2017). For many children, school counselors are the first to identify mental health problems, and for low-income, uninsured, or minority populations they are often the only source of treatment (Bain et al., 2011; Blackstock et al., 2018; Mojtabai & Olfson, 2020). Not surprisingly, treatment rates are particularly low in rural areas and socioeconomically deprived neighborhoods. Demographically, girls, non-Hispanic white, and high-income youth with private insurance receive the most mental-health care while boys, non-Hispanic Black, low-income youth, and those covered by Medicaid or the Children's Health Insurance Program receive the least (Mojtabai & Olfson, 2020). The earlier mental health problems start, the more severe they tend to be, with mental health conditions holding long-term implications for children's social mobility, health, wealth, and happiness later in life (Anderson, 2018; Caspi et al., 2016; Moffitt et al., 2011).

Nature-based interventions may be part of the solution

Worsening youth mental health in the US has been blamed on many factors, including increasing digital-media use, lack of adequate sleep, and diminished community cohesion (Lohmann, 2019). Decreased access to the outdoors and to unstructured play may also be contributing. Overall, children are spending less time outdoors than their parents did (Clements, 2004). In 2010, a typical child spent less than 40 minutes per week outdoors, over 90% of their time indoors, and about 52 hours per week using electronics (Kellert, 2012). In 2018, less than 20% of Americans participated in an outdoor recreational activity at least once per week, and children went on 15% fewer outings than they did even six years earlier (Outdoor Participation Report, 2019).

These low rates of outdoor time are influenced by factors beyond the accessibility of electronic media, including changes in family relationships, over commercialized play (i.e., the encouragement of children to acquire new toys), increased distance to useable green spaces, increased parental fear of the dangers of the outdoors, and a declining importance of nature in both public and private education sectors (Charles & Louv, 2009; Little, 2015; Moore, 1997).

Evidence suggests that getting kids back outdoors could modestly help reverse mental-health trends in the country, with time-in-nature linked to a wealth of physical and mental benefits (Box 1). Evidence about benefits continues to accumulate; as of now, children's exposure to natural spaces has been associated with improved cognitive function, stress resilience, coping with negative emotions, and imagination and creativity, as well as the accelerated development of motor, communication, and decision-making skills (Chawla, 2015; Moore, 1997; Tillmann et al., 2018). For some children the benefits can be profound: in a study focusing exclusively on children with ADHD, a short walk in a park resulted

in transient improvements in attention comparable to common prescription ADHD medications (Faber-Taylor & Kuo, 2009). From a less clinical perspective, children who participate in outdoor programs (Box 2) are also reported to have increased self-confidence, self-worth, autonomy, self-resilience, strength, coordination, focus, problem-solving, and teamwork skills (Kellert, 2012; Warber et al., 2015). A small branch of studies suggests that greater benefits (e.g., stress relief) accrue to individuals in the most need (Korpela et al., 2010; Wells & Evans, 2003).



Box 1. Quick statistics on nature and mental health.

- Kids raised among low levels of neighborhood greenery have roughly a 55% greater risk of developing a mental illness as adults than their peers from greener but otherwise similar neighborhoods ([Engemann et al., 2019](#)).
- Children's parents report significantly fewer child conduct problems and symptoms of anxiety, depression, and somatization (feelings of physical distress) when there is more greenery in the neighborhood ([Madzia et al., 2019](#)).
- When followed over time, individuals who move to greener areas report better mental health afterwards while those moving to less-green areas report worse mental health ([Alcock et al., 2014](#)).
- Neighborhood depression rates drop by more than 40% after greening (pocket park) initiatives ([South et al., 2018](#)).
- Self-reported well-being increases significantly with more than 120 minutes of nature exposure per week ([White et al., 2019](#)).
- After a 90-minute nature walk, study participants report significantly lower levels of rumination — or anxious worry — and demonstrate reduced activity in brain areas linked to mental illness ([Bratman et al., 2015](#)).
- Attendants at a 4-week wilderness camp reported decreases in stress and negative emotions and increases in greater sense of place, emotional attachment, and security in nature after the experience ([Warber et al., 2015](#)).

Mechanisms of effect.

The precise mechanisms tying nature exposure to mental health benefits are still being evaluated, but evidence supports three domains of effects:

1. Natural spaces reduce physical stressors, like heat, noise, and air pollution,
2. Natural spaces provide unique spaces for physical activity, self-reflection, and social interaction, and
3. Natural spaces provide stimuli (sights, sounds, smells) that reduce stress and calm the nervous system (i.e., activate the parasympathetic nervous system) via evolutionarily designed pathways.

See [Kuo, 2015](#) for more details.

Box 2. Children's perceptions of nature after a 12-week Forest School program in Australia

Time outside can reduce fear and build confidence

"I was scared of bees and flies and wasps because they do make a loud buzzing noise when they go near your ear but when I went into Forest School I learned that bees can't hurt you and flies can't hurt you."

"I could never climb trees before but then I learnt. Sometimes when I go up small trees I climb up and I go upside down."

Can build stewardship and curiosity about nature

"Sometimes I collect snails and worms. I pick them up with some gardening gloves. I put them in this pot with like all holes in so I can watch them, and I put leaves in but when they start climbing up then I let them out for a bit so that they can like go in the fresh air again."

"When my friend came to my house we picked different kinds of leaves and put them in the bag and then I was going to for a sleep over at my other friend's house and we picked more leaves and put them in the bag. Then we went on the computer and tried to find out which type of leaves they were."

Can build community

"I really liked the way that we could all join in with everything, and then sometimes we split groups because then we get to meet, we get to play with new people."

"We worked together to build something in the trees that we could hide in."

Adapted from [Ridgers et al. \(2012\)](#)

Access to nature is not equal across communities

Access to natural spaces follows racial and socioeconomic lines in the US ([Friend, 2016](#)). According to the recent Center for American Progress report, *The Nature Gap: Confronting Racial and Economic Disparities in the Destruction and Protection of Nature in America*, more than 70% of low-income communities and communities of color in the contiguous US live in nature-deprived areas ([Rowland-Shea et al., 2020](#)).

This means, among other things, that these communities do not receive the potential psychological benefits of nature exposure. That could play a role in community health disparities: the percentage of tree-cover and greenspace within an urban area has been significantly associated with community

rates of diagnosed anxiety and depressive disorders along with self-reported rates of stress recovery and neighborhood social cohesion (Gerstenberg & Hofmann, 2016; Maas et al., 2009). In a landmark randomized control study in Philadelphia that turned vacant lots into pocket parks, residential rates of “poor mental health,” and feeling “depressed” or “worthless” decreased by 63%, 42% and 51%, respectively, after park installation (South et al., 2018). Similarly, residents of highly green neighborhoods are 1.6 times more likely to have better self-reported mental health and wellbeing than those living in neighborhoods with fewer street trees and greenspaces (Sugiyama et al., 2008). While outdoor programming is not a complete solution, it may be utilized to improve health and quality of life for low-income, at-risk youth, and youth of color who may otherwise lack neighborhood green amenities.

Conserved lands can provide new opportunities for “healthcare”

The land conservation community has a unique opportunity to provide programming that can benefit youth mental health across the US, and in so doing join a growing national movement to connect people to land for their health (Reuben, 2019). By the last count, private land trusts (which take ownership, stewardship, or partial control over property for the conservation of land) directly own over 8 million acres of land across the United States and indirectly protect more than 48 million additional acres through easements and agreements (Land Trust Alliance — 2015 Census Results, 2016). Notably, most holdings are in rural areas, where access to mental healthcare tends to be lowest and rates of mental, behavioral, and developmental disorders highest (Robinson, 2017). This spatial overlap means land trusts may have a new ecosystem service to offer Americans — mental healthcare — that comes in addition to the natural services, like water filtration and wildlife habitat provision, that they have always provided.

Though interested in joining the movement, conservation organizations and land trusts have only played a small role to-date. Contrary to some organization’s concerns, providing programming and access to nature does not have to diminish the integrity of the land: it is now widely accepted that community-driven programming can increase environmental education opportunities and feelings of stewardship for non-traditional land users. While the primary focus of most land trusts is to conserve land, there is always a need to maintain or increase community stewardship, usership, and investment in local preserved lands. Programming can inspire new users and increased relevance within the community which can, in turn, assist land trusts and land managers in continuing to protect and manage landholdings in perpetuity.

There are several land trusts across the nation that are already focusing on community-based conservation practices and are interested in developing or have already developed programming and services for community members (see examples below). Building culturally accessible and attractive pathways to nature through additional programming and potential partnerships with local health, civil society, and governmental agencies can help land trusts engage with new, diverse populations while supporting existing conservation goals.

Background: Take-Aways

Child and adolescent mental health needs are high across the US

- One in twelve children experienced a major depressive episode in 2005. By 2017 this had increased to one in eight.
- Depending on the disorder, between 20% and 50% of children fail to receive treatment for a mental health disorder.
- Children from rural, low income, uninsured, and minority families have the least access to mental health resources and care.

Nature-based interventions may be part of the solution

- Today's children are spending less time outside than previous generations. A typical child now spends < 40 minutes per week outdoors, with > 90% of their time spent indoors.
- Children's exposure to natural spaces has been associated with improved cognitive function, stress resilience, emotional regulation and stress coping, restoration of attention, increased imagination and creativity, and the development of motor, communication, and decision-making skills.

Access to nature is not equal across the US

- > 70% of low-income communities and communities of color in the contiguous US live in nature-deprived areas, with little access to the health benefits of natural spaces.
- Residents of highly green neighborhoods are 1.6x more likely to have better self-reported mental health and wellbeing than those living in nature-deprived areas.

Conserved lands can provide new opportunities for "healthcare"

- Land trusts directly own > 8 million acres of US land and indirectly protect > 48 million acres through easements and agreements.
- Spatial overlap between mental health needs and protected lands creates a unique opportunity for the conservation community to help improve youth mental health in the US.
- Several land trusts are already focusing on community-based conservation strategies that connect people to land for health.
- Additional nature-based programming could increase community engagement and introduce a new, diverse generation of users on public and private lands.

ASSESSING CURRENT NATURE-BASED HEALTH PROGRAMS

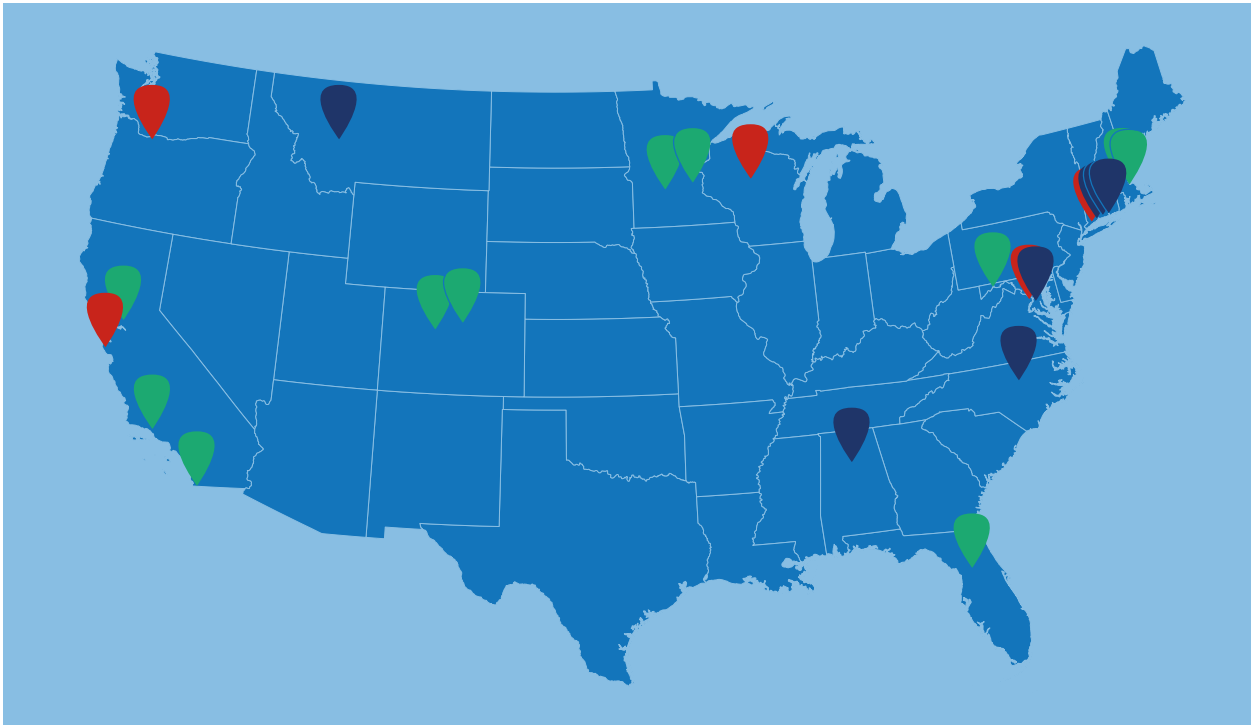


Figure 1. Map of programs and experts interviewed from 23 locations.

Red tags indicate subject experts (5), green program managers or directors (12), and blue land trust staff (6).

To gather knowledge and lessons-learned about potential nature-based child mental health programming, we conducted an informal literature review, convenience interviews, and follow-up program surveys from January to June 2020 targeting nature-health and parks-based programs in three domains:

1. Youth-focused *mental*-health programs with outdoor components,
2. Youth-focused *physical*-health programs with outdoor components, and
3. Community or adult-focused mental-health programs with outdoor components.

Overall, 27 experts were consulted, including mental-health clinicians and practitioners, parks and health-program managers, land trust employees, and researchers in psychology and physiology. **Figure 1** locates programs and researchers in the US. Interviews focused on the history and development of programs — challenges, opportunities, and lessons-learned from program development and deployment — as well as details specific to the audience served, funding sources, and methods of monitoring and evaluating benefits or participation. The follow section presents key recommendations identified during these assessments.

KEY RECOMMENDATIONS IDENTIFIED DURING ASSESSMENT

This section summarizes key themes and lessons-learned about outdoor programming that emerged from qualitative interviews with clinicians and program managers into recommendations for organizations that may be considering program development. However, organizations are first encouraged to reflect on their community's unique needs, interests, and access to open spaces and outdoor programming. Three questions can guide this reflection:

- 1. What new or existing audiences should the program engage?*
- 2. What steps should be taken to reach these audiences in a reasonable and culturally appropriate way?*
- 3. Is this the right program or organization to be reaching them?*

Alongside recommendations we list programs that are emblematic of the recommendation themes, with an eye towards breadth and diversity, noting activities from land trusts, state parks, and local/regional/national organizations. These programs vary widely in terms of their outdoor components, potential health benefits, and audience scope; however, all improve health while seeking to increase community access and connection to land. One key theme not mentioned: there is no one “right way” to do it.

Recommendation Themes

1. Be willing to start the conversation about mental health and nature within your community
2. Recognize your organization's limitations
3. Engage your community in program development
4. Provide a safe, accessible, and welcoming space for program participants that builds comfort over time
5. Create programming that is flexible, adaptable, and grows in challenge over time.

1. Be willing to start the conversation about mental health and nature within your community

Kids with mental health concerns can face rejection, bullying, discrimination, and isolation. Social stigmas against talking about mental illness prevent youth from seeking help — and prevent organizations that can benefit community mental health from stepping into this new role. If your organization connects youth to land or to nature-based experiences, it is likely that your participants are receiving mental health benefits (with benefits varying by participant and type of experience offered). Be willing to talk about mental health problems and how nature experiences can help, in your promotional materials, brochures, programs, activities, and any engagements with the community.

Note that while any program in nature can have a positive effect on health, any program targeting kids with diagnosed mental-health conditions specifically should ideally have staff on-hand with specific mental-health training who can predict and address participant needs, such as clinical psychologists, school counselors, or clinical social workers. Note that graduate programs for all three specialties will have students who may be able to participate in your programs, under supervision, as part of their training — expanding your organization’s ability to offer targeted programming while benefiting mental healthcare professionals’ development.

A great example of such a program is **Fear Facers**, a 1–2 weeklong summer day camp for adolescents ages 8–15 with anxiety or obsessive-compulsive disorders, based in Gainesville, Florida and affiliated with the University of Florida-Gainesville. Participants address psychological concerns by facing fears in a communal, outdoor setting guided by U of F undergraduate camp counselors with support from licensed clinical psychologists. In addition to group activities, each participant also receives one-on-one outdoor therapy sessions. The program mixes the summer-camp model with the hard work of therapy to produce significant and, typically, lasting benefits for participants. Funding is provided by private donors.

Other Example Programs

Park Rx America is a national program that connects patients and healthcare providers to nature-based health prescriptions. It consists of a community of clinical practitioners working to increase the use of parks and public lands as a healthcare intervention, particularly for children.

Using the Park Rx America dashboard, clinicians can prescribe nature outings to patients who have already come to them with physical or mental health concerns — or who could benefit from time outdoors as preventative medicine. To date prescribers use the system in 43 states.

Freshwater Land Trust helps improve the health and wellness of residents in Jefferson County, Alabama by increasing trail connectivity and the availability of green space to underserved neighborhoods.

As an example of a nature-based program with health benefits as a key intended outcome, FLT began developing the Red Rock Trail System in 2012 working closely with community and health partners during project design. The system will eventually encompass 750-miles of parks, bike trails, and sidewalks and aims to provide every county resident access to a greenspace < 1 mile from their home for recreational use and to benefit mental and physical health. The trails currently provide more than 48,000 outdoor experiences each year and link residents with the ongoing annual activities provided at city parks, including projects that connect community members to healthy food options, clinics, schools, community centers, and employment opportunities.

2. Recognize the limitations of your organization

The prospect of leveraging protected lands to improve community health, and usher in a new generation of Americans who care about nature, is exciting. It does not take an expert in mental health to make a difference, but it is important to recognize what role your organization is best equipped to fill. Exploring partnerships and building networks with different expertise can maximize the added value of your organization to the nature-health movement.

A vast number of organizations have formed in the past two decades to encourage use of outdoor space at the local to national levels. Before starting a program, look for potential partnerships. Connecting with existing networks (several are described at the end of this report in Highlighting Additional Resources) can lead to new funding, new resources, or avoided redundancy. For example, a partnership with a local chapter of the Boys & Girls Club of America could provide a conservation organization with new users who may not have access to the outdoors and could benefit from nature walks focused on mindfulness, outdoor yoga, or exploratory activities. Alternatively, initiatives like Reebok's **Build Our Kids' Success (BOKS)** program offers free courses "designed to get kids active and establish a lifelong commitment to health and fitness" that can be deployed indoors or outdoors, by teachers, parents, or park rangers. Courses span child age groups and include functional fitness, fundamental movements yoga, and mindfulness activities. (A notable 8-week program prepares high school students to tackle obstacles in outdoor races designed by the Spartan Foundation). Meanwhile, partnering with nature prescription groups, such as **Park Rx America** (see previous box) can get your preserves and trails on the radar of local healthcare providers and patients in need of restorative spaces.

Whatever role you decide to fill, make sure you can provide consistency for the community, both in your ability to reliably host events and in maintaining a consistent set of staff or volunteers to provide familiar faces who can collect feedback and improve programs over time.

Example Programs

Wilderness Youth Project in Santa Barbara, California offers after-school programs and summer camps for youth ages 3–17. Their Bridge to Nature program is designed specifically for low-income youth, identified through partnerships with trusted community organizations (homeless shelters, children’s centers, and schools). Incremental program designs with different activities for each age group foster growth in confidence while providing consistent and reliable mentorship.

WYP does not own any land itself and uses local parks and land trusts for their programming space. These partnerships support WYP in providing high quality outdoor experiences that foster lasting relationships between youth and the landscapes in their region. Donors and local foundation grants help WYP provide scholarships that cover partial or full program fees and transportation for families who need it.

Triangle Land Conservancy in central North Carolina provides kids with educational programs to create positive experiences in nature. In 2018 the organization took a critical look internally to understand what they could do to expand their reach to more people in the community, particularly youth, through an equity lens. Through a strategic planning process, they also identified gaps in nature-based programming offered by nearby state parks.

TLC now provides annual volunteer-led yoga, meditation, and power walks sessions. These classes opened preserves to new users and built unique connections to the land. Their youth environmental education work focuses on after-school and summer programming to reduce redundancy with other organizations.

3. Engage the community in program development

The community knows best what it needs, but it may take time to build the trust necessary for open communication. Be open to input from potential participants and design programs according to their expressed interests. Community engagement efforts can start small via attending community events, town halls, and planning meetings to listen and learn about existing needs and program gaps in the community. This will also increase odds of successful engagement later on.

In the nature-health space an important avenue to consider are Community Health Needs Assessments, which hospital systems are required to undertake every three years. These identify critical community health concerns through surveys and meetings. Members of the conservation community can join in, to learn about needs and engage with stakeholders.

After the initial listening stage, consider bringing community leaders in for discussions about developing new programs or updating existing ones. During these discussions it is important to be clear about your interests but also to be open to new ideas; experts agree that cursory efforts at inclusion in program design will be easy for underrepresented community members to identify and will result in programs with less attendance and fewer overall benefits. For efforts at learning and engagement to be successful it is important to develop deep connections over time between community leaders and partner organizations. Ultimately, this starts within your organization by employing staff and recruiting board members that can reach across barriers in language, culture, and historical experiences.

In this effort consider:

- Partnering with trusted community organizations during program development and implementation,
- Meeting your target audience (youth and youth groups) where they already gather to talk about the opportunities they need and want,
- Developing new connections and networks in your community (including adding board members from the healthcare sector), and
- Preparing staff with training to recognize implicit biases and discrimination.



Example Programs

Gather New Haven, re-named after a merger between New Haven Land Trust and New Haven Farms in early 2020, is consistently looking for new opportunities to engage the community in nature-based activities. The new mission was designed after multiple community forums discussing the merger and the present needs of the community. “Gather New Haven promotes health, equity, and justice for people and the environment by cultivating connections with each other and our local lands and waters, and by inspiring us to care for ourselves, our community, and the natural world.” It aims to provide programs that bridge urban agriculture, public health, community development, environmental education, and stewardship and has community engagement as a core operating principal.

This is not the first time New Haven Land Trust has changed, in early 2017 it absorbed Schooner Inc and the Schooner Summer Camp. Schooner Camp is an 8-week summer camp designed to deepen camper’s connection to nature in an urban setting. It offers educational programming related to ecosystem health and sailing to youth ages 6–14 and further leadership opportunities for youth ages 15–17 through hands-on learning.

Prickly Pear Land Trust (PPLT) in Helena, Montana hosts environmental education programs and service events for local schools and organizations. PPLT noticed a gap in local environmental education offerings and applied for an AmeriCorps Vista volunteer to help design new environmental education programming. Volunteers now also support annual community service events for Boy Scouts of America, Girls Thrive, the Audubon Society, and Montana Wild, among other organizations.

In 2016, PPLT purchased one of their first plots of land with a grant from the Army Compatible Use Buffer Program. This plot of land was bordered by a creek, an Army base, a Veterans Affairs hospital, a State Park, and a group home for patients with developmental disabilities. In consultation with their multiple neighbors, PPLT built an ADA accessible trail system across the plot to make the preserved land of the most value for the community. They also negotiated easements that connect the trails to surrounding facilities making it easier for patients and patrons to utilize the preserved, natural resource in their back yard.

4. Provide a safe, accessible, and welcoming space for program participants that builds comfort over time

For most people new to spending time in nature, particularly for youth with mental health concerns, from at-risk populations, or from disadvantaged communities, nature-based activities can be intimidating. Programs that are specifically designed to meet participants where they are already comfortable tend to be the most successful in engaging diverse audiences. **The SHINE Program** (Staying Healthy in Nature Everyday) of the East Bay Regional Parks District and University of California — San Francisco Benioff Children’s Hospital Oakland organizes nature outings for children with chronic illnesses such as obesity, diabetes, or ADHD that begin with providing organized transportation for patients and their families directly from the children’s pediatric clinic. Families can combine annual wellness check-ups with one of the nature outings, which tend to be fully subscribed.

There are other ways to make activities welcoming. In this regard, experts noted, the individual leading a program or event can make a difference: striving for diversity in program leaders results in diverse participants, and more meaningful connections to the land. Welcoming back former participants as volunteers, mentors, and staff is a great way to accomplish this goal (see box below).

Note that immigrant communities may have particular safety concerns about using public lands, while Black and Indigenous participants may have complicated feelings about conserved land due to historical patterns of displacement or loss of land rights and ancestral ties. **Satchel and Lahoma LLC.**, an outing company based in Baltimore, Maryland, takes an education-focused approach to build comfort, training educators, youth leaders, and families on the basics of outdoor recreation and safety in order to support financially limited Black and minority families accessing nature for wellness, with a specific focus on mental health benefits. In addition to training leaders, they provide gear, activity ideas, and symptom monitoring to ensure comfort and reduce “the anxiety of new campers.” Adventure spaces are secured through partnerships with local land organizations, and questionnaires are used to track and evaluate participant mental health symptom change and comfort, and to help codify nature as a non-pharmacological treatment option.

Experts also noted that military families and their children may deserve special consideration as they experience considerable stress from parental deployment and frequent changes of station. More programs could consider targeting this population to provide nature-based stress reduction and community-building. **Blue Star Parks**, an initiative of the veteran- community-building group **Blue Star Families**, connects veteran families to local, state, and national parks to foster connections to place that encourage repeat engagement. Consider partnering with one of Blue Star Parks’s 11 national chapters during program development to directly reach the military community.

Lastly, efforts to provide clear schedules with consistent times and transportation information can reduce barriers for busy parents who may need to adjust their schedule or use public transportation to attend events. For example, **Free Forest Schools** provides weekly group meetings consistently at the same time and location, usually a public park, for at least 9 months before considering a new location. This helps parents plan their schedules and transportation, and also allows children to experience the same natural space through multiple seasons. Meanwhile, programs, like California's **Wilderness Youth Project**, and organizations like, North Carolina's **Triangle Land Conservancy**, apply for transportation grants to help reach low-income participants by offering pick-up and drop-off services for events. Other programs have found success by organizing events that align with public transportation routes and times. Program leaders noted that longer arrival windows may be necessary to accommodate participants who use public transportation.

Overall recommendations for how to ensure success focusing on safety and comfort include:

- Understand that participants may face unique stressors, and could have unique fears in outdoor spaces,
- Staff to reflect the community and keep staff members and volunteers consistent,
- Integrate into the community culture as much as possible and try to stay aware of current events and terminology,
- Welcome back former participants as volunteers, mentors, and staff, and
- Say hello to everyone, acknowledge differences (don't avoid them), and go out of your way to welcome all participants.

Example Programs

Thorne Nature Experience offers summer camps, school programs, and early childhood programs for youth in Boulder, Colorado and the Denver Metro Area. Often partnering with local governments and non-profits, Thorne helps provide relevant, hands-on, place based, educational experiences for all youth regardless of race, ethnicity, or income. All programs are designed to be culturally inclusive and program leaders are selected to reflect community diversity.

One of Thorne Nature Experience's programs is a two-week Nature Camp that integrates storytelling and hand-on activities to inspire both education and play. Campers are led on outdoor adventures exploring the camp site, while providing unstructured time to enjoy nature and build skills, teamwork, and community. Kids' comfort and interest guide the lessons, so a participant playing in a tree or watching a frog may lead to a discussion about the development and physiology of plants and animals. Surveys related to scientific learning, nature connection, and empathy for other living things help managers monitor program effectiveness.

Outdoor Youth Connection is an outdoor capacity building program offered by California State Parks — Office of Community Involvement and the California State Parks Foundation. This program offers 3-day team building and leadership training for youth ages 13–17. At the end of training, participants are provided an activity manual and resources to support participants in becoming peer mentors and youth leaders for additional programming in their neighborhood.

Each participant is encouraged to use their skills to plan, prepare, and lead at least two recreational outings or public service projects. This helps the Parks provide programs specific to the needs of disadvantaged youth and neighborhoods while creating a cycle of reliable and relatable program leaders. Having peer mentors and leaders for programs can help organizers understand and address cultural differences and the unique stressors youth in these communities face.

5. Create programming that is flexible, adaptable, and grows in challenge over time

It is important to consider how planned activities may be perceived by participants, particularly those who may be joining for mental health benefits. For example, a participant who has a history of anxiety in large crowds may not enjoy a large group hike with narrow paths. Conversely, a participant with a history of homelessness or victimization may not be comfortable doing activities where they are asked to explore on their own. As with the previous recommendations, this theme is about building trust and comfort. Recommendations in this domain include:

- Consider a mix of programs with both small, tight-knit cohorts and larger events with open attendance,
- Recognize that not everything goes according to plan and include flexibility in the schedule, particularly when working with kids,
- Monitor participation and evaluate perceived benefits. Consider tracking participant demographics to see who is sticking with, or dropping out of, your programming,
- Collect feedback on participant experiences and seek to continually improve,
- Use incremental programming that builds confidence and skill over time, and
- Design activities that provide connections and build habits — ideally participants will not need your organization to repeat these activities later on.

Be aware that small group activities may enhance the innate calming effect of nature and help develop positive social relationships without overwhelming participants with little previous outdoors experience. More intimate settings also make it easier for program leaders to observe participant interests and reactions, which can lead to a more tailored experience. Relatedly, incremental programming can allow participants who may be new to the idea of spending time outdoors to gain confidence and grow their abilities over time. This can also keep older kids engaged through the seasons with new challenges (building towards mastery) to maintain their interest.

Incremental programming can range from meditative exploration or passive education in preserves at the start, to short, directed walks that build into challenging hikes or overnight events. As programming develops, recruiting past participants to support earlier participants can help ensure that program leaders reflect the community and provide lasting connections for the volunteers or staff.

For example, **Elevate Youth Outdoors (EYO)** engages middle-school-aged adolescents in nature-based programs that increase in difficulty with age. By offering leadership roles and potential employment for older participants who have gone through the program, EYO builds trust between program participants and leaders and inspires a deeper connection to nature that includes personal and professional development. In the adult mental-health space, the **Naval Medical Center San Diego's** hike therapy program asks participants to design more difficult hikes for their cohort, with participants gradually taking on more responsibility for the outings, including planning and undertaking the hikes as a team.

For all of these efforts to be most successful, consider building monitoring and evaluation into the program design. This can help programs improve over time, contribute to the body of nature-health research, increase credibility, and potentially open-up funding opportunities. Monitoring can range from simple one-page “pre and post” surveys to larger clinical interviews for programs with trained mental health staff. In this report’s Appendix you will find example surveys used by the **Naval Medical Center San Diego** (see next box) to monitor psychological health before and after individual events and program completion. Creating organization-specific monitoring and evaluation (M&E) techniques can provide direct feedback for program leads without perpetually adding additional work for participants, counselors, and evaluators while more in-depth evaluations can support academic research and allow for comparisons across programs and institutions.

Example Programs

The Naval Medical Center San Diego offers both hike and surf-therapy programs for active duty military with diagnosed mental illness. Cohorts of roughly 20 participants meet for 6 weekly 3–4 hour sessions. These sessions get veterans outdoors and equipped with the skills and resources necessary to build new habits. The hike-therapy program provides participants with hiking guides and encourages participants to choose and lead incrementally more difficult hikes. The surf-therapy program provides participants with gear, one-on-one instruction, and connections to local surfing groups.

Both programs utilize short pre- and post-session surveys to track participant mental health, well-being, and response to the treatment session. A more detailed mental health evaluation is done in a clinical setting before the program starts, after the 6-week program ends, and again 3 months later. These evaluations support patient health and help build the body of research supporting nature-based mental health interventions (e.g., [Otis et al., 2020](#); [Walter, Otis, Glassman, et al., 2019](#); [Walter, Otis, Ray, et al., 2019](#)).

The national **Wilderness Inquiry** program creates inclusive outdoor recreation experiences for youth with a pyramid of engagement to encourage repeat exposure and habit building. Beginning with an introduction to nature through short day excursions, participants move to overnight camping trips in local parks and longer day trips at state and national parks. These experiences gradually immerse participants into the larger outdoor recreation community.

Notable initiatives include the WI **Canoemobile** program, a “floating classroom” that brings students out on local waterways in 24-foot Voyageur canoes with support from federal, state, and local partners to offer experiences across the country. And the **Outdoor Career Academy**, which provides youth with pathways for employment in the outdoors industry through hand-on training and skill-building, leading to new job opportunities and building life-long connections to nature.

STARTING THE JOURNEY (Program Ideas)

Each organization within the land conservation community will have a different level of comfort with the material presented and their presence within the communities they serve. To account for some of these variations we provide a list of suggested pilot program ideas for consideration when getting started in the field of mental health and nature. While it is important to develop programs with community needs in mind, these ideas may supply a starting point for engaging with youth and the mental health benefits of nature. This is not a comprehensive list, nor will every option work for every organization, but it is hoped that these ideas can serve as a platform for brainstorming programs that will work for your community. The program examples have been separated into three main categories:

1. Low input — ideas for raising awareness about the mental health benefits of nature.
2. Medium input — ideas that involve partnering with outside organizations.
3. High input — ideas for developing a new program.

The following sections include recommendations, considerations, and additional resources to support efforts for pursuing these ideas.



Low input

Promote the mental-health benefits of nature in communication materials: The best scientific evidence to-date supports the psychological benefits of spending time in nature. Refer to this evidence in program and fund-raising materials to raise awareness of this emerging “ecosystem” service. Don’t shy away from starting the mental-health conversation.

Encourage staff to engage in mental-health awareness training: An educated staff will be more prepared to identify and address mental-health concerns in their daily work engaging with donors, landowners, youth, and members of the general community. Support meaningful discussions around mental-wellbeing and the benefits of nature. Consider bringing in local mental-health experts to give a presentation to your team on common needs / problems in your community. While they are with you, consider showing them what your organization is already doing to connect people to land.

Provide staff with diversity and anti-racism training: The more exposure program leaders have in identifying implicit biases and discriminatory action, the more capable they will be in reducing the occurrence of these negative experiences for participants. Think of this as a way for your organization to avoid making mental-health problems worse. Programs, organizations, and the lands they manage will be more welcoming for participants of all backgrounds if the organizations staff is trained in these topics.

Create space in existing programs for mental health discussions:

- Does your organization already host educational events, organized hikes, day camps, etc.? Consider scheduling-in time for *mindful moments* during events, asking participants to engage in a quiet minute of reflection on their day and how they are feeling so that they can be fully present for your organized activity. Or encourage participants to notice how they feel before and after your event. Take time afterwards to discuss any positive or negative experiences that they had in nature during the event.
- Consider helping participants deepen their connection to natural settings outside of organized activities by listing exercises that can be done at home in promotional materials, from identifying the different types of trees visible in their neighborhood to taking a moment to count the clouds in the sky. Elevate Youth Outdoors has a number of home activity recommendations at <https://elevateyouthoutdoors.org/nature-activities-more>.
- If your staff are not creating space for mental health themselves, it will be hard to do so for others. Consider taking meetings outdoors, seated or walking, or offering short meditation or yoga sessions for staff to give them firsthand experience of the mental health benefits of mindfulness and time outdoors.

Share health-focused activity guides and supplies at community events: Attending community events or participating in farmers’ markets to provide a “health focus” represents a great, low-cost way to increase engagement with your community. Let people know what you have to offer (trails? outings?)

and consider providing activity sheets that highlight some of the benefits of time spent outdoors. For example, a kit providing a child with a small cup holding seeds, soil, and instructions could also mention the effects that house plants have on calming nerves and improving focus.

Engage with stigma-fighting events

- Host a stigma-fighting hike on World Mental Health Day: October 10th is World Mental Health Day, an international initiative of the World Federation for Mental Health designed to raise awareness of mental illness and its impact on peoples' lives. Hosting an annual "mental health" branded hike on October 10th can connect new users to conserved lands while highlighting the unique benefits of time in nature.
- Join the National Alliance on Mental Illness's StigmaFree Campaign: NAMI is fighting to end stigma in the US and offers individuals and organizations numerous ways to join the effort. Sign their "Pledge to be StigmaFree," consider becoming a "StigmaFree Company," and share promotional materials to become an activity partner during their annual mental health awareness events in May, June, September, and October (www.NAMI.org/Get-Involved).

Host a "Walk with a Doc" outing and talk about the mental-health benefits of time outdoors:

Walk with a Doc, a health provider-led community walk-based outing program (walkwithadoc.org), has hundreds of chapters worldwide — is there a local chapter that could use a new location for walks? Hosting a walk or hike can get your organization connected to new users and members of the healthcare community and allow space to start conversations about stress and coping and how conserved lands can be used for restoration and building psychological resilience.

Survey participants of existing programs to measure health benefits, using a pre-post model:

Circulating 1-page questionnaires about psychological functioning before and after nature hikes, bird watching, or forest meditation sessions can be an easy way to start gathering new data on existing programs' potential benefits. This can help better allocate resources in the future, target branding opportunities, and start conversations about mental health. Examples of empirically supported and validated questionnaires that you can use are provided in the [Appendix](#).

Medium input

Host forest bathing workshops or nature-meditation sessions: Reach out to local yoga or meditation instructors or forest therapists from the community (some of whom may already be volunteers or have previous contact with your organization) and offer a new location to host one of their events. This can help the instructor advertise their services and introduce new community members to the land. Start small and build on successes.

Engage with local arts organizations: Consider alternative types of programming which do not involve a physical component. Everyone can benefit from time outdoors, but not everyone can be physically

active. Small events centered around art, dance, music, or writing can engage new participants who may have mobility issues or be intimidated by the idea of a long hike. Reaching out to classes, camps, or clubs to provide occasional outdoors space for practice can provide new inspiration while promoting positive mental health and connection to place.

Connect with local pediatric mental-health clinics or youth skills-groups. Most pediatric mental-health clinics now offer periodic group-based skills courses to help kids understand emotions and learn coping strategies and life skills in a communal setting, or else get “booster shots” following intensive individual treatment. Reach out to local pediatric clinics to offer day trips targeting skills groups as an end-of-session reward or as a new setting for therapy or skills practice. An easy way to start would be to invite clinical staff to join an existing program or outing for a session to learn about what is already offered.

Find and engage with external, existing outdoor programs: It is possible that organizations in the area are already providing programs which engage youth in nature (e.g., **Free Forest School** now operates in many communities across the country). Explore the field and consider providing additional resources, like a place outdoors to gather, or apply for grants to support enrollment and transportation costs for program participants. This can be an opportunity for advertising to new audiences while providing additional health benefits to the community.

Become a nature-prescription partner: Nature prescription programs are now present in most states in the US, with more coming online every day. Find the closest local program through websites like **Nature PHL** (<https://naturephl.org/>) or the **Institute at the Golden Gate** (<https://instituteatgoldengate.org/>). Connecting with a national program like **Park Rx America** (<https://parkrxamerica.org/>) can add conserved lands to a prescribe-able list of parks and increase public access and use.

Record and evaluate information on program participants: Record some light demographics on participation in your existing programs, including participant age, gender, and race/ethnicity. Look for trends over time and compare to the demographics of your community — are there any groups that you are consistently missing? Additionally, surveys can allow people to share feedback on mental health and other impressions from events. This data can show potential areas for future growth to fill community needs.

High input

Partner with a hospital or clinic to host a 1–2-week summer camp: Develop a program like **Fear Facers Summer Camp** (ufhealth.org/fear-facers-summer-camp) that allows youth and providers a new space for treatments. This can build youth confidence, increase nature exposure, and potentially improve access to mental-health care. The Fear Facers program has demonstrated efficacy and now has a long waitlist.

Pilot an interactive multi-week nature therapy initiative: Use a summer or day camp model to provide nature-based therapeutic exercises like hiking, backpacking, surfing, kayaking, climbing, etc., with gradual increases in activity intensity steered by program participants. This will offer youth programming that can build mastery and deepen engagement with natural settings and landscapes. A great model of such programs are the **Naval Medical Center San Diego** hike and surf therapy programs described in the Recommendations section.

Develop a network of organizations in the community interested in nature and health: Knowing which organizations in the community are already doing this work and increasing partnerships across disciplines can help spread awareness of existing programs and facilitate the development of new, innovative programming. This can be taken further by periodically publishing a list of resources on your website, from partner organizations to calendars of events.

CONCLUSION

Mental health concerns are high and potentially rising among children and adolescents in the US, especially concerns related to depression, anxiety, and attention deficits. Stigma against mental illness, lack of awareness, and lack of access to specialized providers can make it difficult for youth to get treatment. This is especially true for children from rural, low-income, or minority families. Nature-based programming could help manage symptoms for children with underlying mental health concerns or at-risk for later illness. Conserved lands and their managers have a unique opportunity to improve the mental health of America's youth by expanding opportunities for kids to get outside and have high quality, regular experiences in nature.

Numerous programs already exist that work to get children outdoors across the US. Many specifically target underserved and underrepresented communities who have low access to nature and potentially greater risk of mental-health problems. Engaging with these programs or developing a new program in their mode can improve health, increase the perceived value of the land, and support land conservation into the future. The list of program recommendations, examples, and ideas included in this document may offer a starting point for exploring mental-health-targeted nature-based programming. Starting the conversation about mental health in the community now, engaging with existing programs, reaching out to community leaders, exploring community needs, and developing programs to provide comfortable, safe, and welcoming experiences that encourage repeated engagement can lead to programs with broad impact. Using community health and youth mental health as a guiding theme in future conservation efforts can result in a healthier, happier generation of American youth more connected to land and land conservation.

HIGHLIGHTING RELEVANT RESOURCES

This section highlights some notable resources that can support nature-health programming and existing program models.

Program guidance documents, toolkits, and dashboards

Transforming Youth Outdoors's program guides

Transforming Youth Outdoors is a community for people who are committed to providing transformative outdoor experiences for youth. It provides a growing collection of resources on best practices from agencies such as Outdoor Outreach, The Sierra Club, Children and Nature Network, NOLS, REI, and YMCA. Their resources include program guides for a range of activities from angling to snowboarding that provide overviews, introductions, and examples of how to lead the program with Operational Plans and Trip Logs. Resources also include guides on developing a program model with a theory of change and example lesson plans, fliers, and surveys to help with execution and evaluation. Additional operational resources provide information on developing a business plan, grant writing, and risk management. <http://mytyo.org/>

The Institute at Golden Gate's nature prescription toolkit and curriculum

The Institute at the Golden Gate is part of the Golden Gate National Parks Conservancy and a non-profit partner of the National Park Service. The institute focuses on developing innovative partnerships and programs for parks. It has several resources relevant to nature-based health programming including documents introducing Park Rx, a Park Rx program toolkit, a directory of active nature prescription programs in the US, a general collaboration handbook, and a Parks for Health online curriculum for park leaders. The online curriculum includes a course on "Using Nature to Build Resilience from Childhood Trauma," which details how to use a trauma-informed approach to park programming for individuals with adverse childhood experiences. <https://instituteatgoldengate.org/>

Park Rx America's prescriber dashboard

Park Rx America aims "to decrease the burden of chronic disease, increase health and happiness, and foster environmental stewardship, by virtue of prescribing Nature during the routine delivery of healthcare by a diverse group of health care professionals." Their website includes prepared pamphlets on the Park Rx program, quick research guides on the health benefits of nature, and a park-finder dashboard ready made for providers wishing to prescribe nature. www.parkrxamerica.org

Early Childhood Health Outdoors's How-to-Guides

Early Childhood Health Outdoors (ECHO) is a partnership between the National Wildlife Federation, North Carolina State University's Natural Learning Initiative, and the Early Childhood Council Leadership Alliance aimed at creating natural learning and playing spaces for children. ECHO provides guides and training seminars for developing an outdoor learning environment, at home, daycare, and school

settings, along with detailed tips and activities to create a healthy and high-quality space for learning about the environment. ECHO provides additional training for health providers and at home activities for families and could be a good resource for referring program participants too as well.

www.nwf.org/ECHO

US Centers for Disease Control's health monitoring systems

The CDC organizes a number of systems for monitoring trends in adolescent physical and mental health, environmental health, and public health including the Behavioral Risk Factor Surveillance System, the Youth Risk Behavior Surveillance System, and the National Environmental Public Health Tracking Program. Another resource is the Parks and Trails Health Impact Assessment Toolkit which is no longer supported but still provides resources and information on how to assess health risks and benefits.

www.cdc.gov/surveillancepractice/

Professional Associations and Networks

The following list includes the mission statement for each association or network identified in this study, with some text modified for context.

Association of Nature & Forest Therapy Guides & Programs

The Association of Nature & Forest Therapy serves to promote the development and practice of forest therapy and create learning and career pathways for professional forest therapy guides.

<https://www.natureandforesttherapy.org/>

National Association of Therapeutic Schools and Programs

The National Association of Therapeutic Schools and Programs serves as an advocate and resource for innovative organizations which devote themselves to society's need for the effective care and education of struggling young people and their families. <https://natsap.org/>

Children & Nature Network

Children & Nature Network works to give every child in every community a wide range of opportunities to experience nature directly, reconnecting children with nature's joys and lessons, its profound physical and mental bounty. www.childrenandnature.org/

Outdoor Behavioral Healthcare Council

The Outdoor Behavioral Healthcare Council strives to unite its members in promoting high standards among member programs and the industry at large to provide better programs and a better industry that parents and professionals can trust. www.obhcouncil.com/

National Outdoor Leadership School

The National Outdoor Leadership School strives to be the leading source and teacher of wilderness skills and leadership that serve people and the environment. www.NOLS.edu

Natural Learning Initiative

The Natural Learning Initiative strives to create environments for healthy human development and a healthy biosphere for generations to come. <https://naturalearning.org/>

National Partner Examples

These organizations have chapters across the country and could provide partnership opportunities. Consider reaching out to local chapters or groups within:

- The Boys & Girls Clubs of America,
- Outdoor Afro,
- Latino Outdoors,
- Boy Scouts of America,
- Girl Scouts of America,
- National Garden Clubs,
- Blue Star Families,
- Big Brother Big Sister, and
- Sierra Club.

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BIBLIOGRAPHY

- Alcock, I., White, M. P., Wheeler, B. W., Fleming, L. E., & Depledge, M. H. (2014). Longitudinal Effects on Mental Health of Moving to Greener and Less Green Urban Areas. *Environmental Science & Technology*, 48(2), 1247–1255. <https://doi.org/10.1021/es403688w>
- Anderson, L. R. (2018). Adolescent mental health and behavioural problems, and intergenerational social mobility: A decomposition of health selection effects. *Social Science & Medicine* (1982), 197, 153–160. <https://doi.org/10.1016/j.socscimed.2017.11.026>
- Bain, S. F., Rueda, B., Mata-Villarreal, J., & Mundy, M.-A. (2011). Assessing mental health needs of rural schools in South Texas: Counselors' perspectives. *Research in Higher Education Journal*, 14, 1–11.
- Blackstock, J. S., Chae, K. B., Mauk, G. W., & McDonald, A. (2018). Achieving Access to Mental Health Care for School-Aged Children in Rural Communities: A Literature Review. *Rural Educator*, 39(1), 12–25.
- Bratman, G. N., Hamilton, J. P., Hahn, K. S., Daily, G. C., & Gross, J. J. (2015). Nature experience reduces rumination and subgenual prefrontal cortex activation. *Proceedings of the National Academy of Sciences of the United States of America*, 112(28), 8567–8572. <https://doi.org/10.1073/pnas.1510459112>
- Caspi, A., Houts, R. M., Belsky, D. W., Harrington, H., Hogan, S., Ramrakha, S., Poulton, R., & Moffitt, T. E. (2016). Childhood forecasting of a small segment of the population with large economic burden. *Nature Human Behaviour*, 1. <https://doi.org/10.1038/s41562-016-0005>
- CDC. (2020, June 15). *Data and Statistics on Children's Mental Health* | CDC. Centers for Disease Control and Prevention. <https://www.cdc.gov/childrensmentalhealth/data.html>
- Charles, C., & Louv, R. (2009). Children's Nature Deficit: What We Know – and Don't Know. *Children and Nature Network*.
- Chawla, L. (2015). Benefits of Nature Contact for Children. *Journal of Planning Literature*, 30(4), 433–452. <https://doi.org/10.1177/0885412215595441>
- Clements, R. (2004). An Investigation of the Status of Outdoor Play. *Contemporary Issues in Early Childhood*, 5(1), 68–80. <https://doi.org/10.2304/ciec.2004.5.1.10>
- Engemann, K., Pedersen, C., Arge, L., Tsirogiannis, C., Mortensen, P., & Svenning, J.-C. (2019). Residential green space in childhood is associated with lower risk of psychiatric disorders from adolescence into adulthood. *Proceedings of the National Academy of Sciences*, 116, 201807504. <https://doi.org/10.1073/pnas.1807504116>
- Faber-Taylor, A., & Kuo, F. E. (2009). Children With Attention Deficits Concentrate Better After Walk in the Park. *Journal of Attention Disorders*, 12(5), 402–409. <https://doi.org/10.1177/1087054708323000>
- Friend, E. (2016, June 10). *Depression-Era Redlining Leaves Parts Of Durham Less Green*. WUNC. <https://www.wunc.org/post/depression-era-redlining-leaves-parts-durham-less-green>
- Gerstenberg, T., & Hofmann, M. (2016). Perception and preference of trees: A psychological contribution to tree species selection in urban areas. *Urban Forestry & Urban Greening*, 15, 103–111. <https://doi.org/10.1016/j.ufug.2015.12.004>
- Kellert, S. R. (2012). *Birthingright: People and Nature in the Modern World*. New Haven and London: Yale University Press.
- Korpela, K. M., Ylen, M., Tyrvainen, L., & Silvennoinen, H. (2010). Favorite green, waterside and urban environments, restorative experiences and perceived health in Finland. *Health Promotion International*, 25(2), 200–209. <https://doi.org/10.1093/heapro/daq007>

- Land Trust Alliance — 2015 Census Results.* (n.d.). Retrieved June 2, 2020, from <https://www.landtrustalliance.org/census-map/#National>
- Little, H. (2015). Mothers' beliefs about risk and risk-taking in children's outdoor play. *Journal of Adventure Education and Outdoor Learning*, 15(1), 24–39. <https://doi.org/10.1080/14729679.2013.842178>
- Lohmann, R. C. (2019, April 22). *Teen Depression Is On the Rise | For Parents | US News.* U.S. News & World Report. <https://health.usnews.com/wellness/for-parents/articles/2019-04-22/teen-depression-is-on-the-rise>
- Maas, J., van Dillen, S. M. E., Verheij, R. A., & Groenewegen, P. P. (2009). Social contacts as a possible mechanism behind the relation between green space and health. *Health & Place*, 15(2), 586–595. <https://doi.org/10.1016/j.healthplace.2008.09.006>
- Madzia, J., Ryan, P., Yolton, K., Percy, Z., Newman, N., LeMasters, G., & Brokamp, C. (2019). Residential Greenspace Association with Childhood Behavioral Outcomes. *The Journal of Pediatrics*, 207, 233–240. <https://doi.org/10.1016/j.jpeds.2018.10.061>
- Moffitt, T. E., Arseneault, L., Belsky, D., Dickson, N., Hancox, R. J., Harrington, H., Houts, R., Poulton, R., Roberts, B. W., Ross, S., Sears, M. R., Thomson, W. M., & Caspi, A. (2011). A gradient of childhood self-control predicts health, wealth, and public safety. *Proceedings of the National Academy of Sciences*, 108(7), 2693–2698. <https://doi.org/10.1073/pnas.1010076108>
- Mojtabai, R., & Olfson, M. (2020). National Trends in Mental Health Care for US Adolescents. *JAMA Psychiatry*. <https://doi.org/10.1001/jamapsychiatry.2020.0279>
- Mojtabai, R., Olfson, M., & Han, B. (2016). National Trends in the Prevalence and Treatment of Depression in Adolescents and Young Adults. *Pediatrics*, 138(6). <https://doi.org/10.1542/peds.2016-1878>
- Moore, R. C. (1997). The Need for Nature: A Childhood Right. *Social Justice*, 24(3), 203–220.
- Otis, N. P., Walter, K. H., Glassman, L. H., Ray, T. N., Michalewicz-Kragh, B., & Thomsen, C. J. (2020). Effects-of-PTSD-and-MDD-Comorbidity-on-Psychological-Changes-during-Surf-Therapy-Sessions-for-Active-Duty-Service-Members.pdf. *Global Journal of Community Psychology Practice*, 11(2). <https://www.gjcpp.org/pdfs/OtisEtAl-Final.pdf>
- Outdoor Participation Report.* (2019). Outdoor Industry Association. <https://outdoorindustry.org/resource/2019-outdoor-participation-report/>
- Polaha, J., Dalton, W. T., & Allen, S. (2011). The prevalence of emotional and behavior problems in pediatric primary care serving rural children. *Journal of Pediatric Psychology*, 36(6), 652–660. <https://doi.org/10.1093/jpepsy/jsq116>
- Reuben, A. (2019, June 11). *The Incredible Link Between Nature and Your Emotions | Outside Online.* Outside. <https://www.outsideonline.com/2397694/nature-mental-health>
- Robinson, L. R. (2017). Differences in Health Care, Family, and Community Factors Associated with Mental, Behavioral, and Developmental Disorders Among Children Aged 2–8 Years in Rural and Urban Areas—United States, 2011–2012. *MMWR. Surveillance Summaries*, 66. <https://doi.org/10.15585/mmwr.ss6608a1>
- Rowland-Shea, J., Doshi, S., Edberg, S., & Fanger, R. (2020). *The Nature Gap: Confronting Racial and Economic Disparities in the Destruction and Protection of Nature in America.* The Center for American Progress.
- Ruch, D. A., Sheftall, A. H., Schlagbaum, P., Rausch, J., Campo, J. V., & Bridge, J. A. (2019). Trends in Suicide Among Youth Aged 10 to 19 Years in the United States, 1975 to 2016. *JAMA Network Open*, 2(5), e193886–e193886. <https://doi.org/10.1001/jamanetworkopen.2019.3886>

- South, E. C., Hohl, B. C., Kondo, M. C., MacDonald, J. M., & Branas, C. C. (2018). Effect of Greening Vacant Land on Mental Health of Community-Dwelling Adults: A Cluster Randomized Trial. *JAMA Network Open*, 1(3), e180298–e180298. <https://doi.org/10.1001/jamanetworkopen.2018.0298>
- Tillmann, S., Tobin, D., Avison, W., & Gilliland, J. (2018). Mental health benefits of interactions with nature in children and teenagers: A systematic review. *Journal of Epidemiology and Community Health*, 72(10), 958–966. <https://doi.org/10.1136/jech-2018-210436>
- Twenge, J. M., Cooper, A. B., Joiner, T. E., Duffy, M. E., & Binau, S. G. (2019). Age, period, and cohort trends in mood disorder indicators and suicide-related outcomes in a nationally representative dataset, 2005-2017. *Journal of Abnormal Psychology*, 128(3), 185–199. <https://doi.org/10.1037/abn0000410>
- Walter, K. H., Otis, N. P., Glassman, L. H., Ray, T. N., Michalewicz-Kragh, B., Kobayashi Elliott, K. T., & Thomsen, C. J. (2019). Comparison of surf and hike therapy for active duty service members with major depressive disorder: Study protocol for a randomized controlled trial of novel interventions in a naturalistic setting. *Contemporary Clinical Trials Communications*, 16, 100435. <https://doi.org/10.1016/j.conctc.2019.100435>
- Walter, K. H., Otis, N. P., Ray, T. N., Glassman, L. H., Michalewicz-Kragh, B., Powell, A. L., & Thomsen, C. J. (2019). Breaking the surface: Psychological outcomes among U.S. active duty service members following a surf therapy program. *Psychology of Sport and Exercise*, 45, 101551. <https://doi.org/10.1016/j.psychsport.2019.101551>
- Warber, S. L., DeHudy, A. A., Bialko, M. F., Marselle, M. R., & Irvine, K. N. (2015). Addressing “Nature-Deficit Disorder”: A Mixed Methods Pilot Study of Young Adults Attending a Wilderness Camp [Research Article]. *Evidence-Based Complementary and Alternative Medicine; Hindawi*. <https://doi.org/10.1155/2015/651827>
- Wells, N. M., & Evans, G. W. (2003). Nearby Nature: A Buffer of Life Stress among Rural Children. *Environment and Behavior*, 35(3), 311–330. <https://doi.org/10.1177/0013916503035003001>
- White, M. P., Alcock, I., Grellier, J., Wheeler, B. W., Hartig, T., Warber, S. L., Bone, A., Depledge, M. H., & Fleming, L. E. (2019). Spending at least 120 minutes a week in nature is associated with good health and wellbeing. *Scientific Reports*, 9(1), 7730. <https://doi.org/10.1038/s41598-019-44097-3>

APPENDIX

The pages that follow provide empirically validated examples of questionnaires that can be provided to program participants before and after nature activities or multi-week events to gauge mental-health symptoms and change in symptoms.

- The **PHQ-9** uses 9 questions to track symptoms of depression and is ideal for gathering data at the beginning and end of multi-week programs (e.g., a 6-week hike therapy program).
- The **PHQ-4** uses 4 questions to track symptoms of depression and anxiety and is ideal for gathering data at the beginning and end of individual activities (e.g., guided meditation or forest bathing sessions).
- The **GAD-7 Anxiety** uses 7 questions to track symptoms of anxiety and is ideal for gathering data at the beginning and end of multi-week programs.

PATIENT HEALTH QUESTIONNAIRE (PHQ-9)

NAME: _____

DATE: _____

Over the last 2 weeks, how often have you been bothered by any of the following problems?
(use “✓” to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite	0	1	2	3
6. Feeling bad about yourself—or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. Moving or speaking so slowly that other people could have noticed. Or the opposite—being so fidgety or restless that you have been moving around a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead, or of hurting yourself	0	1	2	3

add columns + +

(Healthcare professional: For interpretation of TOTAL, please refer to accompanying scoring card).

TOTAL:

10. If you checked off any problems, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all _____
Somewhat difficult _____
Very difficult _____
Extremely difficult _____

PHQ-9 PATIENT DEPRESSION QUESTIONNAIRE

For initial diagnosis:

1. Patient completes PHQ-9 Quick Depression Assessment.
2. If there are at least 4 ✓s in the shaded section (including Questions #1 and #2), consider a depressive disorder. Add score to determine severity.

Consider Major Depressive Disorder

- if there are at least 5 ✓s in the shaded section (one of which corresponds to Question #1 or #2)

Consider Other Depressive Disorder

- if there are 2–4 ✓s in the shaded section (one of which corresponds to Question #1 or #2)

Note: Since the questionnaire relies on patient self-report, all responses should be verified by the clinician, and a definitive diagnosis is made on clinical grounds taking into account how well the patient understood the questionnaire, as well as other relevant information from the patient.

Diagnoses of Major Depressive Disorder or Other Depressive Disorder also require impairment of social, occupational, or other important areas of functioning (Question #10) and ruling out normal bereavement, a history of a Manic Episode (Bipolar Disorder), and a physical disorder, medication, or other drug as the biological cause of the depressive symptoms.

To monitor severity over time for newly diagnosed patients or patients in current treatment for depression:

1. Patients may complete questionnaires at baseline and at regular intervals (eg, every 2 weeks) at home and bring them in at their next appointment for scoring or they may complete the questionnaire during each scheduled appointment.
2. Add up ✓s by column. For every ✓: Several days = 1 More than half the days = 2 Nearly every day = 3
3. Add together column scores to get a TOTAL score.
4. Refer to the accompanying PHQ-9 Scoring Box to interpret the TOTAL score.
5. Results may be included in patient files to assist you in setting up a treatment goal, determining degree of response, as well as guiding treatment intervention.

Scoring: add up all checked boxes on PHQ-9

For every ✓ Not at all = 0; Several days = 1; More than half the days = 2; Nearly every day = 3

Interpretation of Total Score

Total Score	Depression Severity
1–4	Minimal depression
5–9	Mild depression
10–14	Moderate depression
15–19	Moderately severe depression
20–27	Severe depression

PHQ-4

Over the last 2 weeks, how often have you been bothered by the following problems?
(use “✓” to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Little interest or pleasure in doing things	0	1	2	3
4. Feeling down, depressed, or hopeless	0	1	2	3

Scoring

PHQ-4 total score ranges from 0 to 12, with categories of psychological distress being:

- **None** 0–2
- **Mild** 3–5
- **Moderate** 6–8
- **Severe** 9–12

Anxiety subscale = sum of items 1 and 2 (score range, 0 to 6)

Depression subscale = sum of items 3 and 4 (score range, 0 to 6)

On each subscale, a score of 3 or greater is considered positive for screening purposes

The PHQ scales were developed by Drs. Robert L. Spitzer, Janet B.W. Williams, and Kurt Kroenke and colleagues. The PHQ scales are free to use. For research information, contact Dr. Kroenke at kkroenke@regenstrief.org

Kroenke K, Spitzer RL, Williams JBW, Löwe B. An ultra-brief screening scale for anxiety and depression: the PHQ-4 Psychosomatics 2009;50:613-621.

GAD-7 ANXIETY

Over the last 2 weeks, how often have you been bothered by the following problems?
(use “✓” to indicate your answer)

	Not at all	Several days	More than half the days	Nearly every day
1. Feeling nervous, anxious or on edge	0	1	2	3
2. Not being able to stop or control worrying	0	1	2	3
3. Little interest or pleasure in doing things	0	1	2	3
4. Feeling down, depressed, or hopeless	0	1	2	3
5. Being so restless that it is hard to sit still	0	1	2	3
6. Becoming easily annoyed or irritable	0	1	2	3
7. Feeling afraid, as if something awful might happen	0	1	2	3

Column totals + + =
TOTAL SCORE

If you checked any problems, how difficult have they made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all

Somewhat difficult

Very difficult

Extremely difficult

Source: Primary Care Evaluation of Mental Disorders Patient Health Questionnaire (PRIME-MD-PHQ). The PHQ was developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke, and colleagues. For research information, contact Dr. Spitzer at ris8@columbia.edu. PRIME-MD® is a trademark of Pfizer Inc. Copyright© 1999 Pfizer Inc. All rights reserved. Reproduced with permission

Scoring GAD-7 Anxiety Severity

This is calculated by assigning scores of 0, 1, 2, and 3 to the response categories, respectively, of “not at all,” “several days,” “more than half the days,” and “nearly every day.” GAD-7 total score for the seven items ranges from 0 to 21.

- **Minimal anxiety** 0–4
- **Mild anxiety** 5–9
- **Moderate anxiety** 10–14
- **Severe anxiety** 15–21