

HEALTHY DEVELOPMENT RELIES ON YOUTH RELATIONSHIPS WITH NATURE

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In a time of unprecedented loss of the world's biodiversity and widespread urbanization, humans are living in contexts that are increasingly detached from nature. Lack of connection to animals, plants and the natural world has serious implications for human's behavioral and mental health, particularly during childhood and adolescence.

Two figures walk side-by-side down a gravel path, one tall and one short, carrying feed buckets. Fog envelops their boots, crunching along on the farm road, and is accompanied by the muffled shuffling of animals waking in the barn.

Mere steps away from the school and residential buildings, boundaries soften where the barn-red buildings open onto animal runs and farmyards; the garden overflows with abundance; paddocks form the outer border; and nature trails meander into the neighboring forest. Since 1947, the mission of Green Chimneys, a school for special education and mental health treatment, has been to empower youth to maximize their full potential through nature-based education within clinical, residential, and recreational services. Located on 175 acres of private farmland, Green Chimneys is home to state-of-the-art classrooms, therapy facilities, and residential student housing for students enrolled in 1st through 12th grade. Interwoven among these traditional youth services facilities are farm animal and horse barns; an outdoor climbing and recreation area; a wildlife center that houses small mammals, reptiles, and amphibians; canine kennel facilities; educational gardens and greenhouses; numerous pastures; and access to other recreational resources, such as nearby lakes, wetlands, and hiking trails.

Ample evidence suggests that exposure to nature has broad emotional, behavioral, and cognitive benefits for human health and well-being. Human-animal-environment interactions are associated with the regulation of stress, distress, arousal, and conflict. Likewise, social and emotional learning during childhood and adolescence is enhanced through relationships with nature, which has positive implications for students' engagement in school, as well as their ability to form and sustain social connections and live with autonomy. At Green Chimneys, a transdisciplinary team of specialized therapists, clinicians, educators, and support staff work collaboratively to provide an individualized approach to each student's learning and therapy that integrates animals, plants, and the natural environment.

Youth connections with nature foster self-regulation and positive youth development

Over 200 animals and plant species are incorporated into the special education and treatment programs at Green Chimneys to enhance experiential learning and foster psychosocial wellness for students. With such a diverse range of animal species living on campus, teachers and therapists are able to plan and customize their incorporation of nature to meet individual needs to enhance each student's academic, therapeutic, and developmental trajectories.



Psychosocial development in youth has important and enduring impacts on their mental health, well-being, and capacity to care for themselves and others in adulthood. Notably, the ability to self-regulate represents a key component of healthy child and adolescent development. An individual's lack of self-regulation skills or competencies can have lifelong implications for their own health and quality of life. During childhood and adolescence unique developmental challenges are related to the refinement of self-regulation skills. These skills are pivotal, as they have been shown to predict better social competence, support improved academic performance, contribute to healthy adjustment in adulthood, and protect against internalizing and externalizing symptomatology.

The theoretical approach and intervention strategy known as positive youth development offers an innovative, strengths-based approach to understanding and promoting trajectories of thriving for youth. According to this framework, when the strengths and interests of an individual align with the assets present in their environmental and social contexts, mutual relational benefits are likely to occur. Green Chimneys applies a positive youth development treatment approach within its unique context that integrates animals, plants and the natural environment. As the ability to self-regulate and manage emotions is a key component of developmental and mental health, additional research in these areas is needed. Further, health and education intervention research has not yet examined the processes driving these positive outcomes. Green Chimneys is uniquely poised to serve as an important research site to better understand how nature-based contexts shape the immediate processes of self-regulation and are related to long-term youth development.



Understanding the drivers of change at Green Chimneys

A comprehensive research agenda is being conducted in a partnership with Green Chimneys and the Institute for Human Animal Connection at the University of Denver's Graduate School of Social Work. This integrated research portfolio is focused on measuring and understanding the effects of nature-based programs delivered in a complex treatment and special education environment on youth development for students experiencing severe psychosocial challenges. First, researchers compiled a comprehensive documentation of the types of nature-based programs at Green Chimneys, along with a detailing of each intervention's key components. Available as a free download on the organization's website (<https://www.greenchimneys.org/why-animals-nature/sam-myra-ross-institute/tools-resources-practitioners/recent-studiesfindings/>), this documentation uses positive youth development as the theoretical framework to evaluate how nature-based programs complemented Green Chimney's clinical and teaching strategies to enhance educational and youth development outcomes.

In another study, student self-regulation was measured by the number of physical restraints that occurred in different locations on campus to determine whether nature-based contexts supported students to better manage stress, anger, and anxiety. Results showed 1,000-fold and 100-fold lower rates of dysregulation occurring in the nature-based program areas compared to the school and other areas of the campus. These findings support the hypothesis that the nature-based programs have at least an immediate impact on self-regulation. Nature-based program areas at Green Chimneys are multi-species learning and therapeutic environments where students can participate in hands-on programming. While the sensory and kinesthetic input of nature-based activities can enhance the delivery of nature-based programs, Green Chimneys staff carefully consider each student's individual learning and sensory processing needs before introducing them to this setting. Time spent caring for animals, walking nature paths, or gardening supports youths' physical, motor, cognitive, social, and emotional development.

"After a few weeks of participation in the Equine Program, and getting to know the animals in the Horse Barn, this student noticeably changed his attitude, even choosing to be late to his own breakfast in order to ensure that all equines had received their morning meal. In other words, he took a step he seldom had before: he put himself and his needs second, and has since continued to willingly feed the donkeys and horses each day with a sense of responsibility and compassion."

-Green Chimneys Intern

An integrated series of qualitative studies are being carried out to better understand the nuances of effects of the nature-based programs from a variety of perspectives. This type of research focuses on identifying common themes in interviews with practitioners and participants to gain unique perspectives on how an intervention potentially works. The first of these studies analyzed interviews with Green Chimneys teaching staff, who spend a large amount of time with students who participate in nature-based programs. Analysis revealed major themes that included prosocial behavior, caregiving and nurturing, connection to animals and humans, and curiosity and excitement about learning. The second study analyzed interviews with nature-based program staff, who work closely with students and animals, and identified major themes such as the facilitation of students' relationships with others and greater self-control. Both groups had seen youth be positively impacted by their relationships with animals, plants and nature. The perspectives of teaching staff emphasized increased student self-regulation and prosocial behavior while the nature-based program staff highlighted students' personal growth and cooperative behavior. While this qualitative method does not represent a causal relationship between HAIs and student outcomes, it points towards potential key pathways of change.

Overall, these preliminary data continue to drive the research team toward the hypothesis that human-animal-environment interactions at Green Chimneys affect self-regulation skills and support positive youth development. Youth relationships with animals, plants, and the natural environment offers them a wealth of learning and therapeutic opportunities. These contexts provide a calming and grounding setting where youth can contribute to the wellbeing of other living creatures and experience themselves as capable, confident, and whole. Gaining a nuanced understanding of the Green Chimneys model will inform the development of similar nature-based approaches to supporting the development of adolescents in other therapeutic programs.

