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The sensory garden as an educational therapy tool for children with Autism Spectrum Disorder

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Abstract
This conceptual review explores the therapeutic and educational potential of sensory gardens (SenGdns) as a holistic intervention for children with Autism Spectrum Disorder (ASD). Anchored in sensory integration theory and ecological principles, SenGdns are proposed as structured yet naturalistic environments that promote sensory regulation, emotional awareness, and adaptive learning. Through multi-sensory stimuli, involving tactile, visual, auditory, olfactory, and proprioceptive, these SenGdns facilitate self-regulation and cognitive engagement. The paper integrates psychoeducational frameworks, including the Sensory Profile framework and the Cattell-Horn-Carroll (CHC) theory of cognitive abilities, especially sensory-related abilities, to argue for the systematic inclusion of SenGdns in individualized educational therapy and intervention plans for learners with ASD.

Keywords: Autism Spectrum Disorder (ASD), ecological principles, educational therapy, sensory integration, sensory garden

Introduction

Children with Autism Spectrum Disorder (ASD) often experience challenging difficulties in their sensory processing, modulation and reaction or response (SPMR for short) which, in turn, often affect how they perceive and respond to sensory input from their environment [1]. These difficulties may involve sensory regulation, meaning they might be over-responsive (hypersensitive), under-responsive (hyposensitive), or actively seek out certain sensory experiences. In other words, the sensory homeostasis of these children with ASD is upset. Such patterns are described in Dunn's model of sensory processing, which highlights how neurological thresholds (low vs. high) and behavioral responses (active vs. passive) interact to shape sensory experiences [2]. As a result, everyday stimuli (e.g., bright lights, loud noises, or certain textures) can easily trigger intense sensory reactions, including distress, withdrawal, or repetitive behaviors [3], leading to behavioral autotelicity (e.g., self-stimulatory behaviors) that have been noted in children with ASD [4]. These sensory challenges can significantly impact communication, social interaction, and participation in daily life, making it essential to understand and support sensory needs in individuals with ASD.

What is a Sensory garden?

The term sensory garden (abbreviated as SenGdn) consists of two components for its general definition: The former [*sensory* (Sen)] relates to the senses, e.g., sight, sound, smell, touch, and taste. The latter [garden (Gdn) or garden *s* (Gdns)] refers to a planned outdoor space, usually containing plants, flowers, and other natural elements, designed for cultivation, relaxation, or enjoyment. Hence, in the general definition of a SenGdn, the author of this paper refers it to a type of garden specifically designed to stimulate the senses (including sight, smell, touch, hearing, and sometimes taste) through the careful selection and arrangement of plants, textures, sounds, and other natural or man-made features.

Haag [5] explains that SenGdns are thoughtfully designed spaces that engage the five senses, i.e., sound (auditory processing), taste (gustatory processing and oral sensory processing), touch (haptic processing), smell (olfactory processing), and sight (visual processing), inviting visitors (or participants) to interact with the natural environment in a rich, multi-sensory manner.

1. Defining the Sensory garden within the Conceptual Context of Sensory Space

Within the conceptual context of a Sensory Space, the SenGdn can be defined as a multi-sensory ecological environment that is intentionally designed to engage, regulate, and integrate the sensory systems through interaction with natural elements, forming part of a broader therapeutic Sensory Space that promotes emotional balance, cognitive engagement, and adaptive functioning [6].

Within the Sensory Space framework, the concept of the SenGdn refers to intentionally designed natural environments that support children with ASD in processing, organizing, and responding to sensory input in meaningful and developmentally supportive ways [7]. The SenGdn represents the ecological and natural dimension of Sensory Space, where therapeutic and educational goals are achieved not through artificial stimuli, but through immersive interaction with nature [8]. It leverages the inherent sensory richness of the natural world (including sights, sounds, textures, scents, tastes, and movement) to create a setting that is both soothing and stimulating, tailored to meet the diverse sensory needs of children with ASD.

Functioning across multiple domains, the SenGdn holds ecological, regulatory, therapeutic, and educational value. Ecologically, it offers dynamic, living stimuli that reflect natural rhythms and support both sensory engagement and environmental awareness [9]. Its regulatory function helps balance sensory hypo- or hyper-responsiveness (i.e., sensory homeostasis) by providing calming or organizing input through nature-based interaction [6, 8]. Therapeutically, the SenGdn promotes mindfulness, curiosity, and sensorimotor integration through exploration of natural affordances, aligning with ecological perception and sensory integration theories [7]. Educationally, it enables hands-on activities (e.g., planting or observing growth) that foster experiential learning, emotional regulation, and social reciprocity

through direct, meaningful contact with the natural environment [9]. Thus, the SenGdn functions as a holistic, nature-based sensory space that nurtures the cognitive, emotional, and sensory development of children with ASD.

In summary, a SenGdn is the natural embodiment of a Sensory Space, i.e., an ecological learning environment where sensory, cognitive, and emotional development are integrated through dynamic interactions with nature [8]. It links ecological systems [28] with sensory processing frameworks [2, 10] to create adaptive, inclusive, and therapeutic experiences for children with ASD.

2. Connecting the Sensory Profile to Multisensory Elements in a Garden

As mentioned earlier, the five common senses involved in a SenGdn can be found listed in the Sensory Profile-Caregiver Questionnaire (SP-CQ) [10] and Adolescent/Adult-Sensory Profile (AA-SP) [11]. The Sensory Profile, originally developed by Winnie Dunn [10], an occupational therapist by profession, is an assessment tool that identifies how a person responds to sensory input in daily life based on their unique patterns of sensory processing. In fact, the Sensory Profile covers more than just the five common senses. According to Lui and Xie [12], there are also other sensory processes, such as vestibular processing [10], movement processing [11], and oral sensory processing [10]. These senses are not mentioned by Haag [5].

3. Connecting the Senses to the CHC and non-CHC Theories of Cognitive Abilities

The Cattell-Horn-Carroll (CHC) theory of broad and narrow cognitive abilities is a comprehensive psychological model that categorizes human intelligence into a hierarchy of broad and narrow cognitive abilities [13]. While the theory does not focus specifically on the senses, sensory processing is fundamentally connected to several cognitive domains within the CHC framework, particularly those related to perception, attention, and processing speed.

The five common senses mentioned by Haag [5] can be found in the CHC theory of broad cognitive abilities [13] (see Table 1) under its G-code sensory subdomain of the Sensory-Motor Domain-Specific Abilities (CHC model, version 2.1) [12, 14]. For those senses not found in the CHC framework, they are listed under the Q-code sensory subdomain in the non-CHC model of Sensory Intelligence (SenQ) [15], "also known as sensory processing or sensory integration," (p. 36) [16], referring to "the ability of the brain to receive, interpret, and respond to sensory information from the immediate environment" (p. 36) [16]. Lomard [15] described SenQ as a learning process through sensory engagement that offers a crucial role in how individuals perceive, process, and acquire knowledge and experiences from their environment. The SenQ varies from person to person and influences the way an individual learns and remembers information registered sensorily [12].

Table 1: Sensory Subdomain of the Sensory-Motor Domain-Specific Abilities

Senses	Sensory Processing	Abilities		Description
		CHC (G-code)	Non-CHC (Q code)	
Hear (Sound)	Auditory processing	Ga	--	The ability to receive, interpret, and make sense of sound signals transmitted from the ears, allowing us to understand speech, recognize noises, and perceive music and other auditory stimuli.
Taste	Gustatory processing [Gp]	--	SenQ-Gp	The ability to interpret chemical signals from taste receptors on the tongue, allowing us to perceive and identify different flavors, e.g., sweet, salty, sour, bitter, and umami.
Touch	Haptic processing	Gh	--	The ability to detect, process and interpret sensory information received through the skin and body, enabling us to perceive and discriminate pressure, texture, temperature, pain and movement, as well as to manipulate touch stimuli.
Motor	Movement (Kinesthetic) processing	Gk	--	The ability to perceive, interpret, and coordinate information from muscles, joints, and tendons to guide body movement, position, and motor control.
Smell	Olfactory processing	Go	--	The ability to process and interpret chemical signals detected by smell receptors in the nose, enabling us to recognize and differentiate a wide range of odors.
Eat & Drink	Oral sensory processing [Osp]	--	SenQ-Osp	The ability to perceive, interpret, and respond to sensory information from the mouth, including taste, texture, temperature, and pressure during eating, drinking, and oral exploration.
Balance & Move	Vestibular processing [Vsp]	Gp	SenQ-Vsp	The ability to detect and interpret information from the inner ear about head movement, balance, and spatial orientation to help maintain posture, coordination, and equilibrium. The term 'equilibrioception' (the sense of balance) or 'vestibular perception' is sometimes used to describe this sensory processing.
See (Sight)	Visual processing	Gv	--	The ability to interpret and make use of simulated mental imagery received through the eyes, allowing us to recognize shapes, sizes, colors, movement, depth, and spatial relationships.

For instance, in the CHC framework, the broad ability of Visual Processing (Gv) involves interpreting and manipulating visual stimuli, which directly relies on the sense of sight. Similarly, Auditory Processing (Ga) relates to the sense of hearing and includes skills such as auditory discrimination and memory for sound patterns, which, in turn, are critical for the development and application of language and communication. The Short-Term Memory (Gsm), which is now relabeled as Working Memory (Gwm) in the version 2.5 of the CHC model [13], and the Processing Speed (Gs) also depend on how efficiently the brain processes and integrates sensory input from the

environment. In this way, the senses serve as entry points for information, influencing how well individuals can perform cognitive tasks measured by CHC abilities. Understanding the Sensory Profile [2, 10, 11] of a person, therefore, can offer insight into how different individuals engage with and process information across cognitive domains involving sensory processing, modulation and responses.

However, not all the different senses are found in the CHC model. For instance, under the SenQ [16], there are gustatory processing (SenQ-Gp) and oral sensory processing (SenQ-Osp). Both sensory processes are related but they are also distinct forms of sensory processing. The key difference between the two is that SenQ-Osp is a broader term that covers all sensory input from the mouth, including touch (tactile; Gh in the CHC model or SenQ-Osp.Ta in the non-CHC model), pressure (under SenQ-Osp.P in the non-CHC model), temperature (under SenQ-Osp.Te in the non-CHC model), proprioceptive (under SenQ-Osp.Pp in the non-CHC model) feedback, and taste (under SenQ-Gp in the non-CHC model). It involves how the mouth perceives and responds to sensations during activities like eating, drinking, speaking, or oral exploration. Gustatory processing (SenQ-Gp), on the other hand, refers specifically to taste perception, i.e., how the tongue and taste buds detect and interpret flavors such as sweet, salty, sour, bitter, and umami. In short, gustatory processing is one component of the oral sensory processing as illustrated in the equation below:

$$\text{Oral sensory processing} = \text{Tactile} + \text{Proprioceptive} + \text{Temperature} + \text{Gustatory input (taste)}$$
$$\text{SenQ-Osp} = \text{SenQ-Osp.Ta} + \text{SenQ-Osp.PpF} + \text{SenQ-Osp-Te} + \text{SenQ-Gp}$$

The SenGdns encourage close-up exploration, such as smelling fragrant plants, listening to natural sounds, touching varied textures, and even tasting edible elements. They are suitable for spaces of all sizes, ranging from compact containers to larger courtyards. SenGdns can be arranged to stimulate one sense at a time or multiple senses at once. Beyond their aesthetic appeal, SenGdns can also serve practical functions, offering opportunities for education, relaxation, and therapeutic use. These garden s can also be tailored to meet specific needs, such as for children, individuals who are visually impaired, or those with sensory learning styles. To ensure inclusivity, Haag [5] emphasizes incorporating features like raised beds and wider pathways to make the space accessible for everyone.

In other words, a SenGdn is a wonderful therapeutic and educational environment, and certainly more so for children with ASD. In fact, it can help them engage, regulate, and integrate sensory input in a safe and structured way.

Essential Components of a Sensory garden for Children with ASD

As already mentioned earlier, a SenGdn is a purposefully designed outdoor environment that stimulates and supports all sensory modalities (i.e., visual, auditory, olfactory, tactile, vestibular, proprioceptive, and gustatory) through safe and engaging natural and constructed elements. In the context of ASD, SenGdns are increasingly recognized as powerful educational therapy (EdTx) tools that help promote sensory integration, emotional regulation, communication, and social engagement [17, 18]. Children with ASD often experience atypical sensory processing, either hypersensitivity or hyposensitivity, which can affect attention, behavior, and learning. Therefore, the SenGdn offers a controlled multi-sensory environment that encourages self-paced exploration, calmness, and adaptive engagement with the surroundings [23].

In fact, to design or create an appropriate SenGdn (e.g., the Yew Tee Sensory garden in Singapore; see Fig. 1) for children with ASD will require a careful structuring of sensory zones to meet specific therapeutic goals [19. 20, 21].

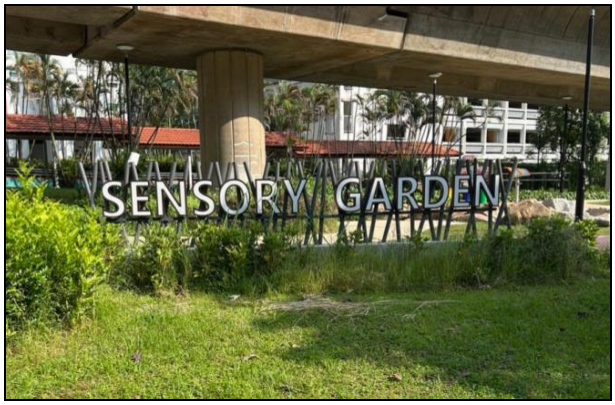

Fig 1: Yew Tee Sensory garden, Singapore

First, the visual zones need to include natural color contrasts, gentle movement, and calming focal points such as flowering plants, reflective surfaces, or slow-moving water features to support visual attention without over-stimulation [22]. Next, the auditory zones can benefit from soothing and predictable sounds, e.g., rustling grasses, bamboo chimes, garden xylophone (see Fig. 2), drums (see Fig. 3), or small fountains, to enhance auditory filtering and also to reduce stress through rhythmic sound patterns [17]. Similarly, the olfactory zones using aromatic plants (e.g., lavender, mint, or basil) can help modulate sensory arousal levels, as scent is strongly linked to the limbic system and emotional regulation [18].

Fig 2: Garden xylophone

Fig 3: Drums in the Sensory garden

Also, the tactile zone is another essential component that can allow children with ASD to explore different textures through touch, e.g., smooth and rough rocks/stones (see Fig. 4), bark, sand (see Fig. 4), and moss surfaces, promoting tactile discrimination and sensory exploration [23]. As regarding to the vestibular-proprioceptive input, the SenGdn can integrate gentle movement activities, e.g., swings (see Fig. 5), hammocks, or low in-ground trampolines (see Fig. 6), which can provide rhythmic sensory stimulation known to reduce hyperactivity and support body awareness [24].

Fig 4: Smooth & rough rocks/stones with sand bay

Fig 5: Swings

Fig 6: Low-in-ground trampoline

Fig 7: Balance logs

Balance logs or beams (see Fig. 7) and soft climbing structures also help improve coordination and self-regulation through proprioceptive feedback [25]. However, highly stimulating or high-speed play equipment, e.g., merry-go-rounds (see Fig. 8) or tall slides, should generally be avoided, as they can trigger sensory overload or disorientation in children with ASD [22].

Fig 8: Merry-go-round

A gustatory zone, when safe and appropriate, may include edible plants such as strawberries, tomatoes, or herbs, which provide opportunities for oral sensory integration and teach functional life skills such as garden ing and tasting healthy foods [18]. Equally important is a quiet retreat zone, where children can rest or self-regulate when overwhelmed. This might include shaded gazebos, soft seating areas, or small enclosed spaces that offer a sense of security and calm [26]. The overall layout should follow predictable, clearly marked pathways with visual cues to promote spatial orientation and minimize anxiety [22].

In therapeutic and educational contexts, SenGdns have been shown to enhance attention, emotional balance, and social interaction in children with developmental differences, including ASD [17]. Each sensory component contributes to integrated development, e.g., visual stimuli improve focus, auditory inputs enhance sensory filtering, tactile experiences build discrimination skills, and vestibular activities help regulate movement and alertness [24]. When implemented thoughtfully, SenGdns act as natural therapy environments that promote inclusion, engagement, and well-being for neurodiverse learners.

How Sensory garden links to Ecology

The concept of a SenGdn lies at the intersection of ecology, sensory integration, and educational therapy, offering a powerful and holistic tool, especially for working with children on the autism spectrum (ASD). It is more than a collection of plants or a calming space. In fact, the SenGdn is a therapeutic and educational environment intentionally designed to engage and regulate the sensory systems while fostering emotional and cognitive development through meaningful interaction with nature [7, 8].

1. Understanding the Ecological Link

Ecology, the study of relationships between living organisms and their environments, provides a foundational lens through which SenGdns can be understood. In this context, the SenGdn acts as a living, natural system that

supports a rich diversity of sensory input, i.e., sights, sounds, smells, textures, tastes, and movement [9]. For children with ASD, this environment provides a balance of predictability and novelty through its natural rhythms and seasonal variations: both of which are essential for supporting sensory regulation and maintaining engagement.
In addition, the ecological setting model's interdependence by illustrating how every element in nature has a role [8]. Through this type of nature-based learning, children are exposed to concepts of relationship, responsibility, and reciprocity, which are often difficult to teach through conventional approaches.

2. Sensory garden as an Educational Therapy Tool

A SenGdn is purposefully structured to stimulate and balance the seven sensory systems: visual, auditory, tactile, olfactory, gustatory, vestibular, and proprioceptive [2]. For children with ASD, who often face challenges with sensory modulation (i.e, being either hypersensitive or hyposensitive), the SenGdn can offer them a controlled, non-threatening exposure to natural sensory stimuli. The soft texture of moss, the gentle sound of wind chimes, or the scent of herbs can support emotional grounding and help children with ASD to engage in self-regulation [27]. These shared sensory experiences serve as catalysts for communication, exploration, and social learning, all within a space that is emotionally safe and therapeutically rich.

3. Ecological Principles Applied to Therapy for ASD

Applying ecological principles to therapy for children with ASD deepens the potential of the SenGdn. The first ecological principle is Biodiversity, which is represented by a variety of plants, colors, and textures, supports different sensory needs and sparks curiosity. The second ecological principle is Adaptation that can be shown by children with ASD observing how plants and animals adjust to changes, paralleling their own efforts to adapt to sensory input. Interdependence, which is the third ecological principle, is learned through garden ing tasks (e.g., composting, weeding, and/or watering) which encourage empathy, responsibility, and connection. Sustainability, the fourth ecological principle, teaches mindfulness and respect for life, nurturing self-regulation and emotional growth [9]. The SenGdn also reflects natural rhythms (e.g., day-night cycles and seasonal changes) that help create predictable routines, i.e., a crucial component for children with ASD [7]. Table 2 below provides a summary of the ecological principles discussed here.

Table 2: Ecological Principles Applied to Therapy for ASD

Ecological Principles	Application in Sensory garden for Children with ASD
1. Biodiversity	Variety of plants, textures, and colors support different sensory profiles and promote curiosity.
2. Adaptation	Children learn that different organisms adapt to environments: mirroring their own learning to adapt to sensory stimuli.
3. Interdependence	Activities like watering or composting teach responsibility and connection: the key to building empathy and social awareness.
4. Sustainability	Nurtures mindfulness, patience, and respect for living systems: important for self-regulation and moral-emotional growth.
5. Natural Rhythms	Seasonal and diurnal cycles support routines and predictability: important for ASD learners who thrive on structure.

4. Educational Therapy Goals Linked to Ecology

Through ecologically grounded experiences, SenGdns allow educational therapists and educators to address a wide range of developmental and therapeutic goals. Cognitive development is supported as children observe natural cause-effect relationships, such as planting and growth cycles. Adaptive behavior is encouraged through consistent garden ing routines and transitions. Social-emotional learning is promoted through cooperative tasks, turn-taking, and shared responsibilities. Sensory integration naturally occurs as children engage with varying textures, temperatures, sounds, and visual contrasts. Additionally, the SenGdn provides a peaceful setting for mindfulness, including quiet reflection or sensory pauses to support emotional regulation [27].

5. Theoretical Frameworks Supporting This Link

Several theoretical models support the integration of ecology and sensory therapy. For example, Bronfenbrenner's Ecological Systems Theory [28] places its emphasis on how the development of a child with ASD can be shaped by interactions with multiple environmental systems. The SenGdns strengthen the microsystem by offering direct experiences with a meaningful, structured environment [28]. In another example, Gibson's Ecological Theory of Perception introduces the concept of affordances, i.e., the possibilities for action offered by the environment, which are richly available in sensory garden s [29]. Dunn's Sensory Processing Framework [2, 10] provides insight into how individuals respond to sensory input based on their neurological thresholds, allowing natural environments like SenGdns to offer customized sensory regulation opportunities [2]. Finally, the theoretical framework applied in the educational therapy (EdTx) integrates ecological, sensory, and emotional perspectives to support adaptive functioning and meaning-making in children [7].

6. Ecological Learning in Action

One example of ecological learning in action involves a child with sensory-seeking behavior participating in a daily watering routine. The tactile experience of handling water, the proprioceptive feedback from lifting the watering can, and the visual satisfaction of seeing plant growth all activate and regulate multiple sensory systems. Over time, the child will gain a sense of responsibility, develops an understanding of predictable cause-effect patterns, and experiences calm regulation through repeated interaction with the SenGdn: a beautiful fusion of nature-based learning and therapeutic practice [8].
In summary, ecology provides the living framework, while the SenGdn acts as a therapeutic interface through which learning, sensory integration, and emotional regulation occur. For children with ASD, this combination can support their development of sensory harmony, ecological awareness, and emotional balance through direct, structured interaction with nature [8].

Figure 9 (designed by the author) illustrates the Ecological-Sensory-Educational Therapy Model that can be applied to work with children with ASD. It would make an excellent tool to design an individualized intervention plan.

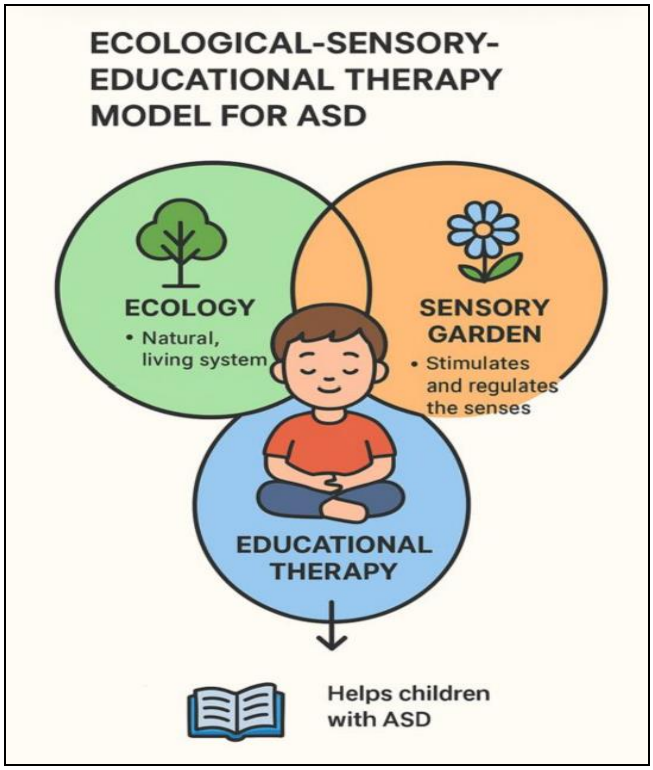

Fig 9: The Ecological-Sesnory-Educational Therapy Model for ASD

Suggested Activities that can be done in a Sensory garden

There are activities that can help to promote sensory awareness in children with ASD within the setting of a SenGdn:

1. **Structured sensory exploration:** This involves using guided activities to help children with ASD become more aware of and describe different sensations. Touch stations can be set up with a variety of textures, such as smooth leaves, rough bark, and soft moss, encouraging hands-on exploration [30]. Activities like the 'Find the Feeling' game prompt children to match objects by texture or temperature, e.g., distinguishing between cool stones and warm wood, which supports sensory discrimination and cognitive engagement [31]. Additionally, tactile pathways made of surfaces (e.g., sand, grass, and pebbles) offer barefoot walking experiences that promote body awareness and support sensory regulation [32].

2. **Sensory scavenger hunts:** These are interactive activities designed to engage multiple senses while encouraging exploration and observation. By prompting children with ASD with tasks (e.g., 'Find something that smells sweet'), they can be guided to use their sense of smell to identify natural scents like flowers or herbs [31]. Similarly, asking them to 'Touch something rough and something soft' encourages tactile exploration, helping them distinguish textures through direct contact with natural materials like tree bark or petals [30]. The prompt 'Listen for three different sounds' develops auditory awareness, prompting children with ASD to focus on environmental noises, e.g., rustling leaves, bird songs, or flowing water [32]. These playful yet purposeful hunts support sensory development, enhance mindfulness, and deepen these children's connection to the natural world. They encourage selective attention and help children with ASD to process and discriminate sensory stimuli [3].

3. **Sound and movement zones:** These zones are specially designed sensory-related areas (also collectively known as tangible sensory spaces) that combine auditory and proprioceptive experiences to help children develop regulation, coordination, and body awareness [33, 34]. These zones can include soothing or stimulating auditory elements (e.g., wind chimes, flowing water features, or interactive musical panels), which can invite or prompt children with ASD to explore sound [35]. To engage the body, movement can be encouraged through activities like walking on balance logs/beams, hopping across stepping stones, or relaxing in swinging seats, all of which support physical development and sensory integration [31]. Incorporating rhythm-based activities (e.g., walking to drumbeats or mimicking clapping patterns) further enhances coordination and motor planning by linking movement with auditory cues in a playful, structured way [36].

4. **Visual sensory awareness:** Activities related to raising visual sensory awareness encourage children with ASD to observe and engage with the visual details of their environment, fostering attention to color, light, and patterns [32]. By identifying favorite plant colors or unique shapes, children with ASD begin to develop a vocabulary for describing what they see, enhancing visual perception [33]. 'Color walks' can guide their focus toward the variety of hues and shades in nature, promoting mindfulness and appreciation for subtle visual differences [37]. Providing magnifying lenses allows for close-up inspection of plants, insects, or textures, sparking curiosity and strengthening visual discrimination skills through detailed exploration [31]. These activities help to support visual sensory processing and can be especially beneficial for children with ASD who may experience either heightened or reduced sensitivity to visual stimuli.

5. **Mindful sensory breaks:** Taking mindful sensory breaks in a SenGdn setting provides calming opportunities to children with ASD, allowing them to develop self-regulation and emotional awareness through intentional connection with their senses [38]. Encouraging deep breathing while smelling fragrant flowers or herbs not only engages the olfactory system but also promotes relaxation and focus [39]. Designated 'quiet corners' in shaded, peaceful areas offer a safe space for rest, reflection, or solitude, helping children

reset during overstimulating moments [40]. Incorporating sensory grounding techniques, such as the 5-4-3-2-1 method where children with ASD are encouraged to list five things they see, four they can touch, three they hear, two they smell, and one they taste, supports mindfulness and helps anchor their attention in the present moment [41]. These simple yet powerful practices use the sensory richness of Mother Nature to nurture emotional well-being and resilience [8].

6. **Collaborative and communicative play:** This form of play introduced or implemented in sensory activities offers a powerful way to promote social-emotional learning by encouraging children with ASD to engage with others through shared experiences [42]. Pairing children with ASD with their typical peers to water plants or collect leaves together can help them to foster cooperation and teamwork, and develop important social skills [43]. During these interactions, using descriptive language, e.g., "This leaf feels bumpy!" not only enhances their sensory vocabulary but also encourages expressive communication and active listening [44]. Additionally, encouraging turn-taking in sensory games teaches patience, respect, and social reciprocity, essential components for building positive relationships [45]. By combining sensory exploration with cooperative tasks, children with ASD can learn to connect with both their environment and their peers in meaningful ways.

7. **Integrate the goals of educational therapy (EdTx):** In the educational therapy (EdTx), by integrating its goals into sensory activities, each EdTx session involves customizing experiences to meet the unique sensory profile of each child with ASD, e.g., those identified through assessments like the Sensory Profile [10]. By linking appropriate sensory-related activities to these profiles, educational therapists, teachers, and parents can address individual sensory modulation needs: e.g., providing calming, soothing experiences for autistic children who are hypersensitive or offering more stimulating, and/or engaging activities for those who are hyposensitive [36]. This personalized approach supports better sensory regulation and overall functioning. Additionally, incorporating reflective practices (e.g., journaling, taking Fig..., or drawing) allows children to process and articulate their sensory experiences, strengthening the connection between cognitive understanding and sensory input [46]. These EdTx strategies promote deeper learning, self-awareness, and skill development within a therapeutic framework.

Figure 10 (designed by the author) is a framework to illustrate how to structure these sensory awareness activities according to different sensory domains (touch, sound, sight, smell, movement). It could be used in training parents and teachers how they can work with children with ASD or be incorporated into the EdTx sessions when working with these children.

Fig 10: Promoting Sensory Awareness in a SenGdn

Conclusion

The sensory garden s (SenGdns) represent an innovative convergence of ecological design and therapeutic education (i.e., educational therapy or EdTx), offering a dynamic, inclusive space that supports the developmental needs of children with ASD. By integrating the key ecological principles that involve biodiversity, adaptation, interdependence, and sustainability, these environments foster sensory processing, emotional regulation, and cognitive flexibility. The structured yet fluid nature of SenGdns allows children with ASD to explore, adapt, and connect within a safe sensory-rich setting. This approach applied in the clinical context of educational therapy (EdTx) not only bridges therapy and education but, more importantly, also cultivates meaningful, developmentally appropriate learning experiences that enhance both well-being and academic engagement in the autistic populations.

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