

CATEGORY: POPULATIONS/PROGRAMS

Children & Youth Populations & Programs

Horticulture can impact children and youth on so many levels from increasing physical activity through gardening, improving nutrition by growing, tasting & eating healthy produce, promoting resiliency at school gardens, after-school horticulture programs & wilderness camps, and connecting with nature & plants in support of environmental stewardship. Plant-based recreational and therapeutic activities are being used to address adverse childhood experiences (ACE), trauma, family disruption, homelessness, early childhood development, poor nutrition, & COVID-19 issues. Research focuses on child & youth attitudes, behavior, neurosequential development and how plants, gardens and nature can positively impact child & youth populations. Horticulture programs for this population are delivered at a variety of places including schools, treatment centers, camps, and public gardens. Increasing attention is being paid to youth and college aged young people, recognizing that connections to nature & gardening can reduce their stress, improve attention & coping skills, & provide positive leisure activities.

Newer initiatives are focusing on social emotional learning in gardens (Oh et al., 2020; Dankew et al., 2020; Mann et al., 2022), increasing nature exposure as antidote to digital screen time, and using nature connections to address high rates of obesity (American Academy of Pediatrics *Clinical Practice Guidelines*). The breadth of initiatives speaks to the broader framework FLHHN supports: *National Schoolyard Forest System* <https://www.greenschoolyards.org/schoolyard-forest-system> and Zeiger's study that found pediatric primary care providers want to include nature counseling, connections to nature & HT as part of their services.

For related resources refer to category Landscapes for Health: School Gardens & category Horticultural Therapy & Health Services: Autism populations

Key Organizations

[American Horticultural Society Youth Gardening](#)

[Children & Nature Network](#)

[Green Schoolyards America](#)

[Junior Master Gardener Program](#)

[Kids Gardening](#)

[National Schoolyard Forest System](#)

[Whole Kids Foundation](#)

Books, journals & epublications on children & youth horticulture programs

Junior Master Gardener curricula <https://jmgkids.us/kids-zone/>

Latane, C. (2021). *Schools that heal: Design with mental health in mind*. Island Press.

National Agriculture in the Classroom. (2022). Agricultural literacy curriculum matrix (searchable data base). <https://www.agclassroom.org/matrix/>

National Wildlife Federation. (2022). [Growing a wild NYC \(a K-5 urban pollinator curriculum\)](#).

Rakow, D. A. & Eells, G. T. (2019). *Nature Rx: Improving college-student mental health*. Cornell University Press.

Research & articles on children & youth horticulture programs

Recently published selected research & articles:

- Allah Yar, M., & Kazemi, F. (2020). The role of dish gardens on the physical and neuropsychological improvement of hospitalized children. *Urban Forestry & Urban Greening*, 53.
- Anaebo, J., Agbonome, P., Agu, A. et al. (2023). Exploring the use of landscape to enhance social interactions among the inmates of centres for destitute children. *Int J of Innovative Environmental Studies Research*, 11(3).
- Bates, C.R., Bohnert, A.M., & Gerstein, D.E. (2018). Green schoolyards in low-income urban neighborhoods: Natural spaces for positive youth development outcomes. *Frontiers in Psychology*, 9.
- Baur, J. (2020). Campus community gardens and student health: A case study of a campus garden and student well-being. *J Am Coll Health*, 5, 1-8.
- Bennett, A. (2023). [Gardening and sustainability lessons for kid](#). *Today's Homeowner.com*.
- Berezowitz, C.K., Bontrager, A.B., Yoder, D.A., & Schoeller, D.A. (2015). School gardens enhance academic performance and dietary outcomes in children. *J. Sch. Health*, 85(8), 508-518.
- Bezold, CP. et al. (2018, April). The relationship between surrounding greenness in childhood and adolescence and depressive symptoms in adolescence and early adulthood. *Annals of Epidemiology*, 28(4), 213-219.
- Bice, M.R., Ball, J., Bickford, N. et al. (2018). Community gardens: Interactions between communities, schools, and impact on students. *The Health Educator*, 50(1).
- Bølling, M., Niclasen, J., Bentsen P., & Nielsen, G. (2019). Association of education outside the classroom and pupils' psychosocial well-being: Results from a school year implementation. *Journal of School Health*, 89, 210-21.
- Chawla, L. (2020). Childhood nature connection and constructive hope: A review of research on connecting with nature and coping with environmental loss. *People and Nature*, 2(3), 619-642.
- Chen, M.L., Lo, L.C., & Lou, S.J. (2018). Effects of strength-based approach horticultural therapy on primary students' resilience. *Creative Education*, 9(16), 2973.
- Chimento, A. Mukherjee, I., Chandna, J. et al. (2018). A haven of green space: Learning from a pilot pre-post evaluation of a school-based social and therapeutic horticulture intervention with children. *BMC Public Health*, 18(1), 836.
- Coffino, J.A., Spoor, S.P., Drach, R., & Hormes, J.M. (2021). Food insecurity among graduate students: Prevalence and association with depression, anxiety and stress. *Public Health Nutr.*, 24(7), 1889-1894.
- Cueva, K., Speakman, K., Neault, N. et al. (2020, June). Cultural connectedness as obesity prevention: Indigenous youth perspectives on Feast for the Future. *J Nutr Educ Behav.*, 52(6), 632-639.
- Curzio, O., Billeci, L., Belmonti, V., Colantonio, S. et al. (2022). Horticultural therapy may reduce psychological and physiological stress in adolescents with anorexia nervosa: A pilot study. *Nutrients*, 14(24), 5198.
- Dankiw, K.A., Tsiros, M.D., Baldock, K.L., & Kumar, S. (2020). The impacts of unstructured nature play on health in early childhood development: A systematic review. *PLoS ONE*, 15(2).
- Diehl, L. (2021). The effect of therapeutic horticulture on student wellbeing. *AHTA Magazine*, 49(3), 11.
- Elten, M., Benchimol, E.I., Fell, D.B. et al. (2021). Residential greenspace in childhood reduces risk of pediatric inflammatory bowel disease: A population-based cohort study. *Am J Gastroenterol.*, 116(2), 347-353.
- Etheredge, C.L., Waliczek, T.M., & Sudakaran, P.O. (2020). Measuring the economic and educational value of a university-based service-learning floral and plant program. *HortTechnology*, 30(3).
- Gatto, N.M., Martinez, L.C., & Spruijt-Metz, D. (2017). LA Sprouts randomized controlled nutrition, cooking and gardening programme reduces obesity and metabolic risk in Hispanic/Latino youth.

- Pediatr Obes.*, 2(1), 28-37.
- Greenschoolyards.org. (2024). [Experiencing nature supports social-emotional health and well-being.](#)
- Grimes, K.E. (2021). The Wild Earth Preschool. *AHTA Magazine*, 49(1), 10-11.
- Guo, S., Li, T., Xue, B., & Yang, X. (2023). Horticultural activities participation and college students' positive mental characters: Mediating role of academic self-efficacy. *Horticulturae*, 9(3), 334.
- Hand, K.L., Freeman, C., Seddon, P.J. et al. (2017). The importance of urban gardens in supporting children's biophilia. *Proceedings of the National Academy of Sciences*, 114(2), 274-279.
- Hollis, A., & Bruno, B. (2021). The effects of horticultural therapy on at-risk youth. *ISHS Acta Horticulturae 1330: XV International People Plant Symposium and II International Symposium on Horticultural Therapies: The Role of Horticulture in Human Well-being and Social Development*.
- Jeong, Y., Kim, M., Chang, T., & Yun, S. (2021). Components for early childhood horticultural education program derived from expert delphi research. *Journal of People, Plants, and Environment*, 24(2), 119-135.
- Johnson-Jennings, M., Paul, K., Olson, D. et al. (2020). Ode'imín Giizis: proposing and piloting gardening as an indigenous childhood health intervention. *Journal of Health Care for the Poor and Underserved*, 31(2), 871-888.
- Jung, S.M., & Lee, S. (2021). Effects of interpersonal caring horticultural activities program on interpersonal caring need, aggression, depression and life respect consciousness in high school students. *ISHS Acta Horticulturae 1330: XV International People Plant Symposium and II International Symposium on Horticultural Therapies: The Role of Horticulture in Human Well-being and Social Development*.
- Karthikeyan, V. (2023). Horticultural therapy activities can reduce stress and enhance the social and cognitive skills in autism children. *International Journal of Intellectual Disability*.
- Kim, Y.K., Ryu, J.Y., Yun, S.Y., & Choi, B.J. (2020). Relationship satisfaction and emotional change between parents and children through the Agro-Healing Program. *Journal of People, Plants, and Environment*, 23(5), 555-564.
- Kim, H.R., Kim, S.O., & Park, S.A. (2021). The effects of horticultural activity program on vegetable preference of elementary school students. *Int J Environ Res Public Health*, 18(15), 8100.
- Kim, S.O., Oh, Y.A., & Park, S.A. (2020). Foliage plants improve concentration and emotional condition of elementary school students performing an intensive assignment. *HortScience*, 55(3), 378-385.
- Kim, S.O., Jeong, J.E., Oh, Y.A. et al. (2021). Comparing concentration levels and emotional states of children using electroencephalography during horticultural and nonhorticultural activities. *HortScience*, 56(3), 324-329.
- Kwack, H.R. (2021). Development and application of horticultural kit for children's horticulture education. *Journal of People, Plants, and Environment*, 24(6), 595-608.
- Larson, L.R., Mullenbach, L.E., Browning, M.H.E.M. et al. (2022). Greenspace and park use associated with less emotional distress among college students in the United States during the COVID-19 pandemic. *Environ Res.*, 204(Pt D), 112367.
- Lee, M., J., Oh, W., Jang, J.S., & Lee, J.Y. (2018). A pilot study: Horticulture-related activities significantly reduce stress levels and salivary cortisol concentration of maladjusted elementary school children. *Complementary Therapies in Medicine*, 37, 172-177.
- Lee, A.Y., Kim, S.O., Gim, G.M. et al. (2020). Care farming program for family health: A pilot study with mothers and children. *International Journal of Environmental Research and Public Health*, 17(1), 27.
- Li, Y.L., Gui, F., & Gao, W.B. (2022). Promoting effect of horticultural therapy on college students' positive psychological quality. *Front Psychol.*, 26, 13, 864147.

- Loso, J., Staub, D., Colby, S.E., Olfert, M.D. et al. (2018). Gardening experience is associated with increased fruit and vegetable intake among first-year college students: A cross-sectional examination. *J Acad Nutr Diet.*, 118(2), 275-283.
- Mann, J., Gray, T., Truong, S. et al. (2022). Getting out of the classroom and into nature: A systematic review of nature-specific outdoor learning on school children's learning and development. *Front Public Health.*, 10, 877058.
- Mann, J., Gray, T., Truong, S. et al. (2018). Systematic review protocol to identify the key benefits and efficacy of nature-based learning in outdoor educational settings. *Int J Environ Res Public Health.*, 18(3), 1199.
- Mayne, S.L., Kelleher, S., Hannan, C. et al. (2022). Neighborhood greenspace and changes in pediatric obesity during COVID-19. *Am J Prev Med.*, S0749-3797(22), 00411-1.
- McCormick, R. (2017). Does access to green space impact the mental well-being of children: A review. *J Pediatr Nurs.*, 37, 3-7.
- McFarland, A., Sommerfeld, A., Waliczek, T. M., & Zajicek, J. (2023). Use of gardening programs as an intervention to increase children's ability to delay gratification. *HortTechnology*, 33(1), 131-137.
- Meredith, G.R., Rakow, D.A., Eldermire, E.R.B. et al. (2020). Minimum time dose in nature to positively impact the mental health of college-aged students, and how to measure it: A scoping review. *Front. Psychol.*, 14.
- Miller, C.T. (2019). Plant madness: A classroom game using bracketology for horticulture plant identification courses. *HortTechnology*, 29(2).
- Neshteruk, C.D., Skinner, A.C., Counts, J. et al. (2023). Translating knowledge into action for child obesity treatment in partnership with Parks and Recreation: Study protocol for hybrid type II trial. *Implementation Science* 18, 6.
- Norwood, M.F., Lakhani, A., Fullagar, S. et al. (2019). A narrative and systematic review of the behavioural, cognitive and emotional effects of passive nature exposure on young people: Evidence for prescribing change. *Landscape and Urban Planning*, 189, 71-79.
- Nunez, G.H., & Neves da Silva, M. (2021). At-home plant growing kits foster positive student experiences in an online horticulture course. *HortTechnology*, 31(6).
- Oh, Y.A., Lee, A.Y., An, K.J., & Park, S.A. (2020). Horticultural therapy program for improving emotional well-being of elementary school students: An observational study. *Integrative Medicine Research*, 9(1), 37-41.
- Oh, Y.A., Kim, S.O., & Park, S.A. (2019). Real foliage plants as visual stimuli to improve concentration and attention in elementary students. *Int J Environ Res Public Health.*, 16(5), 796.
- Padial-Ruz, R., Puga-González, M.E., Céspedes-Jiménez, Á., & Cabello-Manrique D. (2021). Determining factors in the use of urban parks that influence the practice of physical activity in children: A systematic review. *Int J Environ Res Public Health.*, 18(7), 3648.
- Park, K.H., Kim, S.Y., & Park, S.A. (2022). Efficacy of a horticultural therapy program designed for emotional stability and career exploration among adolescents in juvenile detention centers. *Int J Environ Res Public Health.*, 19(14), 8812.
- Rees-Punia, E., Holloway, A., Knauff, D., & Schmidt, M.D. (2017). Effects of school gardening lessons on elementary school children's physical activity and sedentary time. *Journal of Physical Activity and Health*, 14(12), 959-964.
- Rogers, M., Livstron, I., Roger, B., & Smith, A. (2019). Growing North Minneapolis: Connecting youth and community through garden-based experiential learning. *HortTechnology*, 30(1).
- Ruhl, J., & Lordly, D. (2021). University students harvesting the benefits of a garden laboratory. *Can J Diet Pract Res.*, 82(3), 107-114.

- Ryu, J.Y., Yun, S.Y., & Choi, B.J. (2020). Effects of horticultural therapy on the emotions and stress index of trainees entrusted to the Juvenile Classification Review Center. *Journal of People, Plants, and Environment*, 23(1), 47-53.
- Sachs, A.L., Coringrato, E., Sprague, N. et al. (2022). Rationale, feasibility, and acceptability of the meeting in nature together (MINT) program: A novel nature-based social intervention for loneliness reduction with teen parents and their peers. *Int J Environ Res Public Health*, 19(17), 11059.
- Shao, Y., Elsadek, M., & Liu, B. (2020). Horticultural activity: Its contribution to stress recovery and wellbeing for children. *Int J Environ Res Public Health*, 17(4), 1229.
- Slagle, T. (2019). Program example: Neurosequential approach to horticultural therapy. In Haller, Kennedy & Capra (Eds.) *The profession and practice of horticultural therapy*. CRC Press.
- Stevenson, M.P., Dewhurst, R., Schilhab, T., & Bentsen, P. (2019). Cognitive restoration in children following exposure to nature: Evidence from the Attention Network Task and Mobile Eye Tracking. *Front. Psychol.* 10.
- Stluka, S., McCormack, LA., Burdette, L. et al. (2019). Gardening for health: Using garden coordinators and volunteers to implement rural school and community gardens. *Prev Chronic Dis*, 16, E156.
- Sommerfield, A., McFarland, A., Wliczek, T., & Zajicek, J. (2021). Use of gardening programs as an intervention to increase children's visual-motor integration. *HortTechnology*, 31(5).
- Trauth, J.N., Harris, K., & Jackson, N. (2023). Using trauma-informed care and horticulture therapy with college students: A counseling approach modeled after a refugee resettlement community. In *Practical strategies to reduce childhood trauma and mitigate exposure to the school-to-prison pipeline* (pp. 66-82). IGI Global.
- Tseng, T.A., Chang, J.J., & Chang, Y.C. (2023). Green experience: The effect of horticultural activities on children's physical and mental health and dietary behavior. *HortScience*, 58(6), 691-698.
- van den Berg, A., Warren, JL., McIntosh, A. et al. (2020). Impact of a gardening and physical activity intervention in Title 1 schools: The TGEG study. *Child Obes.*, 16(S1), S44-S54.
- van Dijk-Wesselius, J.E., van den Berg, A.E., Maas, J., & Hovinga, D. (2020). Green schoolyards as outdoor learning environments: Barriers and solutions as experienced by primary school teachers. *Front Psychol.*, 10, 2919.
- Williams, DR., Brule, H., Kelley, SS., & Skinner, EA. (2018). Science in the Learning Gardens (SciLG): A study of students' motivation, achievement, and science identity in low-income middle schools. *Int J STEM Educ.*, 5(1), 8.
- Yates, J. (2022). Cultivating potential at The Children's Center. *AHTA Magazine*, 50(1), 12-13.
- Zhang, Y., Mavoa, S., Zhao, J. et al. (2020). The association between green space and adolescents' mental well-being: A systematic review. *Int J Environ Res Public Health*, 17(18), 6640.
- (2021). [UF professor helps autism spectrum adults earn horticulture certification](#). *UF/IFAS BLOGS*.

Examples of children & youth horticulture programs

A Day at Forest School demonstrates outdoor learning, importance of access to nature.

<https://www.youtube.com/watch?v=-9ADLZv7jms>

Anne and Robert H. Lurie Children's Hospital of Chicago uses a garden play area Crown Sky Garden to deliver treatment and services to pediatric patients.

<https://www.luriechildrens.org/en/patients-visitors/visiting-lurie-childrens/tour-the-hospital/family-community-destinations/crown-sky-garden/>

Charles R. Drew Transition Center & its school-based horticulture program in Detroit teaches hort skills for young people with disabilities addressing childhood obesity, early-onset diabetes and food insecurity using hydroponics, in-ground gardens.

<https://kidsgardening.org/garden-story-empowering-hydroponics/>

From Apples to Acorns at Hillcrest Elementary School Oak Harbor Washington is a partnership with the school, local garden club & community improving the school courtyard.

<https://kidsgardening.org/garden-stories-apples-to-acorns/>

Gardening with kids/dinosaur garden/teaching children the joy of gardening.

<https://www.youtube.com/watch?v=Oe6rX6sasDY>

Hershey School's Sensory Garden engages students including trauma informed theory.

<https://www.youtube.com/watch?v=pvlsbp98KSI>

Junior Master Gardener Learn, Grow, Eat & Go program is an interdisciplinary program with academic focus, gardening, nutrient-dense food experiences & physical activity.

<https://jmgkids.us/lgeg/>

Mala'ai Middle School's Hawaiian Culinary Garden is a one-acre ecosystem classroom with native, endemic edibles and craft crops, part of Hawai'i Island School garden Network.

<https://malaai.org/>

Monarch School of New England uses therapeutic gardens for learning & vocational training for elementary & high school students who have significant special needs.

<https://www.youtube.com/watch?v=goVNY7doTEU>

National Children & Youth Garden Symposium annual event is hosted by the American Horticultural Society.

<https://ahsgardening.org/gardening-programs/youth-gardening/ncygs/>

National Garden Clubs' Children & Youth Programs include youth pollinator gardens, youth garden clubs, ecology warriors workbook, contests, scholarships & grants.

<https://www.gardenclub.org/youth-and-scholarships>

National Schoolyard Forest System initiative seeks to create schoolyard forests to directly shade & protect students from extreme heat related to climate change. A resource library has been started in support of this work with lectures, videos

<https://www.greenschoolyards.org/schoolyard-forest-system>

<https://www.greenschoolyards.org/schoolyard-forest-design-lecture-series>

North Carolina Botanical Garden's Youth & Family Programs include nature activities, camp flytrap, Little Sprouts preschool program, family workshops, children's wonder garden & *Nature Play at Home* guide.

<https://ncbg.unc.edu/learn/youth-family/>

Pacific Quest outdoor behavioral health care program for adolescents uses neurodevelopmental approach, horticultural therapy and nature connections.

<https://pacificquest.org/adolescents/>

The Children's Center @ The Centers for Exceptional Children in Winston-Salem, NC delivers horticultural therapy and nature-based programs to children with physical disabilities, orthopedic challenges & other health issues.

<https://thecfec.org/prek-elementary/>

The Wild Earth Preschool at the Dallas Zoo provides nature experiences for this age group.

<https://www.dallaszoo.com/wildearthpreschool/>

Urban Roots works with at-risk youth in North Carolina using a vocational horticultural therapy program partially funded through Campaign for Black Male Achievement.

<https://www.urbanrootsnc.com/about-us>

Seed your Future organization seeks to inspire and educate students about horticulture careers, with career exploration, scholarships, summer camps, green career week, & DIY plant videos.

<https://www.seedyourfuture.org/students>

Southern Boone Learning Garden in Ashland Missouri has a variety of programs for students pre-k -4th grade, with direction from the Southern Boone county School District.

<https://www.sblearninggarden.org/lessonplans>

Youth Programming Toolkit from Children & Nature organization, Outdoor Foundation, Search Institute, and Fresh Tracks provides resources re nature-based programming & youth.

<https://www.childrenandnature.org/resources/youth-development-and-nature-toolkit/>

Videos, websites & webinars on children & youth horticulture programs

Big Green resource database

<https://biggreen.org/thegreenhouse/>

Cultivating Resiliency in Youth with Deep Nature Connections youtube webinar by Joanna Yates, HT practitioner discusses ways to develop this connection.

<https://youtu.be/ppWSeB8EEKY>

Healing Gardens: Dell Children's Medical Center has 7 different gardens on the campus with a focus on behavioral health, lifestyle changes, sensory garden, maze, labyrinth & nature connections.

<https://www.youtube.com/watch?v=oll4Q-prnkM>

Healing Garden Virtual Tour – Golisano Children's Hospital of SW Florida showcases the outdoor garden built in 2017.

<https://www.youtube.com/watch?v=7jMYBaqbpmk>

Kids Gardening website provides resources for educators & parents based on garden-based learning, hands-on activities with info on grants, contests, webinars, curriculum, interactive discussion sessions.

<https://kidsgardening.org/for-educators/#>

Loveland Youth Gardeners in Colorado serv youth with programs like Green Adventures, LEAD exploration program, Repair to Grow HT program among others.

<https://www.lovelandyouthgardeners.org/programs-1>

National Outdoor Learning Library, part of Greenschoolyards.org has resources: living schoolyards & climate resilience, health benefits, teaching, school gardens, enriching play & social spaces.

<https://www.greenschoolyards.org/library>

Need to Know Developments in HT & Horticulture for Health youtube video discusses children's social & emotional learning in garden & green space settings by HT practitioner Lesley Fleming, 2023

[New Developments in Horticultural Therapy and Horticulture for Health - YouTube](#)

New Jersey Agricultural Experiment Station & Rutgers University *Gardening with Youth* website offers resources with online links on starting school gardens, and webinars (starting an indoor garden, 4-H Victory Garden STEP club), gardening activities for youth, & family fun pages.

<https://njaes.rutgers.edu/home-lawn-garden/gardening-with-youth.php>

Nierenberg, D. (2023). When we talk about college campuses, we're forgetting food insecurity. *Food Tank*. <https://foodtank.com/news/2022/08/when-we-talk-about-college-campuses-were-forgetting-food-insecurity/>

Plant Heroes website from the American Public Gardens Association has hands-on materials, educator resources with a focus on nature-based education related to forest health, ecology and plant conservation.

<https://planheroes.org/>

School Garden Forum from Florida Horticulture for Health Network in 2022 raises topics where these settings can promote health, education.

<https://www.youtube.com/watch?v=khgyNZEIDic>

Schoolyard Activity Guides website from greenschoolyards.org offers free activity guides in multiple languages.

<https://www.greenschoolyards.org/guides>

THAD (Therapeutic Horticulture Activity Database) offers TH activities across populations including children & youth (bulb planting, citrus tasting, lavender wand, pita pizzas)

<https://hort.ifas.ufl.edu/therapeutic-horticulture-activities-database/children-and-youth/>

Related organizations

[Plant a Seed Foundation](#)

Written & compiled by Lesley Fleming Dec 2021; revised by Lesley Fleming, Erin O'Connor, Joanna Brown 2024.