

Horticulture for health framework

L.L. Fleming^a

Bradenton Beach, USA.

Abstract

The goal of this paper is to define a framework for horticulture for health. The exponential growth of horticulture-focused programs, organizations and trends that promote human health and well-being is presented in a framework referred to as horticulture for health. It identifies and organizes programs, services, activities and concepts across disciplines and sectors reflecting current practices in health services, education, food production, business, landscape architecture and green industry. Often focused on their own domain with limited crossover, integration or inclusion in a larger context, the horticulture for health framework captures the breadth and diversity in a coherent model, including disparate initiatives like mobile food markets, digitized horticulture technology, ecotherapy, parks prescription (Rx), forest bathing, and therapeutic horticulture for populations including those with food insecurity. This refreshed examination and categorization relies on a philosophy that recognizes the multi-sectoral nature and horticulture-specific commonality of the components, each focused on improving human health where horticulture plays a significant role.

Keywords: health services, horticulture, horticultural therapy, therapeutic modalities, food security, landscapes for health, framework

INTRODUCTION

In 2003 Relf and Lohr referred to an emerging field in horticulture research – human issues in horticulture. Their foundational work categorized horticulture and health connections into seven areas: “physical modifications to the environment; business and economic impacts; healthy communities and urban revitalization; individual health and health care facilities; fruit, vegetables, and herbs for health; education; and horticulture industry issues”. They, and others (Relf, 1992; Lohr, 2000; Raskin et al., 2002; Shoemaker, 2002;), broadened the understanding of the role plants play in “life quality”, moving beyond the traditional horticulture parameters of food, fiber and medicine.

In the 20 years since then, developments in many fields including psychology, medicine, nutrition, public health, and horticulture have produced evolutionary change such that a refreshed framework better explains current models, activities and concepts where horticulture impacts human health. The term horticulture for health began being used in 2018 referring to a more current mix of horticulture-focused initiatives (Fleming et al., 2020).

Inclusion criteria for the horticulture for health framework began with initiatives or organizations where horticulture-specific attributes were defining and or distinguishing characteristics. Horticulture was defined as a branch within agriculture, dealing with edible and ornamental plants, typically on a smaller scale than agriculture (agriculture defined as the practice of farming, the cultivation of plants and rearing of animals for consumption on a larger scale), with the scope and scale distinguishing horticulture from agriculture.

The philosophical foundation for the horticulture for health framework was based on three constructs common to all of the initiatives. Biophilia, a widely accepted theory of man’s intrinsic need to connect to the natural world, is an essential element, a pathway to improving human health and well-being through engagement with nature that can include, but is not limited to horticulture (Fromm, 1973; Aldridge and Sempik, 2002). Health, defined from a salutogenic orientation, where factors including those from emotional, physical, mental, psychological, and spiritual health domains are determinants of health, rather than health

^aE-mail: lesleyfleminghtr@gmail.com



defined from a pathogenic orientation (Antonovsky, 1996; Haller et al., 2019). Thirdly, a framework based on Sachs' landscapes for health concept that orders components with similar characteristics into categories (2008).

Examining horticulture-specific activity and concepts where health is a core tenant revealed five distinct subsets, each with specific characteristics:

- health services that use horticulture as an integral part within a therapeutic modality framework;
- groups or movements using horticulture as the catalyst for social interactions;
- landscapes for health: specifically designed landscapes (Sachs, 2008);
- food, nutrition, and food security;
- horticultural practices.

RESULTS AND DISCUSSION

Health services that use horticulture as an integral part within a therapeutic modality framework

Horticulture is currently being used as an integral component within a therapeutic modality framework in a variety of disciplines, settings and models (Figure 1). Traditional therapeutic disciplines like horticultural, occupational, recreation and physical therapy, are, and have been using horticulture or therapeutic garden settings as one option within their treatment regiments. Therapeutic processes of assessments, goal-setting, intervention activities, measurable outcomes, standards of practice, and therapeutic techniques can include plants, gardening activities, garden settings, adaptive garden tools and techniques. A second grouping of health services that utilize horticulture within a therapeutic modality framework, many identifying as nature-based therapeutic services, incorporate a broader range of delivery mechanisms including recreational strategies, self-help, and self-led options, in addition to discipline-specific, formalized therapeutic protocols. Each uses targeted health goals as the core of health services, per therapeutic modality theory, with horticulture playing a role in addressing health improvements in any one or more of physical, mental, cognitive, spiritual, social, vocational and emotional health domains.

1. Traditional therapeutic services.

The use of experiential horticultural activity is the core principle of horticultural therapy and therapeutic horticulture (AHTA, 2019; Siu et al., 2020). Recreation, occupational and physical therapists also incorporate plant and gardening activities as a component of their services (Davis, 2011; Wagenfeld and Atchison, 2014), as do dietitians, mental health, social work, and public health professionals delivering services to a wide range of populations including those diagnosed with eating disorders, diabetes, and cancer, as well as children involved in school nutrition programs. The practice of using garden space or horticultural activity, while not utilized by all professionals in these disciplines, is being used more frequently in allied health services (Fleming et al., 2017).

2. Nature-based therapeutic models.

Nature-based therapies (NBT), wilderness camps, aromatherapy, forest therapy and forest bathing (shinrin-yoku) use therapeutic modality principles as underpinnings for their health services, in conjunction with horticultural activities (Herz, 2009; Corazon et al., 2010; Tillett and Ames, 2010; Li, 2012; Bragg and Atkins, 2016). The emergent social science field of ecopsychology and the applied practice of ecotherapy use several types of interventions including: physical exercise in a natural environment, involvement in conservation activities, and horticultural therapy, each rooted in the relationship between human beings and the natural world (Roszak, 1993; Chaudhury and Banerjee, 2020). Veteran to farmer programming, focused on transitioning military personnel to civilian life, combines access and connection to nature as an integral part of health, social and educational services delivered in a farm setting (Fleming, 2015). Similarly, care farms and therapeutic farms use horticulture and other farming tasks as part of a therapeutic process to address physical and psychological

health challenges including substance misuse, intellectual disabilities, trauma, post-traumatic stress disorder (PTSD), and stress diagnosed in a variety of populations (Sempik et al., 2010).

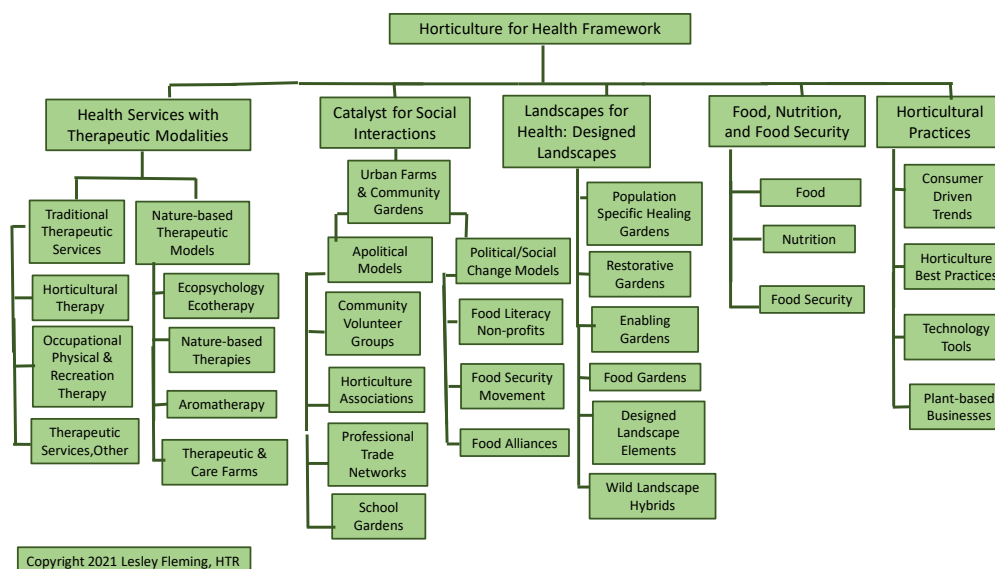


Figure 1. Horticulture for health framework.

Groups or movements using horticulture as the catalyst for social interactions

Groups or movements that use horticulture as the catalyst for social interactions is the second of five primary subsets within the horticulture for health framework. Research has validated the positive role social interactions play in health, both psychologically and sociologically. Awareness of this health factor has become more pronounced with COVID-19 restrictions on social interactions (Poortinga, 2012; Berkman, 1995; Van Den Berg and Custers, 2011). In the context where horticulture is an agent for interactions, these promote sense of community and social cohesion (Hanson, 2012; Heilmayer et al., 2020), with common characteristics – desire to perform community service, interest in affiliating through hands-on gardening activity, and high participation levels by those from wellness populations. Within this subset, two distinct sub-groups emerge, one where social interactions are apolitical, the other – groups focused on social change related to food justice and food security. The interplay between gardening activities, small-scale food production, and social affiliation makes this subset unique, as does its role as a lightning rod for current societal thought and action.

Urban farms and community gardens straddle the apolitical and political or social change subsets. Some participants affiliate for political or social change reasons, others not. Important as physical gathering spots providing an inclusive location for social interactions, these models share a common commitment to environmental concern, sharing of plant knowledge and materials among participants, community building, food production, and preservation of culture (food and other) (Okvat and Zautra, 2011; Companion, 2016). In the last decade, interest in social justice, food policy and food security has propelled greater numbers of people to turn to urban farms and community gardens as local, grassroots initiatives for advancing their concerns, practices and social connections, both as individuals and collective groups (Tam, 2014; Fleming et al., 2020), though not all who participate do so with this intent.

1. Apolitical models.

The apolitical subset is distinguished by a high degree of involvement by volunteers.

Organizations where social interaction is a significant reason to participate and where their mandates focus on horticulture and horticultural activities include a variety of groups: horticulture associations like native plant societies, rare fruit councils, American Public Garden Association, Children and Nature Network; master gardener programs and garden clubs (Boyer et al., 2002; Sugiyama et al., 2008); and horticulture and green industry professional trade groups (i.e., American Hort and Perennial Plant Association). Social interactions occur at educational workshops, conferences, plant sales, and community service projects predicated on a social capital philosophy of shared values (Dicke and Saitgalina, 2014). Industry trade groups have an added element, integrating economic and business components into their social interactions. School gardens, different in nature from the aforementioned groups, but also sharing apolitical tendencies, support social affiliation where a specific grouping – parents, school children, educators and community members interact with the purpose of fostering positive social and behavioral interactions within the school garden setting (Pollin and Retzlaff-Fürst, 2021).

2. Political/social change models.

A second distinct component of this subset are groups focused on social change with horticulture-food justice as the common bond for their affiliations, identity and social cohesion (Tam, 2014). These include food security groups at local, regional and national levels established as part social movement, part food security movement intent on transforming the food system(s) using social interactions for knowledge transfer, policy reform, food action, and community restructuring (Eisenmann et al., 2011; Food Secure Canada, 2017). Food alliances, another model, seek to improve access to healthy food through economies of scale for food costs, while promoting connections between consumers and local growers (Goodman et al., 2012; HEAL, 2017). Food literacy non-profit groups use social networking and affiliation to expand and share knowledge on food education and related initiatives like biodiversity projects; meal distribution; sensory and traveling gardens; upcycling food waste and food rescue; horticulture and farming techniques training (Food Tank, 2016a).

Landscapes for health: designed landscapes

Landscapes for health are defined as “any landscape, designed or wild, that facilitates human health and well-being” (Sachs, 2008). Landscape space itself is not intrinsically therapeutic but rather the relationship and experiences in the landscape that enable healing and health improvements (Bell et al., 2018). Designed landscapes, those with intentional plantings of horticultural specimens, have been included in the horticulture for health framework. Diehl’s healing garden hierarchy (2013) sheds light on the role designed landscapes play in human health including relief, restoration and rehabilitation with capabilities spanning mental, physical, emotional, spiritual, cognitive and vocational health domains.

Population specific therapeutic gardens “designed for use as a component of a treatment, rehabilitation, or vocational programs” (AHTA, 2019), address health challenges of specific populations – hospice, rehabilitation, veterans and active service personnel, corrections, indigenous, and maternity populations, as well as gardens for mental and behavioral health populations (Cooper Marcus and Sachs, 2014). These include “green spaces and platforms for health services including ecotherapy, horticultural therapy, nutrition counseling, and infusion treatment” as well as restorative space and facility beautification (Fleming and Figueirido, 2016). Restorative gardens in various forms (meditation, contemplation, sanctuary, memory gardens, and labyrinths), are designed to address cognitive, emotional, and or psychological aspects of mental health (Diehl, 2013) and promote the feeling of being away, fascination, and compatibility, which Kaplan identifies as key components of mental restoration (1995). Enabling gardens seek to reduce physical barriers and increase physical activity as a means of promoting physical health; Diehl’s three models – demonstration, eldercare and Alzheimer care gardens used for diverse populations. Food gardens at schools or community locations support health via nutrition, food production and food donations, community identity and social contact, social justice and advocacy (Lovell et

al., 2014).

Designed landscape elements – hardscapes and softscapes – promote health in a variety of ways, for example, improved accessibility reducing physical barriers, improved indoor air quality through plant absorption, and elements that provide sense of place and or sensory stimulation, important for elder and mental health populations (Dijkstra et al., 2008). Some wild landscape hybrids, where designed or planned plantings exist – managed forests, beaches planted with sea oats, wildflower meadows, and Parks Rx, fall within this subset, where passive restorative, active enabling elements, or a combination of “social relatedness where emotional retreat and everyday socializing can occur”, provide undemanding forms of therapeutic landscapes, or “empathetic affective sanctuary” (Butterfield and Martin, 2016).

Food, nutrition, and food security

The relationship between human health and plant-based food and nutrition has existed for centuries, as has food deprivation. Research undertaken in the last 20 years has more thoroughly linked negative health, poor nutrition and food insecurity, the latter considered to be a complex, global social-health crisis poignantly exposed during COVID-19 (Gundersen and Ziliak, 2015; Porter, 2018; Wolfson and Leung, 2020). The role that horticulture plays in seeking to improve human health takes many forms, none on their own panaceas but that address different facets of human health and food issues. The dimensions of this subset are quite distinct from the other horticulture for health categories.

1. Food and nutrition.

Health outcomes are well documented where plant-based diets and consumption of organic and super foods dense in nutrients improve cardiovascular, neurodegenerative disease, cancer and mortality rates (Derbyshire, 2017; Sofi et al., 2010). Consumer driven trends for healthy, local and sustainably grown edible plants has created demand within the green industry; food purchase patterns across healthcare, hospitality and educational sectors substantiate this trend (Lazaroiu et al., 2019). Relatedly, the impact of nutrition as an important health determinant affecting brain fatigue, mood and inflammation has been validated by research from the emerging field of nutritional cognitive neuroscience (Selhub and Logan, 2012; Zamroziewicz and Barbey, 2016). Plants used for medicinal purposes, mainly herbal remedies which are typically produced in small quantities (vs. plant-based pharmaceuticals commercially manufactured) are being used in greater numbers as plant-based strategies in line with the large numbers in third world populations who rely on herbal remedies (Tilbert and Kaptchuk, 2021).

2. Food security.

Food action, a newer term referring to a broad range of initiatives addressing food security, focus on using food to alleviate health deficits and hunger. Organizations supporting food security, many focused on particular elements of food insecurity, have emerged including food literacy groups like dietician-led school food programs, food upskilling festivals from ecology groups, and Washington State University Bread Lab’s whole-grain bread promotion among cooks, educators, students, and entrepreneurs (Food Tank, 2016b; Island Food Network, 2019). Other models – National Farm to School Network (US), Atlantic Canada Organic Regional Network’s food biodiversity program and seed bank and Dreaming Out Loud’s urban horticulture and farmers’ markets entrepreneurship and workforce development programs, are innovative, replicable food security models (Food Tank, 2018; Atlantic Canada Organic Regional Network, n.d.). Research think tanks, academic institutions and government agencies are initiating public policy, action, advocacy and funding for food security projects, many related to sustainable community goals intended to strengthen community cohesion, capacity-building and public health (National Institute of Food and Agriculture, n.d.; Fleming et al., 2020). Economic tools like endowment funds and land trusts used to purchase land for small-scale food production sites like urban farms and community gardens (No Farms No Food, 2015; Food Tank, 2016b).

Traditional and alternative food networks are using a variety of mechanisms for food

distribution in an effort to improve public health. Models like food alliances and community food banks integrate economic and social benefits at local, regional or national levels (Goodman et al., 2012; HEAL, 2017). Re-establishment of roadside farm markets (Connecticut Department of Agriculture, 2017) and expanding numbers of farmers' markets provide direct to consumer outlets, and locally grown fresh produce (Beckie et al., 2012). Newer food distribution models such as community bulk buying clubs, food box programs, community commercial kitchens and community freezers are targeting nutrition deficits of food insecure seniors, pregnant women, children and indigenous people (Fridman and Lenters, 2013) working in tandem with food hubs, mobile food markets, and pop-up food markets in communities seeking to improve access to food (Stroink and Nelson, 2013; Fleming et al., 2020). Similarly, seed exchanges, meal programs, and access to food grown and distributed at community gardens use horticulture-focused action for alleviating food insecurity (Torgrimson, 2015; Bazerghi et al., 2016; Ecology Action Centre, 2017). The food pharmacy/food Rx model links food resources with health care, offering dual services targeting at-risk populations prone to diabetes, heart disease and food insecurity (Goddu et al., 2015).

The food access-health connection is evident at small scale food production sites like food forests, community gardens and urban farms which combine local, hands-on horticultural activities growing and distributing healthy food while providing social inclusion and strategies for improving nutrition at the community level (Misuraca Ignaczak, 2014; Common Roots Urban Farm, 2017). Other models – home gardens, an individualized form of food production and security (Hashini Galhena et al., 2013); community supported agriculture; and school gardens, are grassroots initiatives that have been effective as small-scale food production sites (Beaton et al., 2013). Gleaning programs like the Garden Communicators Association's Plant a Row initiative involving gardeners, farmers and grocers growing, collecting and donating excess fresh food function in a different manner (USDA, 2009), as does the Slow Movement model which includes food rescue, non-perishable food collection and prepared food rescue (Slow Movement, 2019). Many of the models in this category have emerged in the last ten years, though not necessarily adopted on a wide-scale basis.

Horticultural practices

A broad spectrum of horticultural practices impact human health and well-being from plants, horticulture technology, environmental and regulatory requirements and consumer preferences. These can have direct health impact, indirect in the case of environmental fallout, or extemporaneous, as business decisions within the green industry. Trends within the last 20 years, and particularly during COVID-19, have highlighted horticulture-specific preferences, many responses driven by stress, health pandemics, and lifestyle choices, with access to healthy food a high priority. The balancing of business, environmental and health factors shed light on the complex and evolving nature of horticultural practices and their link to human health and well-being.

Plant trends, driven by consumer preferences, have created greater demand for specific plant-based protein crops like nuts, hemp seeds, beans and edamame, organic foods, heirloom fruits and vegetables, and plants used for herbal remedies (Gómez-Pinilla, 2008; Tilbert and Kaptchuk, 2021). Consumers are demanding safety and transparency for all types of plant products including edibles, ornamental plants, cut flowers, seeds, and vegetative cuttings used in residences, community and commercial gardens (FAQ et al., 2020). Interest in home gardens, gardening as self-care, houseplants addressing *weltschmerz*, and foodscaping are a few examples where plants intersect health strategies (Mikkelsen, 2011; Garden Media Group, 2021).

Best practices for plant production related to diverse health issues including chemical sensitivities, water source contamination, children's delayed cognitive development, and nutritional deficits (Mie et al., 2017), have influenced the green industry and its use of chemicals, GMO seeds, food borne pathogens and production practices, development of nutrient-dense food and more (Callejón et al., 2015). Advances in horticulture technology and

digital tools support higher yields, better monitoring of food production and processing systems, and lesser environmental footprint, each with its own impact on health (Sulecki, 2016). Relatedly, business innovations continue to emerge within the horticultural and agricultural fields, for processes and products that provide edible and ornamental plants appealing to consumers interested in healthier lifestyle choices including plant-based alternative foods, availability (and techniques to hasten maturity) of fruit and use of refurbished shipping containers for hydroponic plant production for example (Innovacorp, 2017, 2018; Very Local Greens, n.d.).

DISCUSSION

Horticulture for health framework captures a broader range of activities, programs, services, and models

Previous to this framework, activities that used horticulture for health improvements typically were defined by the discipline that used them – horticultural therapy or landscape architecture’s healthcare gardens. The analysis suggested the need for a broader framework, one that could take a holistic view, not restricted by discipline-specific parameters, and one that could better explain and capture the diversity and range of horticulture-health promoting activities. The research identified initiatives that fell within several sectors – private sector businesses, social groupings, political advocacy, and horticultural production methods. Some of the models did not fall within the confines of conventional or traditional health strategies, but were contributing to health improvements of individuals, populations and communities.

Distinguishing between horticulture and agriculture

The framework used horticulture as its defining characteristic, as the basis for inclusion in horticulture for health. The line between horticulture and agriculture was moot at times, this more frequently noted in the small-scale food production, nutrition and food security areas. Some benefits identified from the horticulture for health models are applicable to larger scale agriculture. Some organizations used models and practices for both agriculture and horticulture.

Specific health disciplines lacked the capacity to include emerging horticulture-health models

Some health disciplines, horticultural therapy for example, have remained insular in its focus, lacking the capacity or willingness to embrace emerging horticulture-focused health models. Ecopsychology and nature-based therapies have presented newer models, some of which incorporate horticulture. Allied therapeutic disciplines of physical, occupational and recreational therapies have adopted some concepts and practices like adaptive gardening techniques and use of therapeutic gardens, but none of these health specific disciplines have been broad enough to incorporate or legitimize the expansive nature of horticulture for health paradigm.

Expanding use of horticulture for health models as mental and emotional health strategies

With greater awareness about mental and emotional health, the need for services addressing challenges in these health domains continues to expand. Newer strategies have emerged including models of horticulture for health, used by health practitioners across disciplines. Veteran populations, with high incidences of mental health challenges, as one example, have turned to a broader range of services beyond traditional therapeutic modalities, to include therapeutic horticulture, veteran to farmer programming, food pharmacies, visitation and programming at restorative, therapeutic and enabling gardens, and aromatherapy. Green industry trends during COVID-19 have seen significant increases in plant-based activity as health strategies addressing stress relief, stay in place restrictions, benefits of connecting with nature, and food security growing food in home gardens (Mayasari et al., 2020).

Food security as a significant factor in health and well-being

Food security continues to grow as an important societal concern, one that has generated grassroots action, research, governmental support, small and large-scale food production models. The health implications of food insecurity continues to be documented, including deficits related to nutrition and child development, and food insecurity due to the COVID-19 pandemic. Horticulture-focused strategies and models are one of many tools that have been addressing food insecurity, significant because small-scale food production has been impactful and actionable by individuals, communities and organizations.

CONCLUSIONS

The scope of activities, organizations, services and models that use horticulture to improve human health and well-being necessitates a framework that can organize and explain how and why horticulture is, and can be a significant factor for health improvements. Reliance on one discipline or sector to oversee, explain or use horticulture in capacities affecting health appears too narrow and not reflective of changes that are occurring. Recognizing the multi-sectoral nature and diversity of models where horticulture plays a role in health improvements will better inform interdisciplinary professional development, support exchange of knowledge, and ultimately, elevate health services.

Literature cited

- Aldridge, J., and Sempik, J. (2002). Social and therapeutic horticulture: evidence and messages from research. Centre for Child and Family Research Evidence Papers 6.
- American Horticultural Therapy Association. (2019). Definitions and positions. <https://www.ahta.org/ahta-definitions-and-positions>.
- Antonovsky, A. (1996). The salutogenic model as a theory to guide health promotion. *Health Promot. Int.* 11 (1), 11–18 <https://doi.org/10.1093/heapro/11.1.11>.
- Atlantic Canadian Organic Regional Network. (n.d.) <http://www.acornorganic.org/>.
- Bazerghi, C., McKay, F.H., and Dunn, M. (2016). The role of food banks in addressing food insecurity: a systemic review. *J Community Health* 41 (4), 732–740 <https://doi.org/10.1007/s10900-015-0147-5>. PubMed
- Beaton, S., Cobb, M., Fawcett-Hill, W., MacLeod, M., Mather, L., Rainville, T., and Ramen, S. (2013). Halifax, Nova Scotia, Canada: communities fighting food insecurity with self-sustaining initiatives. Community Conservation. www.communityconservation.net.
- Beckie, M., Huddart Kennedy, E., and Wittman, H. (2012). Scaling up alternative food networks: farmers' markets and the role of clustering in western Canada. *Agric. Human Values* 29 (3), 333–345 <https://doi.org/10.1007/s10460-012-9359-9>.
- Bell, S.L., Foley, R., Houghton, F., Maddrell, A., and Williams, A.M. (2018). From therapeutic landscapes to healthy spaces, places and practices: a scoping review. *Soc Sci Med* 196, 123–130 <https://doi.org/10.1016/j.socscimed.2017.11.035>. PubMed
- Berkman, L.F. (1995). The role of social relations in health promotion. *Psychosom Med* 57 (3), 245–254 <https://doi.org/10.1097/00006842-199505000-00006>. PubMed
- Boyer, R., Waliczek, T.M., and Zajicek, J.M. (2002). The master gardener program: do benefits of the program go beyond improving horticultural knowledge of the participants. *Horttechnology* 12 (3), 432–436 <https://doi.org/10.21273/HORTTECH.12.3.432>.
- Bragg, R., and Atkins, G. (2016). A Review of Nature-based Interventions for Mental Health Care. Natural England Commissioned Reports, Number 204.
- Butterfield, A., and Martin, D. (2016). Affective sanctuaries: understanding Maggie's as therapeutic landscapes. *Landsc. Res.* 41 (6), 695–706 <https://doi.org/10.1080/01426397.2016.1197386>.
- Callejón, R.M., Rodríguez-Naranjo, M.I., Ubeda, C., Hornedo-Ortega, R., Garcia-Parrilla, M.C., and Troncoso, A.M. (2015). Reported foodborne outbreaks due to fresh produce in the United States and European Union: trends and causes. *Foodborne Pathog Dis* 12 (1), 32–38 <https://doi.org/10.1089/fpd.2014.1821>. PubMed
- Chaudhury, P., and Banerjee, D. (2020). Recovering with nature: a review of ecotherapy and implications for the COVID-19 pandemic. *Front Public Health* 8, 604440 <https://doi.org/10.3389/fpubh.2020.604440>. PubMed
- Common Roots Urban Farm. (2017). 2017 Annual Report. <http://commonrootsurbanfarm.ca/wp->

content/uploads/2018/03/Common-Roots-Urban-Farm-Annual-Report-Spreads-RGB.pdf.

Companion, M. (2016). Lessons from “The bucket Brigade”: the role of urban gardens in Native American cultural continuance. In *Cities of Farmers: Urban Agricultural Practices and Processes*, J.C. Dawson, and A. Morales, eds. (Iowa City, IA, USA: University of Iowa Press), p.126–140 <https://doi.org/10.2307/j.ctt20q23dv.13>.

Connecticut Department of Agriculture. (2017). Farm, roadside stand to re-emerge through Farmlink partnership. <https://www.ct.gov/doag/cwp/view.asp?A=1401&Q=590468>.

Cooper Marcus, C., and Sachs, N. (2014). *Therapeutic Landscapes: an Evidence-Based Approach to Designing Healing Gardens and Restorative Outdoor Spaces* (Hoboken, NJ, USA: John Wiley and Sons. Inc.), pp.179.

Corazon, S., Stigsdotter, U., Jensen, A., and Nilsson, K. (2010). Development of the nature-based therapy concept for patients with stress-related illness at the Danish healing forest garden Nacadia. *J. Ther. Hortic.* 20 (1), 35–51.

Davis, B.E. (2011). Rooftop hospital gardens for physical therapy: a post-occupancy evaluation. *HERD* 4 (3), 14–43 <https://doi.org/10.1177/193758671100400303>. PubMed

Derbyshire, E.J. (2017). Flexitarian diets and health: a review of the evidence-based literature. *Front Nutr* 3, 55 <https://doi.org/10.3389/fnut.2016.00055>. PubMed

Dicke, L.A., and Saitgalina, M. (2014). How can professional membership associations provide meaningful value for their members? Creating models of affiliation and engagement. Paper presented at: American Society of Association Executives Foundation Membership Engagement Models of the Future Award (Washington, D.C., USA: American Society of Association Executives Foundations).

Diehl, L. (2013). A framework for categorizing healing gardens. *AHTA News Magazine* 41 (2), 4–6.

Dijkstra, K., Pieterse, M.E., and Pruyn, A. (2008). Stress-reducing effects of indoor plants in the built healthcare environment: the mediating role of perceived attractiveness. *Prev Med* 47 (3), 279–283 <https://doi.org/10.1016/j.jpmed.2008.01.013>. PubMed

Ecology Action Centre. (2017). *The Our Food Project Reconnecting Food and Community 2013–2017* (Halifax, NS, Canada: Ecology Action Centre), pp.9.

Eisenmann, J.C., Gundersen, C., Lohman, B.J., Garasky, S., and Stewart, S.D. (2011). Is food insecurity related to overweight and obesity in children and adolescents? A summary of studies, 1995–2009. *Obes Rev* 12 (5), e73–e83 <https://doi.org/10.1111/j.1467-789X.2010.00820.x>. PubMed

FAQ, IFAD, UNICEF, WFP and WHO. (2020). *The State of Food Security and Nutrition in the World 2020. Transforming Food Systems for Affordable Healthy Diets* (Rome, Italy: FAQ), pp.13.

Fleming, L. (2015). Veteran to farmer programs: an emerging nature-based programming trend. *J. Ther. Hortic.* 25 (1), 27–48.

Fleming, L., and Figueirido, M. (2016). Healing gardens for cancer populations. In *Therapeutic Horticulture, a Practitioner’s Perspective*, L. Fleming (Bradenton Beach, FL, USA: Smashwords), pp.89.

Fleming, L., Carroll, K., Douglas, J., and Flinton, C. (2017). Interdisciplinary professional development, ceus and horticultural therapy: the Michigan model. *J. Ther. Hortic.* 27 (2), 51–64.

Fleming, L., Davis, A., House, B., Bos, L., and Carter, J. (2020). Nova Scotia’s horticulture for health activity. *J. Ther. Hortic.* 30 (1), 57–65.

Food Secure Canada (2017). *Building a Healthy, Just and Sustainable Food System: Food Secure Canada’s Recommendations for a Food Policy for Canada* (Montreal, Canada: Food Secure Canada), pp.8.

Food Tank. (2016a). 35 food education organizations. <https://foodtank.com/news/2016/09/thirty-five-food-education-organizations/>.

Food Tank. (2016b). 116 need-to-know nonprofits changing the food system. *Organic Spa Magazine* <https://www.organicpamagazine.com/116-need-to-know-nonprofits-changing-the-food-system/>.

Food Tank. (2018). 33 food and agriculture organizations building a better food system in Washington, D.C. <https://foodtank.com/news/2018/02/32-food-agriculture-organizations-washington-d-c/>.

Fridman, J., and Lenters, L. (2013). Kitchen as food hub: adaptive food systems governance in the city of Toronto. *The International J. Justice Sustain.* 18 (5), 543–556 <https://doi.org/10.1080/13549839.2013.788487>.

Fromm, E. (1973). *The Anatomy of Human Destructiveness* (New York, NY, USA: Henry Holt and Co), pp.7.

Garden Media Group. (2021). 2021 garden trends report: the great reset. <http://grow.gardenmediagroup.com/2021-garden-trends-report>.

Goddu, A.P., Roberson, T.S., Raffel, K.E., Chin, M.H., and Peek, M.E. (2015). Food Rx: a community-university partnership to prescribe healthy eating on the South Side of Chicago. *J Prev Interv Community* 43 (2), 148–162



<https://doi.org/10.1080/10852352.2014.973251>. PubMed

Gómez-Pinilla, F. (2008). Brain foods: the effects of nutrients on brain function. *Nat Rev Neurosci* 9 (7), 568–578 <https://doi.org/10.1038/nrn2421>. PubMed

Goodman, D., DuPuis, E., and Goodman, M. (2012). *Alternative Food Networks Knowledge, Practice, and Politics* (London, UK: Routledge), pp.11 <https://doi.org/10.4324/9780203804520>.

Gundersen, C., and Ziliak, J.P. (2015). Food insecurity and health outcomes. *Health Aff (Millwood)* 34 (11), 1830–1839 <https://doi.org/10.1377/hlthaff.2015.0645>. PubMed

Haller, R., Kennedy, K., and Capra, C., eds. (2019). *The Profession and Practice of Horticultural Therapy* (New York, NY, USA: CRC Press), pp.251.

Hanson, B.M. (2012). *Growing health: community gardens and their effect on diet, physical and mental health and community*. Electronic theses and dissertations (Orlando, FL, USA: University of Central Florida), <https://stars.library.ucf.edu/etd/2203>.

Hashini Galhena, D., Freed, R., and Maredia, K. (2013). Home gardens: a promising approach to enhance household food security and wellbeing (Agriculture and Food Security, College of Agriculture and Natural Resources, Michigan State University), <https://doi.org/10.1186/2048-7010-2-8>.

HEAL. (2017). Theory of change/motivation. <http://healfoodalliance.org/strategy/the-real-food-platform/>.

Heilmayer, D., Reiss, N., and Buskirk, M. (2020). Community gardens cultivate positive experiences for refugees. *J. Ther. Hortic.* 30 (1), 25–35.

Herz, R.S. (2009). Aromatherapy facts and fictions: a scientific analysis of olfactory effects on mood, physiology and behavior. *Int J Neurosci* 119 (2), 263–290 <https://doi.org/10.1080/00207450802333953>. PubMed

Innovacorp. (2017). Spark winners 2017. <https://innovacorp.ca/news/spark-winners-2017>.

Innovacorp. (2018). Spark winners 2018. <https://innovacorp.ca/news/spark-winners-2018>.

Island Food Network. (2019). Upskilling. <http://islandfoodnetwork.ca/upskilling/>.

Lazaroiu, G., Andronie, M., Uță, C., and Hurloiu, I. (2019). Trust management in organic agriculture: sustainable consumption behavior, environmentally conscious purchase intention, and healthy food choices. *Front Public Health* 7, 340 <https://doi.org/10.3389/fpubh.2019.00340>. PubMed

Li, Q. (2012). *Forest Medicine* (Waltham, MS, USA: Nova Biomedical), pp.57.

Lohr, V.I. (2000). International human issues in horticulture. *Horttechnology* 10, 12–93 <https://doi.org/10.21273/HORTTECH.10.1.27>.

Lovell, R., Husk, K., Bethel, A., and Garside, R. (2014). What are the health and well-being impacts of community gardening for adults and children: a mixed method systematic review protocol. *Environ. Evid.* 3 (1), 20 <https://doi.org/10.1186/2047-2382-3-20>.

Mayasari, N.R., Ho, D.K.N., Lundy, D.J., Skalny, A.V., Tinkov, A.A., Teng, I.C., Wu, M.C., Faradina, A., Mohammed, A.Z.M., Park, J.M., et al. (2020). Impacts of the COVID-19 pandemic on food security and diet-related lifestyle behaviors: an analytical study of Google trends-based query volumes. *Nutrients* 12 (10), 3103 <https://doi.org/10.3390/nu12103103>. PubMed

Mie, A., Andersen, H.R., Gunnarsson, S., Kahl, J., Kesse-Guyot, E., Rembiałkowska, E., Quaglio, G., and Grandjean, P. (2017). Human health implications of organic food and organic agriculture: a comprehensive review. *Environ Health* 16 (1), 111 <https://doi.org/10.1186/s12940-017-0315-4>. PubMed

Mikkelsen, B.E. (2011). Images of foodscapes: introduction to foodscape studies and their application in the study of healthy eating out-of-home environments. *Perspect Public Health* 131 (5), 209–216 <https://doi.org/10.1177/1757913911415150>. PubMed

Misuraca Ignaczak, N. (2014). 20 urban food forests from around the world. <https://www.shareable.net/blog/20-urban-food-forests-from-around-the-world>.

National Institute of Food and Agriculture. (n.d.). Hunger and Food Security Programs. <https://nifa.usda.gov/program/hunger-food-security-programs>.

No Farms No Food. (2015). Don't take farmland for granted. <http://www.nofarmsnofood.ca/>.

Okvat, H.A., and Zautra, A.J. (2011). Community gardening: a parsimonious path to individual, community, and environmental resilience. *Am J Community Psychol* 47 (3-4), 374–387 <https://doi.org/10.1007/s10464-010-9404-z>. PubMed

Pollin, S., and Retzlaff-Fürst, C. (2021). The school garden: a social and emotional place. *Front Psychol* 12, 567720 <https://doi.org/10.3389/fpsyg.2021.567720>. PubMed

- Poortinga, W. (2012). Community resilience and health: the role of bonding, bridging, and linking aspects of social capital. *Health Place* 18 (2), 286–295 <https://doi.org/10.1016/j.healthplace.2011.09.017>. PubMed
- Porter, C.M. (2018). What gardens grow: outcomes from home and community gardens supported by community-based food justice organizations. *J Agric Food Syst Community Dev* 8 (Suppl 1), 187–205 <https://doi.org/10.5304/jafscd.2018.08A.002>. PubMed
- Raskin, I., Ribnicky, D.M., Komarnytsky, S., Ilic, N., Poulev, A., Borisjuk, N., Brinker, A., Moreno, D.A., Ripoll, C., Yakoby, N., et al. (2002). Plants and human health in the twenty-first century. *Trends Biotechnol* 20 (12), 522–531 [https://doi.org/10.1016/S0167-7799\(02\)02080-2](https://doi.org/10.1016/S0167-7799(02)02080-2). PubMed
- Relf, D. (1992). Human issues in horticulture. *Horttechnology* 2 (2), 159–171 <https://doi.org/10.21273/HORTTECH.2.2.159>.
- Roszak, T. (1993). *The Voice of the Earth: an Exploration of Ecopsychology* (New York, NY, USA: Touchstone), pp.15.
- Sachs, N. (2008). Isn't every garden a healing garden: part I. Therapeutic Landscapes Network <http://www.healinglandscapes.org/blog/2008/08/>.
- Selhub, E., and Logan, A. (2012). The brain on nature's nutrients: nutri-ecopsychology. In *Your Brain on Nature The Science of Nature's Influence on Your Health, Happiness, and Vitality*, E. Selhub, and A. Logan, eds. (Mississauga, Ont., Canada: John Wiley & Sons Canada Inc), pp.175.
- Sempik, J., Hine, R., and Wilcox, D., eds. (2010). *Green Care: a Conceptual Framework* (London, UK: Loughborough University), pp.27.
- Shoemaker, C.A., ed. (2002). *International Interaction by Design: Bringing People and Plants Together for Health and Well-being: an international Symposium* (Hoboken, NJ, USA: Wiley Blackwell), pp.10.
- Siu, A.M.H., Kam, M., and Mok, I. (2020). Horticultural therapy program for people with mental illness: a mixed-method evaluation. *Int J Environ Res Public Health* 17 (3), 711 <https://doi.org/10.3390/ijerph17030711>. PubMed
- Slow Movement. (2019). Gleaning and food recovery as tools to reconnect at the local level <https://www.slowmovement.com/gleaning.php>.
- Sofi, F., Abbate, R., Gensini, G.F., and Casini, A. (2010). Accruing evidence on benefits of adherence to the Mediterranean diet on health: an updated systematic review and meta-analysis. *Am J Clin Nutr* 92 (5), 1189–1196 <https://doi.org/10.3945/ajcn.2010.29673>. PubMed
- Stroink, M., and Nelson, C. (2013). Complexity and food hubs: five case studies from northern Ontario. *The International J. Justice Sustain.* 18 (5), 620–635 <https://doi.org/10.1080/13549839.2013.798635>.
- Sugiyama, T., Leslie, E., Giles-Corti, B., and Owen, N. (2008). Associations of neighbourhood greenness with physical and mental health: do walking, social coherence and local social interaction explain the relationships? *J Epidemiol Community Health* 62 (5), e9 <https://doi.org/10.1136/jech.2007.064287>. PubMed
- Sulecki, J. (2016). Five trends in horticulture technology. *AgFunder News* <https://agfundernews.com/five-trends-horticulture-technology.html>.
- Tam, A. (2014). *Empowering citizens in a global era: a grounded theory study of community gardens*. All Dissertations, Paper 1437 (Clemson University).
- Tilbert, J.C., and Kaptchuk, T.J. (2021). Herbal medicine research and global health: an ethical analysis. *Bulletin of the World Health Organization* <https://www.who.int/bulletin/volumes/86/8/07-042820/en/>. <https://doi.org/10.2471/BLT.07.042820>.
- Tillett, J., and Ames, D. (2010). The uses of aromatherapy in women's health. *J Perinat Neonatal Nurs* 24 (3), 238–245 <https://doi.org/10.1097/JPN.0b013e3181ece75d>. PubMed
- Torgrimson, J. (2015). Seed banks are the first line of defense in food security. *Seed Savers Exchange* <http://blog.seedsavers.org/blog/foodsecurity>.
- USDA. (2009). Let's glean! <https://www.slowmovement.com/gleaning.php> https://www.usda.gov/sites/default/files/documents/usda_gleaning_toolkit.pdf.
- Van Den Berg, A.E., and Custers, M.H. (2011). Gardening promotes neuroendocrine and affective restoration from stress. *J Health Psychol* 16 (1), 3–11 <https://doi.org/10.1177/1359105310365577>. PubMed
- Very Local Greens. (n.d.). Very local greens. <http://www.verylocalgreens.com>.
- Wagenfeld, A., and Atchison, B. (2014). Putting the occupation back in occupational therapy: a survey of occupational therapy practitioners' use of gardening as an intervention. *Open J. Occup. Ther.* 2 (4), <https://doi.org/10.15453/2168-6408.1128>.
- Wolfson, J.A., and Leung, C.W. (2020). Food insecurity during COVID-19: an acute crisis with long-term health

implications. *Am J Public Health* *110* (12), 1763–1765 <https://doi.org/10.2105/AJPH.2020.305953>. PubMed

Zamroziewicz, M.K., and Barbey, A.K. (2016). Nutritional cognitive neuroscience: innovations for healthy brain aging. *Front Neurosci* *10*, 240 <https://doi.org/10.3389/fnins.2016.00240>. PubMed