CULTIVATE

FLORIDA HORTICULTURE FOR HEALTH NETWORK

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The Florida Horticulture for Health Network's vision: To promote activities and connect organizations to each other and resources that use horticulture to improve health including therapeutic horticulture and horticultural therapy, landscapes for health, nature, emerging professional support, allied horticulture and health services, community and school gardens, and food action initiatives.

CONTENTS

Active and Passive Engagement with Plants: Incorporating Interoception, Proprioception and Vestibular Senses for Therapeutic Outcomes

By Lesley Fleming, HTR & Kathryn E. Grimes, MAT, HTR

Photos by J. Fleming, T. Cooper.Unsplash & Beaver County Times

A core concept in horticultural therapy is engaging clients or participants in activities that address therapeutic goals, using plants, gardening, or nature activities in plant-rich environments. The engagement refers to the relationship or exchange between the therapist and the client (Chowdhury, 2019; Fleming, 2017); and the process of the client interacting with the plants or the environment (Fleming, 2023). Client: plant engagement, the focus of this article, is a multi-sensory experience, with stimulation of the five well-known senses and three lesser-known senses, contributing to therapeutic outcomes.

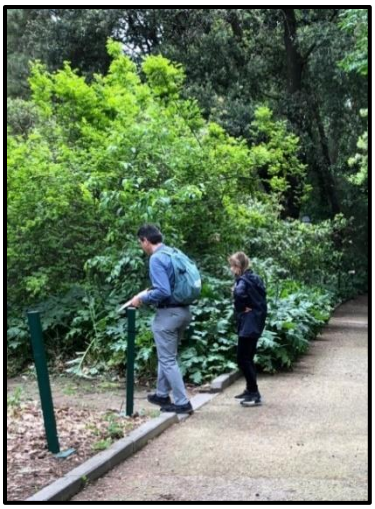
Engagement in this context is usually described as passive or active. Passive engagement constitutes some degree of connection by the client with the plant activity. For example, the client may listen but perhaps not discuss issues, or they may watch but not physically participate in plant activity. Clients with some health conditions like stroke or dementia may be passive while attending a horticultural therapy (HT) session, and therapists assign benefit to this passive engagement, such as intellectual

stimulation, social engagement with others by sitting in a group, or access to fresh air/garden. Active engagement, easier to understand and identify, includes gardening tasks, participating in discussions, or sharing potting soil with group members.

Both passive and active engagement involve the individual's senses. Generally thought of as hearing, tasting, smelling, seeing, and touching, these senses are defined as a group of sensory cell types that respond to specific physical inputs corresponding to regions within the brain that send signals throughout the body (Hiskey, 2019). Stimulation of these senses elicit engagement; for example, a client may have a reaction to touching the softness of lamb's ear plant, tasting sour citrus, listening to the crunch underfoot of acorns, or smelling the fragrance of ylang ylang flower.

In addition to these five primary senses are three lesser-known senses now recognized by medical and therapeutic disciplines: interoception, proprioception, and the vestibular sense. Interoception refers to a person's awareness of the internal signals within their body, like hunger or itchy skin (Barker et al., 2021). Proprioception refers to how a person's body orients itself to the world around it and includes knowing the location and movement of body parts without looking at them; for example, holding a pencil or catching a ball (Pathways, 2023). The vestibular sense refers to a person's balance or equilibrium, allowing them to move smoothly and confidently. Just like the five primary senses, these three lesser-known senses can stimulate both active and passive engagement in clients when they interact with plants. And when HT practitioners intentionally introduce related therapeutic goals and integrate multi-sensory interactions and activities to address these goals, therapeutic outcomes may be improved.

Sensory stimulation that results in active engagement is often easiest to identify. For example, to address the therapeutic goal of improving coordination, the therapist may provide the client an opportunity to pick up a tray of plants without looking at the object directly, stimulating proprioception. Likewise, to address the goal of improving balance and mobility, an activity may prompt the client to walk on uneven ground in the garden without stumbling, or to stand from a squat, stimulating their vestibular system (Fleming, 2022). Self-regulation goals are addressed when a client's interoceptive sense is stimulated, eliciting an active engagement response, such as when a participant moves away from thorny plants that scratched, or chooses to extend an experience they relish like letting cool hose water wash over their hands. Responding to interoceptive stimulation, or internal signals, provides opportunities for the client to practice coping mechanisms, decreasing aggressive or


"over-the-top" reactions to stimuli (Fleming et al., 2023). These activities, all related to therapeutic goals, are multi-sensory. In addition to stimulating proprioception, interoception, or the vestibular sense, they also involve seeing, hearing, and/or touching.

In contrast to active engagement, passive engagement elicited from garden-based stimulation of the interoceptive, proprioceptive, and the vestibular senses may require more insight from the HT practitioner to understand the responses and apply them to therapeutic goals. This understanding, however, will guide the practitioner to explore and present opportunities to their client that expands both types of engagement, and that use passive engagement to segue to more active interactions.

A passive response to interoceptive stimulation, for example, may be difficult for the therapist to discern because they may not see a client's internal responses to plants when they occur. A plant's rough texture will induce an internal response even if there is no outward sign of the touching response. In this case, the therapist may introduce the therapeutic goal of increasing interaction with others and may incorporate activities such as discussions of the plant's texture, or choosing a preferred plant to share with others, thereby moving a passive response to an active one to make it more visible. Likewise, a mobility-impaired client may respond passively to the vestibular stimulation received while walking along a challenging garden path. The therapist may activate the client's engagement by introducing a therapeutic goal to improve motor planning. To address this goal, they may incorporate an activity such as sitting together in the garden within sight of the pathway and discussing how to anticipate and maneuver the uneven texture in a wheelchair or cope with the challenge. A passive response to proprioceptive stimulus might be avoiding a task like propagation. In this case, the therapist might introduce a goal to improve body awareness and incorporate incremental tasks that lead to filling pots with soil without looking. These tasks may be a prelude to typing on a computer and other life skills.

Integrating sensory stimulation into HT/TH activities is a standard therapeutic technique that yields measurable outcomes. When therapists become aware of their clients' passive and active responses to the lesser-known senses of interoception, proprioception, and vestibular balance, the insight may bring a greater depth to sessions and lead practitioners to expand their toolkits for therapeutic services.

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Lesley Fleming, HTR has had several articles published on the topic of horticultural therapy and sensory interactions. She co-authored "Self-Regulation, Its Neuroscience Foundations and Horticultural Therapy: Growing the Connections" with Maureen Bethel & Tasha Roberts, published in the 2023 Journal of Therapeutic Horticulture. Kathryn Grimes, MAT, HTR, CIG has guided outdoor and garden-based programming for over 20 years in contexts that include schools, a community garden, parks and recreation, early learning environments, and the oldest and largest AZA-accredited zoo in Texas. As a Registered Horticultural Therapist and a Certified Interpretive Guide, she has designed and implemented therapeutic and sensory gardens, programs, walks, tours, and interactions that focus on care for the environment and affect human well-being.

This article and the following one Case Example: Using Sensory Experiences to Improve Self-Regulation article are being published concurrently in Nova Scotia Horticulture for Health Network's Digging In.

Case Example: Using Sensory Experiences to Improve Self-Regulation

By Kathryn E. Grimes, MAT, HTR
Photo by P. Goodwin.Unsplash

On hot summer days, a favorite activity of the toddlers and preschoolers in the therapeutic early childhood garden program was getting wet! When given a spray bottle of water or a watering can for the plants, the children responded with relish to the refreshing feeling of water on their arms, hands, or faces. Seeing the children's willingness to participate in this sensory experience, the therapist looked for ways to develop interactions that would use this interoceptive stimulation to address self-regulation goals, for example, coping with the arduous task of waiting their turn or giving a turn to a classmate. Two structured types of interactions emerged as being particularly effective.

The first structure was a watering can refill station. With a group of 12 motivated children, 3-4 small watering cans were made available with the staff person stationed near the hose. The children formed a line along the fence and as the watering can was filled, it was passed to the first child in line. After the child watered the plants and cooled off, their task was to approach the next child in line, make eye contact, hand them the empty can, and say, "It's your turn!" The receiving child would respond, "Thank you!" and accept the can. Only after this exchange would the watering can be refilled. Taking turns was sometimes difficult, but prompting or modeling would usually improve a successful interchange. If, after the prompts, a child was still not ready to pass off the watering can, they could keep it, but it would not be refilled. Eventually, they would lose interest and drop the watering can somewhere in the garden, and another child would pick it up and return it to the queue where the practice in self-regulation continued.

The second effective structure was a game we played while staff watered plants with the hose and a spray nozzle. Toddlers and preschoolers alike loved to thrust their hands into the shower stream of water and feel the coolness wash over them. To address the goal of self-regulation while waiting for their turn, the water game involved a chant to help the children anticipate their turn to get wet. As the plants were watered the leader chanted, "Pat your hands on your knees; pat your hands on your knees; pat your hands on your knees; now one… two… three… go!" On "go!" they could put their hands back into the shower of water until the chant began again. On days when they were allowed to get wet all over, with the word "go!" the water was directed overhead into the air, and they ran, sprinkler style, through the water, squealing with delight, stimulating their proprioceptive and vestibular senses as well. After running, they returned to the planter, eager to participate once again in the goal-enforcing activity.

Sensory stimulation can be a powerful tool in a therapeutic gardening program, especially when it provides experiences, such as these, that are self-motivating to the participant through their interoceptive, proprioceptive, or vestibular senses. By using this motivation to develop a structure for interaction that addresses the individual's or group's goal, the therapist adds an extra layer of benefit to time in the garden, improving outcomes for the participants.

Using the 5-4-3-2-1 Sensory Exercise in Therapeutic Horticulture Activities

Text and photos by Susan Morgan, MS, eat|breathe|garden

Therapeutic horticulture activities offer clients multisensory nature-based experiences that can be calming and restorative and contribute to increased quality of life for participants (FLHHN, 2021). The Mayo Clinic defines mindfulness as "a type of meditation in which you focus on being intensely aware of what you're sensing and feeling in the moment, without interpretation or judgment" (Mayo Clinic, 2022). Therapeutic horticulture practitioners can use the 5-4-3-2-1 sensory exercise in a garden setting as part of their mindfulness toolkit for exercising coping skills with participants experiencing anxiety and stress. The exercise invites participants to isolate and focus their attention in the present using each of the five primary senses in response to nature stimuli; this, in turn, aids in the redirection of perseverative, ruminating thoughts that contribute to symptoms of stress and anxiety. Clinical social worker Michael Vallejo, LCSW, states,

> "By using our five senses — sight, touch, sound, smell, and taste — we're able to fully experience the present moment. When we live in the present, we're not in a "fight-or-flight" state. Instead, we feel safe and relaxed. Cortisol levels fall, and the stress response is reduced" (Vallejo, 2022).

The 5-4-3-2-1 Sensory Exercise

To start, consider the setting in which participants are located for the exercise. Ideally therapeutic horticulture activities take place in a plant and nature-rich environment, such as a garden or conservatory greenhouse, but that is not always the case. Practitioners are adept at pivoting when challenges arise, so work with what is available. Invite participants to observe the space around them and focus on:

5 things you can see – Consider the question "What things catch your eye in the garden?" This can be observing a butterfly feeding on a flower, the emerging buds of trees in spring, or the unique foliage shapes and colors of tropical houseplants in a tabletop terrarium.

4 things you can touch – Identify the soft, hard, poky, lightweight, and other textural experiences of nature objects around you. This could be feathery grass plumes, rubbery texture of canna leaves, or cool sensation of water in a fountain.

3 things you can hear – Listen intently for the sounds of nature, whether it is the wildlife (bees buzzing or hummingbirds whirring by) or the wind rustling through tree branches or teasing wind chimes.

2 things you can smell – Notice the unique smells of the season, such as the fragrance of spring lilacs, the earthy smell of digging in the soil, or the aroma of raking autumn leaves or pine needles.

1 thing you can taste – What are the real or imagined tastes of fruit or vegetables currently outdoors? Are they the ripe blueberries or cherry tomatoes of summertime or the tangy tastes of citrus in winter?

Take as much time as appropriate to focus on one sensory experience at a time.



Tips for Maximizing the 5-4-3-2-1 Sensory Exercise

Throughout the process, encourage intentional focus on breathing, particularly if a participant is in a heightened anxious state. Placing feet flat on the ground, hands on the chest over the heart, and other body positioning techniques may aid in calming and bringing awareness to the breath.

Focus observations on the external – or what is outside the body, rather than feelings inside the body. However, practitioners may want to take a self-reported inventory of participants' internal feelings and present state of mind and body before and after the exercise as this may be helpful in encouraging participants to use this technique in the future on their own.

Use a nature sensory toolkit to overcome physical or psychological barriers. The toolkit incorporating clippings and objects from the garden brings nature directly to the participant, aids in seasonal orientation, and cultivates a sense of place; this is particularly helpful when physical outdoor access is restricted or participants have biophobic tendencies or other psychological barriers impeding their access to nature. Incorporate multisensory, seasonal materials from the outdoors in the toolkit, such as a dried egg gourd, pinecone, orange, rosemary, pine, lamb's ear, and more. In some cases, just one nature object, such as lavender, sunflower, pumpkin, and pine branch with needles and cones, may be used for the exercise due to its multisensory characteristics.

When going outdoors or having hands-on access to plants is limited, use guided imagery to facilitate the 5-4-3-2-1 exercise. Have ready digital or printed images of sensory engaging, plant- and nature-rich environments. Invite participants to go through the process of imagining and engaging the senses as if they were immersed in the natural setting they see. Prepare a guided imagery script to enable participants to imagine the sensory experience, particularly those with the loss of vision, sense of

smell, or other impairments. If time permits, invite participants to share about their sensory experiences in as much descriptive detail as they are open to sharing.

Know your audience and adjust accordingly. Adapt this exercise to suit the participants with whom you are working. When time is limited, make it the 1-1-1-1-1 exercise, identifying one object per each of the five senses. For individuals who have ecophobia or are hesitant to fully engaging with the outdoors, provide incremental opportunities to increase exposure to nature; for example, the guided imagery or nature sensory toolbox might be used in the initial steps before complete immersion outdoors. For individuals experiencing the temporary or permanent loss of one or more of the senses, invite participants to focus on their other sensory experiences. Be open to honest conversations about the grief of the sensory loss and acknowledge their feelings while also keeping the focus on the other intact senses and the participants' experiencing them in the present setting. Throughout the conversation, remind participants to keep a focus on their breathing.

Incorporate the five senses into garden planning. Nature inherently lends itself to being a multisensory environment. Consider using a plant palette and design features that enhance the multisensory aspects of a therapeutic landscape. Practitioners can determine the inclusion and exclusion of garden features based on the characteristics of garden users and considerations of their safe and intentional use of the space. The use or non-use of non-toxic edible plants, plants with sharp edges or thorns (like some ornamental grasses and roses), accessible pathways, and shaded seating areas are among the many considerations of garden design features. Get creative with garden features to adapt them for the intended user, such as raised beds for edible plantings, wildlife attracting features like bird feeders and houses, or seasonal annuals to provide ever-changing, seasonal interest in the garden.

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Therapeutic Horticulture Activity Plan: Harvesting Herb Seeds for Culinary Activities

Text by Lesley Fleming, HTR & Diane Relf, PhD, HTM
Photo by Rona

Materials

Herbs grown for their seeds & ready for harvesting
Garden clippers or safety scissors
Light-weight containers to collect harvest
Containers to store herbs
Labels & pens

ACTIVITY DESCRIPTION: Participants will harvest herb seeds for future use in culinary activities. This can be step one in a multi-session therapeutic horticulture program harvesting herb seeds first, followed by culinary activities.

THERAPEUTIC GOALS:

Cognitive/Intellectual: Focus on task at hand & completion of harvest

Physical: Increase time outdoors building tolerance to sensory climate environment with wind, humidity & temperature

Psychological/Emotional: Take responsibility for performing assigned tasks to complete the harvesting

Sensory: Tolerate touching soil, plants & seeds for longer periods of time; demonstrate decreased tactile defensiveness without adverse reactions

Social: Share garden space with others as a tool for socialization & cooperation

STEP-BY-STEP PROCESS:

1. **Pre-Session Preparations:** Prepare a harvesting kit for each participant consisting of clippers & containers. Determine how much should be harvested for session as prep for a separate activity using herbal seeds for culinary activities.
2. Discuss & determine if herbs are ready to be harvested to collect seeds.
3. Demonstrate harvesting technique & best practice – snip stem just below seed head taking care not to knock seeds off. Consider & communicate how many flowers from the plant should be left unharvested (for other purposes or activities).
4. Participants harvest herbs with blooms, with clear directions re amount to be harvested. It may be logical to have participants harvest one type of herb each. (Suggestion - conduct harvesting activity in the garden with support from staff and volunteers to ensure that plants are not over harvested or damaged.)
5. Remove the seed from the seed head using fingers (see comments below). Sort seeds & spread on flat clean surface to dry completely before storage.
6. Gather together as a group to observe harvested bounty. Examine herbs for pests, discoloration & mold, discarding damaged leaves & debris.
7. Discuss as a group the plant materials, taking time to touch & smell herbs, then discussing characteristics of each herb, description of flowers & seeds (size, shape, color), culinary uses of herb seeds & emotional connections to these plants or flavors.
8. Store herbs in a cool, dark, dry airtight container until they are to be used.

APPLICATIONS FOR POPULATIONS: This therapeutic horticulture activity is appropriate for most populations. Populations that have sensory processing and sensory integration challenges, sensitivity to tactile experiences, lack tolerance for outdoor or nature settings or have nature deficit disorder will need one on one, or close supervision with possible other supports to undertake this activity. Using the platform - working with flowers & harvesting their seeds can lend themselves to therapeutic goals related to taking responsibility for completing a task, focusing on the assigned task, building tolerance to outdoor sensory conditions and working cooperatively with other group members harvesting different herb plants. Some participants may want to wear gloves and consideration for the degree of sensory inputs each person will experience based on their particular tolerance & neurological thresholds should be determined prior to session (Gabaldo, 2019). Bringing seed heads indoors to extract and sort the seeds may be an option if being in the outdoor setting becomes overwhelming.

SAFETY CONSIDERATIONS: Close supervision may be required for some populations or individuals using scissors. Accommodations could include a partner using scissors to cut stem while participant holds stem. Or flowers/seed heads brought inside already cut, with participants using fingers to remove seeds from flowers. People who have tendencies to put items like seeds in their mouths should be closely supervised or provided with another activity (touching & smelling herbs). Gloves should be available as well as wipes or wash station. Sun protection is recommended.

NOTES OR OTHER CONSIDERATIONS: To get the most from any herb, it needs to be harvested at the right time. The ideal time of day to harvest herbs, whether for fresh use or preserving, is in the morning. Gather herbs after the dew has evaporated, but before the heat of the day. Sun and heat wilts plants. Collect seeds when they're ripe but before they fall off the plant. It is usually easy to know when herb seeds are ripe because they turn from green to tan or brown. A week after the flowers fade, start checking seeds for ripeness. Herbs grown for their seeds include dill, caraway, mustard & anise among others.

- Dill: Harvest seed heads about 2-4 weeks after flowers mature, when the seeds turn light brown. Use in vinegar, pickles, and bread.
- Anise: Gather seeds about 1 month after flowers bloom. Use the seeds to flavor confections such as cakes and cookies. Oil from anise seed is used in medicine. Chew the seeds as a breath freshener.

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TH Activity Plan form developed by Lesley Fleming, Susan Morgan, and Kathy Brechner (2012), revised in 2023.

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