
Gardening: A Path to Development And Health

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There is something magical about a garden. Gardens are represented in many forms of literature. In sacred literature, there is the Garden of Eden, which is an integral story to many of the world's religions. In ancient literature, there are the legendary Hanging Gardens of Babylon named one of the Seven Wonders of the Ancient World. During the medieval era, gardens played a central part in the daily life of manor houses and monasteries where herbs and flowers were used to concoct medicinal potions. There are also numerous references to gardens and gardening in classic and contemporary children's literature: The Garden of Live Flowers in *Alice's Adventures in Wonderland and Through the Looking Glass* (Carroll, 2006), the magical plants in *Jack and the Beanstalk* (Jacobs, 1890), Farmer McGregor's garden in *The Tale of Peter Rabbit* (Potter, 2002), and the classic tale of *The Secret Garden* (Burnett, 1962).

Gardens also play an important role in health care. Eastern practitioners and most native cultures have used "traditional medicine" of herbs and botanicals. In many cultures, poultices and teas are used before seeking more modern approaches. More recently, many healthcare organizations have instituted the concept of healing or therapeutic gardens by installing gardens on their campuses. These are quiet areas for meditation, reflection, and conversation to promote physical healing and mental health of patients.

Gardening is also an excellent means for producing both natural beauty and enhancing child development and healthy behaviors. Gardens offer a myriad of opportunities for chil-

Gardening is a global activity that creates great beauty and provides numerous opportunities to enhance development and promote physical and emotional well-being in children of all ages. Child development theory and practical activities are discussed using a developmental perspective. Potential roles of parents, nurses, early caregivers, and teachers in facilitating social, language and motor development, and physical and mental health are discussed. A detailed description of ways pediatric nurses in a variety of settings can engage children and families in gardening activities is included.

dren of all ages. Just as gardens have a magical quality of developing from small seeds, there is a magical quality in the process of a young infant developing into a capable, thoughtful, and healthy young adult. This article explores, from a developmental perspective, how families, educators, and a variety of healthcare providers can foster child development and promote health through gardens and gardening. It concludes with suggestions for specific ways pediatric nurses can promote child development, healthy lifestyles, and a greater awareness of the environment.

Both current news media (Greenidge, 2016) and a growing body of scholarly articles (Chaufan, Yeh, & Sigal, 2015; Sharma, Hedberg, Scala, Chuang, & Lewis, 2014) document the benefits of gardening for children, families, and neighborhoods. What exactly are these benefits for children, and how can these activities be fostered? The benefit of food production to increase healthy vegetable and fruit consumption receives the most attention. Studies report that children involved in growing their own food are more likely to eat those foods both at the time of harvest and in the future (Block et al., 2012; Chaufan et al., 2015). This benefit has been acclaimed not only by gardeners, but also by nutritionists, educators, and government agencies. One of the most widely publicized home gardens has been at The White House linked with Michelle Obama's 2010 program, "Let's Move: America's Move to Raise a Healthier Generation of Kids."

However, benefits of gardening are not limited to just better nutrition and health. Child development involves many components, including skill acquisition, cognitive advancement, physical and social-emotional growth, and moral development. Gardening offers multiple opportunities to enhance all aspects of development by providing a variety of different experiences throughout childhood and adolescence. Gardening with children can result in positive attachment, enhanced development in all domains, and improved health (Raver, 2015). Early involvement of children in the natural world through activities like gardening may also lead to pro-environment attitudes and behaviors as adults (Wells & Leikes, 2006). This long-term benefit is critically important to the global protection of our natural world.

Gardening, in its many forms, is accessible to most families. For those living in apartments, "gardens" can be as simple as potted plants on porches or containers on balconies. For those living in homes with yards, a portion of the yard can be used for a garden. A recent trend has been the inclusion of gardens in children's hospitals, early child care settings, schools, and communities to extend benefits of gardening to all community members.

Development

Early Childhood

Piaget, the well-known child development specialist, recognized

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that children under the age of 2 years learn through their senses and through movement (Inhelder & Piaget, 1958). Gardening provides multiple opportunities for this sensorimotor period of development. Piaget found that even children less than 12 months of age are visually very curious and seek out novel visual stimuli. They also have well-developed hearing at this age and can discriminate a variety of sounds – both familiar and novel. As their motor skills develop, children increase in their ability to manipulate objects, turn, drop, and recover them. Under appropriate supervision, interaction with safe materials, such as bulbs and berries, promotes eye-hand coordination and allows very young children to begin to sense qualities of objects, such as shape, size, and color.

Once children begin walking, they are even more driven to search for novel objects and novel experiences. The garden provides numerous opportunities for this. Again, under good adult supervision, digging in soft soil with hands or tools, touching hard rocks or dried leaves, rolling large bulbs or grasping small seeds, hearing birds chirp and insects buzz, smelling musty dirt or sweet strawberries, feeling warm sun, and spraying cold water all foster sensory awareness and improve both large and small muscle coordination.

While children are in the garden, parents and caregivers can spend time together singing, laughing, and talking. The stress-free time strengthens attachment (Raver, 2015), and when parents associate language activities with these sensorimotor activities, they help move children to the next stage of development from toddlerhood through preschool, while forging close bonds and enjoying the natural world.

Preschoolers

Piaget (1955) and other developmental experts like Gesell (Crain, 2015) discuss this next period of development as a time of amazing growth in symbolic thinking, concept development, and language. Inhelder and Piaget (1958) found that children in the early preoperational stage (2 to 5 years) moved beyond earlier concrete behavioral patterns to more symbolic functioning. Symbolic thought allows children to use experiences from the past to represent something in the present. Piaget sug-

gests the development of mental symbols is based on both visual and motor information. He uses the example of the word “bicycle” as coming from both visual images and sensations involved in the movement of a bicycle (Piaget, 1955). His findings reinforce the need for sensory and motor experiences in early years to facilitate advanced symbolic thought.

In addition to symbolic thought, Piaget (1955) also observed that children in this age range begin to have symbolic play and can use concrete symbols to make an available object represent something that is not available to the child. An example of this ability in a garden is a young child who uses a stick for digging when a trowel is not available. This activity suggests the child has the awareness a tool is needed for an activity and can substitute what is available to perform the activity. This child is concretely adapting to his or her environment (McLeod, 2014).

An important extension of symbolic thought and symbolic play is the development of language, perhaps the greatest example of symbolism. Words begin to represent absent things and progress to representing more complex abstract concepts, such as color, shape, and size. What better place to experience and learn the names of colors and shapes, and to begin to understand concepts of size, weight, and textures, than in the natural environment?

As parents and teachers repeatedly identify colors, children gradually associate colors with names and begin to generalize to other objects both in the garden and in other settings. Once basic concepts are mastered, the complexity of the concepts can be increased to include shape, size, weight, and texture. These can be learned using a variety of simple garden tools, and by comparing a variety of flowers and vegetables. Gardens also facilitate counting (the number of rows, plants in a row, petals on a flower, leaves on a stem, peas in a pod). The ability to touch and hold plants increases sensory input, and thus, facilitates lasting learning. Motor skills advance as preschoolers explore the garden, bending to see new growth, jumping over rows, stretching to pull weeds, raking to smooth the site, and pushing small wheelbarrows. Children need physical activity to maintain good health

and foster gross motor development. This is an especially important benefit to children who may not have the opportunity to enjoy outdoor active play in their own neighborhoods (Jacobi-Vessels, 2013). Garden experiences provide this essential activity.

Benefits of gardening at home with family members can be expanded by gardening projects in preschool and early care centers. Many public and private early care settings have incorporated gardening into the curricula because gardens provide a variety of learning opportunities, active outdoor experiences, and nutritional education. The website www.healthy-meals.nal.usda.gov provides several resources helpful in planning these activities.

Children from 2 to 5 years in the early pre-operational stage are still egocentric and have little awareness that thoughts or needs of others may be different from their own thoughts and needs (Inhelder & Piaget, 1958). Gardening in group settings facilitates important cooperative skills and begins to lessen egocentrism as children talk with each other, share what they have discovered, and help each other with large or heavy objects. This is the time when parallel play is replaced by cooperative play, and egocentrism lessens. This is also the time when imaginary play begins.

Using books with groups of preschoolers while in the garden enhances language development and stimulates imaginative play and higher levels of cognitive thinking. Books both reinforce and expand basic concepts of colors, shapes, matching, similarities, and differences, all important for preschoolers. Books may also spark imaginary play activities using characters from stories, or children may create their own imaginary characters. In addition to the literature mentioned earlier, there are many other specific books useful in a gardening curriculum. Examples include *Eating the Alphabet* and *Planting a Rainbow* by Lois Elbert (1996, 2003). Not only do children improve their receptive language abilities and see pictures associated with their own activities, but they can use expressive language to describe similarities and differences between plants in their garden and book illustrations and actual foods they eat. This encourages early abstract thinking and promotes sharing of ideas. Drawing activities in the garden

improve visual perception and fine motor skills, which are additional important school readiness skills.

If it is a vegetable or fruit garden, benefits to health may be as significant as benefits to cognitive, social, and motor development. Childhood obesity has increased dramatically over the last 30 years in many areas of the world. The most recent data available from the Centers for Disease Control and Prevention (CDC) (2015) indicate that in 2014, 17% of children between ages 2 and 19 years in the United States were obese. The Health Survey for England (HSE) (2016) reports that 38% of children between age 2 and 15 years were overweight or obese, and the World Health Organization (WHO) (2017) indicates that 41 million children under age 5 years worldwide were overweight or obese.

Many studies identify improved health and less inappropriate weight gain in children who participate in gardening (Castro, Samuels, & Harman, 2013; Chauhan et al., 2015). Children try more new foods and eat more fruits and vegetables if they have grown these foods themselves (Sharma et al., 2014). The serving of grown, harvested, and prepared vegetables and fruits at family-style meals in the preschool setting also allows teachers to model good eating practices while fostering positive social interaction (Chauhan et al., 2015). Participation and interest in food preparation in early care settings may carry over to home environments so the entire family benefits from the new knowledge and enthusiasm of the child-gardener (Brendamour, 2015). It is clear from classic child development literature and recent research studies cited above that gardening in early child care settings can have a significant impact on cognitive and social development, as well as improvement in physical health, through increased movement and more nutritious eating.

At the end of the pre-operational stage of cognitive development (7 years), children's language and cognition have dramatically expanded from egocentric toddlers to verbal preschoolers who can initiate cooperative play and engage in pretend play. The next stage develops thoughtful young children who can classify, communicate, and question.

School-Aged Children

As children enter the elementary school years, potential benefits of gardening are even more dramatic both from a developmental and health perspective. School age to early adolescence (7 to 11 years) is identified by Piaget (1955) as the concrete operational stage of development in which thinking becomes more organized and more abstract. However, children at this stage are not yet totally abstract in their thinking (Inhelder & Piaget, 1958). Because they can apply logic only to physical objects, they are not able to connect physical findings and cause and effect to abstract occurrences (McLeod, 2010). For example, if the soil is dry, children at this stage will use logic to deduce that plants need to be watered. However, if plants are wilting, children at this concrete stage of thinking may not know leaves are wilting because the soil is dry and water is needed.

Hands-on aspects of gardening are especially appropriate for children in this age range. The process of gardening includes concrete activities, such as constructing and planning a garden site, digging, planting, estimating, thinning, watering, managing pests, and finally, harvesting, sampling, and preparing foods to share with each other and families. More abstract thinking develops from tasks, such as measuring, identifying, and selecting appropriate crops after estimating how large plants might grow, monitoring the weather, and anticipating outcomes.

During this stage, school children are less egocentric, have a greater sense of external events, and are developing a sense of space, quantity, and time (Piaget, 1955). Designing a garden plot helps children use math skills in determining garden size and predicting changes as plants grow and produce. Children witness stages of growth over time and gain a better understanding of seasonal cycles and how weather (external event) affects garden productivity (cause and effect). All of these garden experiences deepen the appreciation of the natural world and may lead to respectful care of the environment as children move to more abstract levels of thinking (Brendamour, 2015). In schools with onsite gardens, there are many opportunities to incorporate aspects of gardens and gardening into science, language arts, health, and histo-

ry classes. Other benefits to school-age children gardening together are opportunities for increased social interaction (Kim, Park, & Son, 2014). When children of different ethnicities are encouraged to introduce their native foods to classmates, they receive positive recognition, and there is an expanded understanding of culture and diversity for all (Wolsey & Lapp, 2014).

Studies have found positive outcomes in children whose schools have garden projects (Hutchinson et al., 2015). Davis, Spaniol, and Somerset (2014) reviewed 13 studies evaluating elementary school garden projects and found most participants increased consumption of vegetables, increased willingness to try new foods, showed improved identification of healthy foods, and had greater ability to prepare and cook vegetables. If there is a strong structured educational component, then results are likely more long-lasting (Berezowitz, Bontrager Yoder, & Schoeller, 2015). Books like *Worms Eat My Garbage: How to Set Up and Maintain a Worm Composting System* by Appelhof and Olszewski (2017) is an example of a child-friendly book with a specific educational focus that can impact students who, in turn, may bring the concept of composting home to parents.

School-age children are stronger and able to engage in more strenuous garden tasks than younger children. However, school-age children may also spend more sedentary time on electronic devices, so physical activity benefits may be even greater for this group of children. The increased physical activity and the interest in trying more healthy foods support the inclusion of gardening projects into school settings as a positive means to promote health.

Children who garden in school bring new information and new possibilities for better health into the home because students can engage family members to also participate in some type of gardening (Brendamour, 2015). Regardless of living situation, this activity may be developed in containers, window boxes, or a patch of lawn. For children from different cultures, home gardening provides opportunities to cultivate herbs, spices, and produce familiar in their home countries. Books are available that engage family members in the

process of gardening. Gibbons (2008) does an excellent job in the book, *The Vegetables We Eat*, by using pictures and text to provide engaging and interesting information about vegetables. This book also provides a variety of activities for parents and teachers to use to reinforce ideas presented in the book.

In addition to the cognitive benefits of gardening from a Piagetian perspective, there are additional psychosocial benefits for school-age children. Another classic developmental specialist, Erik Erikson (1963), describes the early school-age years as the stage of initiative vs. guilt. According to Erikson (1963), "initiative adds to autonomy the quality of undertaking, planning and attacking a task for the sake of being active and on the move" (p. 255). Gardening activities are excellent opportunities to develop initiative in the physical sense of being actively engaged in creating an actual garden plot, in the cognitive sense of measuring, estimating, and predicting outcomes, and in the social sense of collaborating with adults and peers to execute a project with a desirable and measurable outcome.

Adolescents

By the time students reach middle and high school age, many have reached Piaget's stage of formal operational thought (Inhelder & Piaget, 1958). These students can use abstract, logical thought to begin to understand their environment. Some of the more intangible benefits of gardening are now possible for adolescents. While spending time in gardens at home or with peers, they may begin to be aware of the beauty, harmony, and balance of nature. In a world overwhelmed with technology and social media, spending time in a garden may bring simplicity, relaxation, and connection with peers (Chawla, Keena, Pevec, & Stanley, 2014). For centuries, this sense of peacefulness, reflection, and freedom from stress has been found in gardens. Literature also suggests that gardens and activities in natural "green" settings offer benefits to children and adolescents with attention deficit hyperactivity disorder (ADHD) and anxiety (Castro et al., 2013; Kuo & Faber Taylor, 2009).

Working in a garden is an excellent way to develop the important sense of industry (Erikson, 1963). "To bring a productive situation to com-

pletion is an aim which gradually supersedes the whims and wishes of play" (Erikson, 1963, p. 259). What better example than gardening to bring an activity to completion? Gardening is a concrete activity, and final outcomes are easily visible to the adolescent, classmates, and family members. Participation in gardening strengthens an adolescent's abilities to use effort (industry) to create results for him/herself, peers, and adults to appreciate. This recognition, in turn, strengthens self-esteem, which is important for all children, but especially for those who may be overweight, obese, or otherwise marginalized from peers (Kim et al., 2014).

School gardens for adolescents provide numerous opportunities for teachers to reinforce academic courses, including earth science, biology, ecology, mathematics, and even literature and writing. During this developmental stage of planning for the future, the experience of gardening may lead some students to plant gardens at home and eventually pursue careers in related fields. The opportunity for high school students to engage in a "work experience" while in school provides hands-on activity, reinforces concepts of industry, improves self-confidence, provides important opportunities for physical activity, and may develop interest in environmental careers (Waliczek & Zajicek, 1999; J. Zeoli, personal communication, 2011).

Implications for Pediatric Nurses

From this overview, it is possible to see that gardening is indeed magical in its unique ability to provide a variety of developmental, physical, and mental health benefits for individuals of all ages. The therapeutic role pediatric nurses play in developing gardening activities in a variety of settings is important. Both in-patient and primary care pediatric nurses, nurse consultants in early care settings, and school nurses have many opportunities to engage with children and families. Each setting offers possibilities to blend the magic of healthy development with the magic of gardening.

In-Patient Settings

Over the last few decades, there

has been a marked interest in the use of gardens as a source of emotional development and healing in hospital settings. In the 1980s, a garden project studied children with behavioral disorders hospitalized for an extended period. The author documented increased teamwork, better coping with delayed gratification as plants grew and produced, and a sense of accomplishment at the final harvest (McGinnis, 1989). In a 2005 study of healing gardens in a pediatric cancer center, emotional distress and pain were lower for all patients when they were in the garden than when they were indoors confined to their rooms (Sherman, Varni, Ulrich, & Malcarne, 2005). Children's Hospital St. Louis employs a horticultural therapist to collaborate with the care team of nurses and child life specialists to engage patients in garden activities to improve social skills, provide relief from stress and pain, develop coordination and endurance, and improve problem-solving and memory skills (Wangler, 2018). It is unlikely that every hospital has a horticultural therapist, so it becomes even more important for nurses to engage administration in developing or adapting healing gardens to provide therapeutic opportunities for children to exercise, socialize, and participate in age-appropriate gardening activities.

Nurses working in in-patient settings may also collaborate with child life staff to create simple indoor gardens that children may plant, water, or just observe during short or long-term hospitalizations. Appropriate, common in-room materials, such as tongue blades and pitchers, may be used for planting, watering, and harvesting. These activities must reflect awareness of individual children's unique healthcare needs and restrictions.

Stories, art, and music activities related to gardening contribute to child development, and provide both soothing and social activities to facilitate healing and relaxation for hospitalized children both indoors and outdoors. Parental engagement in these activities also lessens parental stress during children's hospitalizations (C. Mecuriano, personal communication, 2010).

Early Childhood Nurse Consultants

Nurses who serve as consultants

to early child care settings and preschools have the important role of promoting the health and development of children in these settings. Although they function in part-time roles, these nurses provide essential services (Crowley, 2001). Nurse consultants may lead the planning and implementation of gardens with child care staff and parents. They may work with teachers to encourage activities that increase children's sense of wonder (creating rainbows with a hose), provide opportunities for exploration and discovery (harvesting hidden produce), and promote active play (pulling, pushing, climbing, jumping). An additional task for nurse consultants is the provision of in-service offerings for teachers and educational sessions for parents. These are excellent opportunities to reinforce developmental and health benefits of gardening to these groups and to encourage parents to consider simple age-appropriate home gardens. Another essential role of the nurse consultant is to ensure safe gardening environments for young children with appropriate plant selection, adequate hydration, good sun protection, and appropriate insect repellent.

School Nurses

School nurses and teachers in elementary and high schools have a multitude of opportunities to promote development and health in the context of gardening. They may offer similar opportunities as nurse consultants in child care settings, but because school professionals are onsite and work with older children, they may provide additional activities. School nurses and teachers may work alongside students in gardens to encourage increased activity and socialization. They may develop activities that require both concrete and abstract thinking (planning, predicting, puzzles). They may encourage school administrators to establish gardening, ecology, or fitness clubs to engage students in deeper understanding of the natural world and how to be healthy in it. School nurses may have opportunities to teach health courses or to reinforce what is taught in other classes about healthy eating and physical activity. They may be "guest speakers" in science classes or team teach with classroom teachers. If students are stressed, anxious, or sad, then nurses, teachers, school psychologists, or school social

workers can arrange time in the garden to help these students find relaxation, support, or solitude as needed.

Primary Care Nurses

Pediatric clinicians in ambulatory care settings may work with staff to create a model garden for families to explore when arriving or leaving the clinical setting. Primary care staff may organize regular family gatherings at the clinical setting so children can participate in the actual work of gardening and benefit from social, developmental, and health benefits. Nurses can offer a variety of websites (<https://peoplesgarden.usda.gov/>, <https://global-gardens.org/>, <https://www.gardenorganic.org.uk/schools>, <http://www.globalgardenfarm.com/>) that provide geographic and culturally appropriate suggestions for home, school, and community gardens. Clinical staff may also provide handouts about basic garden plans, suggestions for easy-to-grow plants, nutritional information about different produce, child-friendly recipes, and age-specific books to stimulate development and reinforce interest in gardening.

Conclusion

Gardening is an age-old activity. It is documented in a variety of classic and research literature that gardening is indeed magical in its ability to plant the seeds for development and to provide a myriad of opportunities to enhance social, cognitive, and motor skills, as well as improve emotional and physical health. Gardening activities can foster development in all of Piaget's cognitive stages, from sensorimotor skills in very young children to formal operational thinking in adolescents. While engaged in gardening activities, it is possible to see school-age children and adolescents progress through Erikson's stages of initiative and industry. It is evident in hospitalized children that gardening has healing and restorative effects.

Parents, healthcare professionals, and educators all have opportunities to engage children in a variety of gardening activities to promote these benefits. Activities may range from simple potted plants in the home to extensive outdoor plantings to therapeutic healing gardens. As described above, gardening is a valuable tool that contributes to the development and health of children. The experience of gardening may persist from

childhood into adulthood, with a greater awareness and appreciation of the natural world. ■■■

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An overview and description of the many health benefits you achieve from gardening, including why gardening leads to these benefits. Perhaps leave one area to go wild with native flora and fauna while also laying a winding path through to create a fairytale forest feel. And create another area purely for entertaining with a dining set, decking, and a BBQ. Small Steps. Thinking of making a new, or moving an old, garden path? There is a huge amount of potential when it comes to garden paths – something that is often overlooked. In our ultimate guide to choosing a garden path, we give you a clear idea of how to make the best of yours! Garden paths link, lead and lure, not only do they serve a practical purpose, but they also offer great scope for imaginative designs and planting. Carefully thought-out paths strike a balance between necessity and style, seamlessly linking house and outbuildings with the garden and its features – all whilst also blending with the environment.

Gardening is good for our mental health. Even something as simple as having a plant on your desk can reduce stress and make you feel more energized and able to think more clearly, and many that suffer from anxiety or depression have found gardening and caring for plants to be incredibly beneficial. But did you ever stop to wonder why that is? So not only can gardening benefit our mental well-being, it also plays a part in serving our physical and social wellbeing as well. With charities like Thrive, horticultural therapy and gardening interventions are becoming more and more widely available to those who suffer with mental health problems, are recovering from physical injuries, or are disabled, disadvantaged or vulnerable. Get involved. Erskine runs gardening projects for people with learning disabilities and physical and mental health problems. He began his social care career in residential settings but found the environment frustrating and lacking meaningful activity. “I have always felt that social care is at its best when it’s focused and activity-based,” he says, “as these are often the times when people loosen up and start to have a more positive focus.” He’s also in negotiations with his local council to develop an accessible forest therapeutic project in Amber Valley, Derbyshire. Horticultural and woodland therapies are attracting attention thanks to the increasingly well-documented value of the outdoors for people’s mental health and wellbeing.