

Chapter 1 : What Works - School fruit & vegetable gardens

Confronted with huge, uncontrollable forces, we tend to fall back on magical thinking. Say a goat was sacrificed on the volcano rim last year and lava did not engulf the village. It must follow.

In some settings, design based on intuition or common sense is fine. But when it comes to creating spaces for specific people with specific needs and where the space is designed for a specific outcome or result, design must be based on sound research. Here are some good resources. Have a resource to add? Four of the best online, searchable resources for articles are: InformeDesign Free searchable database of articles on architecture, landscape architecture, interior design, city planning, and other areas of environmental design. This is a free resource, but donations are welcome. Research Design Connections [www](http://www.researchdesignconnections.com). We share this information with subscribers in a quarterly electronic newsletter and in our archive of past articles. Reviewed by Debra D. [Click here to read part of the review.](#) Additionally, it serves as a guide on how to use evidence in design projects, and conduct research to assess effectiveness of design projects. This book focuses on practice based research as opposed to academic research. Exploring Healthcare and Design" Volume 2: Understanding Research in Healthcare Design" Volume 3: Therapeutic Benefits and Design Recommendations, Eds. Each chapter has a historical overview, literature review, case studies, and design recommendations. Also chapters on theory and research and practical ideas on fundraising and construction. Candice Shoemaker Proceedings from the International Symposium. An excellent broad view with contributions from stellar researchers and practitioners. Social and Therapeutic Horticulture: The review presents this evidence and draws it together to create a synthesis and a model that will help to explain the processes and outcomes. Journal of Therapeutic Horticulture published by the American Horticultural Therapy Association A professional journal providing information on HT research, professional issues, conference abstracts, and more. Excellent resource for horticultural therapists, designers, educators, and others interested in the interaction of people, plants, and nature. For a list of organizations, visit the [Related Organizations](#) page L. Scofield Company is the oldest, and one of the most trusted manufacturers in the business of Decorative Concrete Manufacturing. This recognition comes from more than 90 years in the industry, creating high standards for products that form a virtually unlimited menu more This work is licensed under a.

Chapter 2 : What Is the Evidence to Support the Use of Therapeutic Gardens for the Elderly?

CPSTF recommends school-based gardening interventions in combination with nutrition education to increase children's vegetable consumption. Read systematic review evidence. Gardening interventions provide children with hands-on experience planting, growing, and harvesting fruits and vegetables in an effort to increase their willingness to.

The systematic review included 14 studies. Consumption of vegetables increased 12 studies while fruit consumption did not change 10 studies. Interventions, including nutrition education in addition to gardening activities, were more effective than gardening activities alone. Summary of Economic Evidence A systematic review of economic evidence has not been conducted. Applicability While additional research is warranted, the CPSTF finding is likely applicable to interventions in elementary and middle school settings in high income countries. Evidence Gaps Additional research and evaluation are needed to answer the following questions and fill existing gaps in the evidence base. What are evidence gaps? Are interventions effective in early care and education, afterschool, and community settings? Are interventions effective when implemented without nutrition education? Does effectiveness vary by age or school level? Do children participating in gardening programs act as agents of change by engaging parents in discussion about food and nutrition? Do parents incorporate healthier dietary habits or purchasing practices at home? Study Characteristics Interventions were conducted in the United States 10 studies , the United Kingdom 2 studies , Australia 1 study , and Canada 1 study. Interventions were implemented in schools 8 studies , afterschool settings 2 studies , communities 2 studies , early care and education settings 1 study , and multiple settings 1 study. Study participants had the following demographic characteristics: Mean age of 9. Interventions included nutrition education in addition to gardening activities 7 studies Intervention duration ranged from 2. Included Studies The number of studies and publications do not always correspond e. American Journal of Preventive Medicine ;44 3S3: Journal of the American Dietetic Association ; The impact of a school-based gardening intervention on intentions and behavior related to fruit and vegetable consumption in children. Journal of Healthy Psychology ;20 6: Canadian Journal of Dietetic Practice and Research ;76 3: Lautenschlager L, Smith C. Understanding gardening and dietary habits among youth garden program participants using the Theory of Planned Behavior. Garden-based nutrition education affects fruit and vegetable consumption in sixth-grade adolescents. Youth gardens increase healthy behaviors in youth children. The impact of nutrition education with and without a school garden on knowledge, vegetable intake and preferences and quality of school life among primary-school students. Public Health Nutrition ;13 BMC Public Health ; Journal of Nutrition Education and Behavior ;41 3: Health Promotion Practice ;12 1: Exposure to a comprehensive school intervention increases vegetable consumption. Journal of Adolescent Health ; Search Strategies Information about the search strategy can be found in the published systematic review Savoie-Roskos, Journal of the Academy of Nutrition and Dietetics ;11 2 ; Considerations for Implementation Considerations for Implementation The following considerations are drawn from studies included in the evidence review, the broader literature, and expert opinion. Incorporating a parental component could increase intervention effectiveness by encouraging changes in the home environment and providing support and resources to families, such as cooking and nutrition workshops. Climate may impact program effectiveness as programs in milder climates have longer growing seasons. Programs in more severe climates may be able to lengthen their programs using other methods such as green houses and hydroponics. Schools or communities with greater resources, including financial resources and physical space for gardening, are better able to implement gardening interventions than those with fewer resources. Garden upkeep and maintenance, especially during summer months and school holidays, maybe be a particular challenge for some programs. Hiring a dedicated garden coordinator or providing stipends to teachers implementing gardening programs can help, though dedicated staff are not a requirement for program success. Previous exposure to gardening may impact program effectiveness, as one study had low retention among students with a prior history of gardening at home.

Chapter 3 : Garden Program Series

Evidence-based Design Nationally recognized aging-design professionals and lighting industry researchers contributed to the architecture, landscape and interior design of Abe's Garden®. Constructed with the needs of individuals with dementia, their families and care partners in mind, Abe's Garden® includes evidence-based lighting, use of.

Median increase of 0. Interquartile interval Seven studies reported on interventions that included nutrition education in addition to gardening activities. Interventions that included nutrition education produced greater increases in fruit and vegetable consumption median increase of 0. One additional study that included nutrition education in addition to gardening activities could not be plotted and reported a greater increase in fruit and vegetable consumption among children in the intervention group when compared to children in the control group. Eight studies reported on interventions that were implemented in schools. Gardening interventions implemented in schools had a median increase in fruit and vegetable consumption of 0. The remaining three studies could not be plotted: Almost all the improvements seen were driven by increases in vegetable consumption median increase of 0. There is not enough evidence to determine whether gardening interventions increase fruit consumption among children median increase of 0. The available evidence was limited for interventions implemented in afterschool, community, or early care and education settings.

Applicability and Generalizability Issues Intervention settings Included studies were conducted in the United States 10 studies , Australia 1 study , Canada 1 study , and the United Kingdom 2 studies. Studies were conducted in schools 8 studies , afterschool settings 2 studies , communities 2 studies , early care and education settings 1 study , or multiple settings 1 study. Among studies that reported urbanicity, six were from urban settings, one was from a rural setting, and one was conducted in mixed settings. Intervention effectiveness did not vary by country or setting. Demographic characteristics Study participants had a mean age of 9. Six interventions were implemented in low-income communities. Eleven studies that reported racial and ethnic distributions had populations composed of students in the following groups: Interventions were effective across sociodemographic groups, including low-income and predominantly racial or ethnic minority populations. Intervention characteristics Seven studies examined interventions that included nutrition education in addition to gardening activities. They reported greater increases in fruit and vegetable consumption than gardening interventions alone 7 studies. The median intervention duration was four months 14 studies ; nine studies were less than six months long. Intervention effectiveness did not vary by intervention duration. Data Quality Issues Study designs included randomized control trials 2 studies , pre-post with a comparison group 7 studies , cohort 1 study , and pre-post without a comparison group 4 studies. Dietary outcomes were based primarily on self-reported or parent-reported data. Common limitations of self-reported dietary data include participants forgetting about consumption of specific foods, inaccurately estimating portion sizes, or accidentally or purposefully failing to report specific items Grandjean, There is also the potential for over reporting fruit or vegetable consumption due to social desirability bias. Most studies attempted to address these limitations by using age-appropriate, validated instruments. Other Benefits and Harms No additional benefits or harms were identified in the included studies. Research indicates that gardening interventions may improve academic outcomes when gardening activities are integrated into existing curriculums Williams et al. Garden-based learning can incorporate all subjects but is especially well-suited for math and science lessons. The CPSTF identified several potential benefits of gardening interventions, including the potential for an improved home dietary environment through parental involvement. There is also the potential for increased physical activity through active gardening activities. No potential harms were identified. Considerations for Implementation The review by Savoie-Roskos et al. The CPSTF identified several other important areas for consideration, including the potential impact climate and resources may have on intervention success. Programs in milder climates can run longer given the longer growing season. Programs in more severe climates may be able to lengthen their programs using other methods, however, such as green houses and hydroponics. Schools or communities with greater resources, including financial resources and physical space for gardening, are better able to implement gardening

interventions than those with fewer resources. Garden upkeep and maintenance, especially during summer months and school holidays, may be a particular challenge for some programs. Hiring a dedicated garden coordinator or providing stipends to teachers implementing gardening programs can help, though dedicated staff are not a requirement for program success. Another important consideration is the level of previous exposure to gardening. One study had low retention among students with a prior history of gardening at home, indicating these interventions may be ineffective among certain populations. Evidence Gaps Additional research and evaluation are needed to answer the following questions and fill existing gaps in the evidence base. Are gardening-based interventions effective in early care and education, afterschool, and community settings? Are gardening-based interventions effective when implemented without nutrition education? Does intervention effectiveness vary by age or school level? Do children participating in gardening programs act as agents of change by engaging parents in discussions about food and nutrition? Do parents incorporate healthier dietary habits or purchasing practices at home? References Centers for Disease Control and Prevention. Department of Health and Human Services; Centers for Disease Control and Prevention. Dietary intake data collection: *Nutr Revl* ;70 Suppl 2: The effect of a summer garden program on the nutritional knowledge, attitudes, and behaviors of children. What influences diet in early old age? Prospective and cross-sectional analyses of the Boyd Orr cohort. *Eu J Public Health* ;16 3: *J Am Coll Nutr* ; 2: Impact of garden-based youth nutrition intervention programs: *J Am Diet Assoc* ; 2: Impact of garden-based learning on academic outcomes in schools: *Review of Educational Research* ;83 2:

Chapter 4 : TFFRS Nutrition: Gardening Interventions | The Community Guide

Gardening interventions provide children with hands-on experience planting, growing, and harvesting fruits and vegetables, which may increase children's willingness to consume fruits and vegetables.

However, additional evidence with stronger study designs is needed to confirm effects. Community gardening may encourage an overall healthy lifestyle by promoting physical fitness, strength, flexibility, and social engagement, and improving cognitive function among participants; especially older adults Wang , Chen b. Adults and teenagers who work in community gardens report eating roughly half a cup more fruits and vegetables per day than those who do not Keihner Community gardens can reduce barriers to healthy food associated with transportation, cost, and food preference Gilroy , and may increase food security Vitiello Community garden participation is associated with increased levels of social capital, neighborhood engagement, and satisfaction Alaimo Interviews with Latino community gardeners in New York suggest that gardens can host social, educational, and cultural events, and in some cases, promote local activism Saldivar-Tanaka By providing an opportunity to plant culturally meaningful foods in a social setting, community gardens may also increase community engagement and improve nutrition among resettled refugees Eggert , Gichunge Since residents maintain the land and space often comes from vacant abandoned lots, community gardens are relatively inexpensive LGC. Placing community gardens in low income areas can reduce disparities in access to healthy foods, especially fresh fruits and vegetables Corrigan , PolicyLink-Flournoy Gardeners can produce high value, high yield harvests especially when planting vertically grown crops such as tomatoes and peppers Algert Implementation United States Numerous municipalities support community gardens. In , California enacted legislation allowing cities and counties to create incentive zones in urban areas for local food production, providing land owners a property tax break for urban agriculture or community gardening activities. Tennessee and West Virginia also enacted legislation addressing infrastructure barriers and liability concerns related to community gardens NCSL Winterfeld-Obesity prevention Community gardens often grow out of public and non-profit partnerships. For example, Chicago NeighborSpace community land trust is authorized to purchase vacant land to preserve it for gardens Chicago NeighborSpace and the Detroit Garden Resource Program works toward a city where the majority of fruits and vegetables consumed by residents are grown within the city limits KGD-GRP. Rural areas and smaller municipalities also support community gardens, as in Hernando, Mississippi, which has a community garden located in walking distance of its most disadvantaged neighborhood Hernando-Healthy community. Additional examples of organizations sustaining community gardens include: Wisconsin There are many community gardens in Wisconsin. Locate your nearest community garden. Community gardens for public health: A webinar about how local governments can support community gardens. Home landscaping tips for building the perfect garden. Rural Childhood Obesity Prevention Toolkit. Urban agriculture and community gardens. Safe routes to healthy foods. Nutrition and physical activity program: Community gardening, neighborhood meetings, and social capital. Journal of Community Psychology. Vegetable output and cost savings of community gardens in San Jose, California. Journal of the Academy of Nutrition and Dietetics. Is eating local good for the climate? Thinking beyond food miles. A look inside food deserts. Strategies to prevent obesity and other chronic diseases: The CDC guide to strategies to increase the consumption of fruits and vegetables. Zoning to encourage healthy eating. Gardening as a potential activity to reduce falls in older adults. Journal of Aging and Physical Activity. Growing what you eat: Developing community gardens in Baltimore, Maryland. Review and analysis of the benefits, purposes, and motivations associated with community gardening in the United States. Journal of Community Practice. Coalition building for health: A community garden pilot project with apartment dwelling refugees. Journal of Community Health Nursing. Harvesting the biopsychosocial benefits of community gardens. American Journal of Public Health. Utamu wa Afrika the sweet taste of Africa: Health, environmental and economic considerations. The effects of household food production strategies on the health and nutrition outcomes of women and young children: Paediatric and Perinatal Epidemiology. Do food miles matter?. Fruit and vegetable access in four low-income

food deserts communities in Minnesota. Agriculture and Human Values. Local government actions to prevent childhood obesity. National Academies Press; Low-income Californians with access to produce in their home, school, work, and community environments eat more fruits and vegetables. Champions for Change; The role of local government in creating healthy, livable neighborhoods. The influence of social involvement, neighborhood aesthetics, and community garden participation on fruit and vegetable consumption. A call for evaluation and research efforts. Journal of the American Dietetic Association. Healthy food, healthy communities: Improving access and opportunities through food retailing. Culturing community development, neighborhood opens pace, and civic agriculture: The case of Latino community gardens in New York City. Soils in the city: Collective efficacy in Denver, Colorado: Strengthening neighborhoods and health through community gardens. Lauren R, Rayburn J. The state of obesity: Better policies for a healthier America. Physical activity guidelines for Americans PAG. From commodity surplus to food justice: Food banks and local agriculture in the United States. The effect of community gardens on neighboring property values. The benefits of gardening for older adults: A systematic review of the literature. A study of Edmonton, Canada. Harvesting more than vegetables: The potential weight control benefits of community gardening. Community managed open space. The city of Columbus land bank community garden program CGP. The Kalamazoo community garden project. Garden resource program GRP. State actions to reduce and prevent childhood obesity in schools and communities: Summary and analysis of trends in legislation. Land use and planning policies to support community and urban gardening. Land bank redeveloping properties: Community gardens program CGP. Bringing university research to your Wisconsin garden: Community gardens WI CGs. Community gardening in Philadelphia:

Chapter 5 : Evidence-based Design at Abe's Garden® | Abe's Garden®

Do pine needles make soil more acidic? How about coffee grounds? Should you add mycorrhizae to your garden? Should you always use a balanced fertilizer? In t.

Published online May Find articles by Mark B. Detweiler Find articles by Jonna G. Murphy Find articles by Pamela F. Chudhary Find articles by Amara S. Halling Find articles by Mary H. Find articles by Kye Y. This article has been cited by other articles in PMC. Abstract Horticulture therapy employs plants and gardening activities in therapeutic and rehabilitation activities and could be utilized to improve the quality of life of the worldwide aging population, possibly reducing costs for long-term, assisted living and dementia unit residents. Preliminary studies have reported the benefits of horticultural therapy and garden settings in reduction of pain, improvement in attention, lessening of stress, modulation of agitation, lowering of as needed medications, antipsychotics and reduction of falls. In support of the role of nature as a therapeutic modality in geriatrics, most of the existing studies of garden settings have utilized views of nature or indoor plants with sparse studies employing therapeutic gardens and rehabilitation greenhouses. With few controlled clinical trials demonstrating the positive or negative effects of the use of garden settings for the rehabilitation of the aging populations, a more vigorous quantitative analysis of the benefits is long overdue. This literature review presents the data supporting future studies of the effects of natural settings for the long term care and rehabilitation of the elderly having the medical and mental health problems frequently occurring with aging. A report from the Population Division, Department of Economic and Social Affairs of the United Nations predicts that the United States will experience major increases of individuals 65 years old and older, from The United Nations also predicts that in 20 years a larger proportion of the Korean elderly Clearly these nations need to prepare for the dramatic changes in population demographics. For some elderly, aging brings declines in cognition and function that may precipitate losing independent living. Economics will also play a major role in determining some of the most cost-effective ways to humanely care for the elderly, as the proportions of working individuals will greatly diminish in the future. Constructing rehabilitation centers, assisted living or dementia residence gardens that encourage autonomy and sensory stimulation is an economically sound, non-pharmacological strategy for improving the quality of life for persons needing these types of residences. Another aim of therapeutic gardens is to promote ambulation, positive reminiscences, decreased stress and stabilized sleep wake cycles. In addition, some studies have reported that having free access to an outdoor area may reduce some agitated behaviors, medications and falls in dementia residents. Horticulture has been used as a therapeutic modality since ancient times. However, despite its long use in fields of physical therapy, psychiatric occupational and recreational rehabilitation, there are few strong quantitative studies supporting the efficacy of garden settings for therapy and rehabilitation. We present some of the findings in the English literature that support initiating research in the effectiveness of horticultural therapy in garden settings for elderly individuals. It employs plants and gardening activities in therapeutic and rehabilitation activities to improve human well being. Around BC, the Persians began creating gardens to please all of the senses by combining beauty, fragrance, music flowing water and cooling temperatures. In the USA, the therapeutic benefits of peaceful garden environments have been understood since at least the 19th century. Benjamin Rush, considered to be the "Father of American Psychiatry" in the United States, reported that garden settings held curative benefits for people with mental illness. In it he stated that "digging in a garden" was one of the activities that distinguished those male patients who recovered from their mania from those that did not engage in garden activities. Gradually in the United States, agricultural and gardening activities were included in both public and private psychiatric hospitals. The use of horticulture to improve the care of veterans took a large step forward during WWI. The enormous number of returning wounded veterans to US hospitals precipitated the start of horticulture use in the clinical settings. Initially, horticulture was used for occupational and recreational therapy as part of psychiatric rehabilitation. The Rusk Institute of Rehabilitative Medicine, associated with New York University Medical Center, was the first US medical center to add a greenhouse to its rehabilitation unit in for interdisciplinary diagnostic and rehabilitative therapy. This would lead to the first

horticultural therapy curriculum in the US. Indoor gardening has been reported to be effective for improving sleep, agitation, and cognition in dementia patients. As a cognitive therapy, HT helps clients learn new skills and regain lost skills. It is a restorative technique to improve memory, attention, sense of responsibility and social interaction with few to no adverse side effects. Moreover, HT has been found to reduce stress, 14 - 17 to increase feelings of calm and relaxation, 18 , 19 to foster a sense of accomplishment 20 , 21 and to improve self-esteem. A few descriptive case studies, often without control patients, to delineate the benefits of the restorative natural setting over traditional rehabilitation settings, have been published about rehabilitation patients in garden settings: Thus, an automatic and subconscious propensity to react to nature in a positive manner is theorized. Most importantly, therapeutic gardens should contain familiar elements that are typical of the region and activities that elders may have participated in at previous stages of their lifetime. Therapeutic garden design focuses on increasing sensory stimulation by providing assisted living or dementia residents access to the outdoor spaces on a daily basis. Dementia facilities have elaborate structural and electronic devices to prevent residents from eloping and to reduce the risk of injury or death. They may also have structured spaces that reduce disorientation. To stimulate the senses, therapeutic gardens typically include a variety of plants to promote visual, olfactory, and tactile stimulation and to attract birds and butterflies. Also, trees may provide shade, color, seasonal variation, and sound when the leaves rustle in the wind. Walking paths promote movement, encourage contact with plants all nontoxic and non-injurious , and lead the residents to protected areas for sitting and socializing. Vegetables and herbs can be planted to expand visual and tactile experiences and help with improved eating. Some therapeutic gardens include raised planters where the residents can use their hands or simple safe tools for digging and other activities with supervision. Gardens should be designed to stimulate the senses and to encourage older adults to spend time outside in nature. Horticultural therapy may also be used to promote gardening interests both as pastimes and to stimulate function and cognition. Large windows looking out into the garden allow the residents full view of the garden in order to promote positive ideations and to remind them of the presence of the garden. The sensory stimulation of a natural setting has been proposed to reduce the consciousness of unpleasant internal and external stimuli. In a randomized controlled study utilizing murals of nature sights and tapes of nature sounds supplied to patients undergoing bronchoscopy, pain, but not anxiety, was significantly reduced. The mechanism of this distraction therapy was not identified. With aging, the risk of needing rehabilitation for acute and chronic medical problems such as cognitive decline, altered mental status, strokes, heart attacks, and surgical procedures increases. Preliminary studies suggest post trauma and post surgical patients have improved treatment outcomes secondary to greater exposure to natural settings. Ulrich 47 performed one of the classic studies on the positive effect of passive interaction with garden settings to reduce pain. Post-cholecystectomy patients having a window with a view of nature required fewer high potency analgesics and had shorter hospital stays than patients with windows having a view of a brick wall. Another measure of the strength of a passive interaction with nature involved the role of sunlight in post cervical and lumbar surgery patients. Improvement in attention Many patients in horticulture or rehabilitation therapy have attention deficits due to either internal or external negative stimuli secondary to clinical entities such as pain, post-stroke sequelae, head trauma, anxiety, depression or dementia. In his attention restoration theory ART , voluntary attention filters extraneous stimuli when an individual is attempting to concentrate on a specific task. This voluntary attention undergoes fatigue with time and stress. On the other hand, involuntary attention does not incur fatigue and is stimulated by colors, motion, contrasts and the unusual sensory stimuli in garden settings. Consequently, in a natural setting, engaging the involuntary attention may spare voluntary attention fatigue, allowing a more prolonged and higher level of attention. The benefits of improving attention in a garden setting when compared to attention in non-green or traditional rehabilitation settings has been described. Decreased ECF is often accompanied by attention deficits. Using different screen sizes, De Kort et al. Improved performance on attention measures was also reported for students looking out a window at natural scenes when compared to students looking out a window at man-made landscapes. After 40 minutes of completing a task requiring focused attention, subjects that walked in a wilderness park reported improved mood and decreased errors in proof reading compared to subjects that followed the tasks with a walk in an

urban setting or sat in a windowless room listening to music or reading magazines. In another study of attention restoration with pregnant women in their third trimester, Stark 52 demonstrated that spending two hours a week in nature activities improved concentration and reduced errors. Using a similar protocol, Cimprich et al. Physiological and behavioral reactions to stress involve bi-directional communication of the brain with multiple systems, including the endocrine, cardiovascular and immune systems. In contrast, a reaction that promotes a state of chronic stress with negative structural remodeling of the hippocampus, amygdala and prefrontal cortex is termed allostatic load. Damage to the brain and body occurs when the stress is chronic, resulting in dysregulation of neurobiologic stress mediators. Allostatic load occurs when the mediators of stress are not turned off after the threat has ceased or when they are not turned on in a manner to adequately manage an immediate threat. Loss of hippocampal cells with aging is normative in most cases; however the glucocorticoid hypersecretion syndrome is not. It is suspected that the cytological degeneration of amyloid in the hippocampus and neocortex, including neurofibrillary tangles and neurotic plaques, 69 in addition to organ aging, combine to accelerate glucocorticoid hypersecretion. These stressors eventually overload long-term neural and endocrine dysfunction leading to functional and cognitive decline. It is thought that an environment with the appropriate ratio between plant abundance and hardscape man made structures may reduce the deleterious effects of man-made settings to the human inhabitants. The ratio of nature and hardscape to foster a positive therapeutic result has been debated. Appropriately designed garden settings may be ideal for experiencing stress modulation 30 , 32 and thus have an important therapeutic role for the elderly experiencing the stresses of aging with comorbid medical and psychiatric problems. Garden settings, both viewed and experienced actively, have already been associated with stress reduction in other populations. In another study, subjects viewing pleasant rural scenes on the wall while using a treadmill experienced greater blood pressure reduction than subjects viewing unpleasant urban scenes. Viewing nature scenes not only lowers sympathetic arousal, it may alter EEG activity. Nakamura and Fujii 87 reported that viewing pictures of a natural hedge produced a greater ratio of alpha to beta activity on EEG when compared to subjects viewing a picture of a similarly shaped concrete wall. In more active garden activities, Hartig et al. Restoration of blood pressure, emotion and attention were all more positively affected for the nature group compared to the urban group. A recent study by Van Den Berg and Custers 17 also involved active participation within gardens. Gardeners whose stress levels had first been deliberately elevated with a difficult task demonstrated significantly lowered salivary cortisol levels and higher self-reported positive mood after 30 minutes of light gardening activities as compared to those who engaged in indoor pleasant reading after the stressful event. Although the relaxing reading did also reduce cortisol levels, this reduction was less than with the gardening, and positive mood showed no increase with the indoor activity. The authors suggest that gardening, as an involved and goal-directed way of interacting with nature, can be valuable in promoting restoration from stress. Thus, there are numerous studies demonstrating the effect of nature in decreasing sympathetic response and stress. Multiple modalities have been used to measure stress responses, including blood pressure, pulse rate, electrodermal activity, EEG activity, salivary cortisol level and self-reported positive and negative moods. These studies demonstrate the need for more research to determine if there will be a quantitative difference in stress reduction as measured by sympathetic and endocrine responses when the elderly engage in active and passive garden activities compared to similar activities performed in non-garden environments. Studies with a broad spectrum of ages suggest that having a daily view of a natural setting, or having access to gardens may promote healing and reduce tension. One of the important concepts to be considered in the design of residences for the elderly is to not replicate the modern medical center appearance. The sterile modern medical complex, often without the sight of or access to gardens or natural settings, may increase resident anxiety and fear as evidenced by elevated vital signs.

Chapter 6 : Evidence-based Interventions

The Abe's Garden® community was developed by noted specialists in the fields of geriatrics, aging design, and lighting. Vanderbilt University Abe's Garden® is establishing best practices for dementia care through its collaboration with Vanderbilt Center for Quality Aging (VCQA).

Kelley and Dilafruz R. Williams; Portland State University Our ecological and social problems are deeply interconnected. Climate change, habitat destruction, loss of biodiversity, food insecurity, air and water pollution, along with innumerable other environmental problems, are increasingly related to issues of equity and social justice. Addressing these problems requires a citizenry that is both scientifically and ecologically literate, ensuring that all people are empowered with the understandings, dispositions, and skills to address the challenges of this modern world. Saving our Children from Nature Deficit Disorder. Louv and numerous other leaders of the No Child Left Inside initiative have done a remarkable job pointing out the parallel phenomena of increasing numbers of children with ADHD and loss of time spent in nature, particularly unstructured time to explore, engage in imaginative play, and utilize all the senses. Nonetheless, time that children spend in school has become more rigid, siloed by discipline. As a society, we place unrealistic demands on educators. Classroom teachers are continually expected to do more with less—less money, less support, less time—with increasing mandates and pressures of accountability, whether from No Child Left Behind or Race to the Top. Informal educators provide a remarkable array of learning experiences, yet many teachers do not have the time or capacity to make use of these opportunities, particularly since in most cases, field trips have to be rigorously defended and justified in context of the school-day curriculum. However, since the early s, the school garden movement has been working to mitigate traditional schooling taking place within the four walls of the classroom by bringing students outdoors on school grounds right where the schools are housed. The NGSS raises the bar for science in schools, and will require that much more attention be paid to science starting in elementary school. To help in this process, the NGSS are integrated by design. First, science education has been integrated into STEM education Science, Technology, Engineering, and Math , elevating the practices and content of engineering design to the level of scientific inquiry. We believe that school gardens provide a rich milieu to put the NGSS into practice, making science relevant to the lives of students as they engage with their own place in meaningful ways across disciplines. Sense of Place As an individually and socially constructed phenomenon, relationship to place is complex and so is the creation and development of meaning, attachment, and identity based on this relationship. According to several scholars, sense of place is recognized as a key component of sustainability and sustainability education. Wendell Berry tells us that if we do not know where we are, we cannot know who we are. Similarly, David Sobel asserts that people tend to protect what they love and know; therefore the actual places where we live, work, and play, become an explicit part of sustainability initiatives. Sustainability education takes a holistic, systemic view of the world, is place-based, experiential, and transformative. STEM and sustainability education are complementary and should be brought together in mainstream education. Not only do we need to weave STEM and sustainability education together, we need to elevate both more prominently in schools. Recent studies have illuminated statistically significant reductions in science instructional time in elementary classrooms Blank, These findings are quite troubling considering the need for scientifically and ecologically literate graduates. If we wait until middle and high school to emphasize science, we have already lost a tremendous number of students, most typically students who are already marginalized in mainstream educational and other systems. Making use of learning gardens can provide a solution. Teaching and learning in gardens is a way to increase student engagement in learning, and also to support different learning styles, integrate various disciplines, and revitalize schools and neighborhoods. In an era characterized by educational malaise and apathy and amidst a repetitive discourse of racing to the top, gardens offer an alternative and regenerative model for bringing schools to life that differs significantly from mechanistic techno-scientific reform efforts oriented toward economic globalization. Williams and Brown outline seven pedagogical principles that are foundational to garden-based education, and that shift learning from a dry, disconnected model to one that is active and alive.

Learning gardens cultivate a sense of place, awaken the senses, and foster wonder and curiosity; further, through practical experience, learners observe rhythm and scale, develop understandings of interconnectedness, and value biocultural diversity. Much of schooling focuses on visual and auditory learning modalities. Learning gardens on the other hand provide multisensory, kinesthetic learning experiences for children and adults. They provide accessible places to build connections to nature—allowing learners to see, feel, hear, smell, and taste the wonders of nature. In our own teaching and working with teachers in low-income schools in particular, we have found the desperate need for this connection among adults and children alike. As districts, schools, and individual classroom teachers work to implement the NGSS, innumerable, place-based opportunities exist to address national, state, and local goals within the context of learning gardens. Nonetheless, it will require leadership at many levels to reach the vision of the NGSS and the school garden movement. Principals need to see the value of garden-based education and embrace this type of teaching and learning by supporting and protecting their teachers. As professionals and leaders working directly with students, teachers will need support in developing relevant, place-based lessons that address the NGSS. Teachers must be integral players, bringing their expertise and experiences to the process. In our summer professional development course entitled, *Integrating STEM and Sustainability Education through Learning Gardens*, classroom teachers, garden-based educators, and graduate students in the Leadership for Sustainability program work together to implement a place-based curriculum with elementary students in a summer garden program through SUN Schools Schools Uniting Neighborhoods. In the afternoons, this diverse group of educators has the opportunity to grapple with the content and design of the NGSS, and to work collaboratively to develop integrated, standards-based instructional units that are contextualized in school learning gardens. For the NGSS to become a reality, teachers will need more professional learning experiences that empower them to put their expertise and knowledge of their students their place into the design and implementation of well-planned instructional units. NGSS and the Framework for K Science Education NRC, from which they were developed provide the structure and scaffolding for building curriculum, but efforts led by teachers and partners from higher education and the local community will provide the flesh and details for implementation. In the following paragraphs, we will highlight some examples of what the NGSS in learning gardens can look like in practice. The first scenario provides an example of an engaging encounter that could open the door to numerous explorations, while the second is an actual lesson we have used in the summer garden program. Both highlight the rich learning opportunities that emerge and are literally just outside the classroom door. An unexpected discovery of a Goldenrod Crab Spider feasting on an unsuspecting honey bee yielded immediate fascination and interest among students and teachers alike. Last summer, a group of teacher candidates and youth ranging in age from four to twelve years old were thoroughly engaged and excited by this predator-prey discovery. For teachers, such wonders provide an anchor for numerous learning experiences. For example, a Kindergarten teacher could help her students investigate the needs of different plants and animals in the garden. Use observations to describe patterns of what plants and animals including humans need to survive. As another possible direction, this initial discovery could serve as the platform for introducing the 3rd grade standards related to heredity and biological evolution. Using their data, they could construct an argument about why some species are more likely to survive in particular habitats over others 3-LS Use evidence to support the explanation that traits can be influenced by the environment; 3-LS Use evidence to construct an explanation for how the variations in characteristics among individuals of the same species may provide advantages in surviving, finding mates, and reproducing NGSS, Students collaborate to gather data about the number and diversity of species they can observe and record in their habitat sampling area. In each of these possible scenarios, there are also numerous interdisciplinary connections to reading and math expectations in the Common Core State Standards CCCS and to real world issues. For example, as third graders learned about the relationships between species and their specific habitats, they could also read a variety of texts describing the flora and fauna, as well as abiotic components, of different ecosystems. They could read and discuss the role of pollinators in ecosystems, and how pollinators are so crucial to our own food sources, particularly those in a specific location—i. As a culminating product, students could create a short video or poster that argues why sustainable agriculture practices are vital to food security and the planet

as a whole. The first day was spent collecting samples to test for soil composition. As students waited for the layers of sand, silt, and clay from various locations around the school yard to settle in their jars, they explored decomposers in the compost and worm bins, and those found in the garden. As a culminating activity that could also serve as an assessment, students were given a worksheet that asked them to draw what they had observed above and below ground in the garden. Students and teachers search for critters aka, decomposers in the raised garden beds at their school. In this particular example of viewing soil as an ecosystem, students were provided with a concrete example of some relatively abstract, complex ideas. It let them think and learn about systems, interconnections, cycles, and flows, laying a strong foundation for further exploration and learning in upper grades. Students had the opportunity to engage in logical reasoning and discourse, using empirical observations to support their claims. Some of the more complicated explanations of why the mineral portions of soil are non-living while the system as a whole can be considered alive, at the most basic level, were understandable to the elementary-age students. Furthermore, a response that declared soil as not being alive because it is made up of sand, silt, and clay could have denied students a deeper exploration into the microbial ecology of soil and compost. While observing and recording the decomposers found in the compost bin, a student observed this black soldier fly emerge from its pupa. School and community learning gardens provide rich, easily-accessible contexts for integrating STEM and sustainability education. Learning experiences that are multisensory, place-based, and interconnected come to life in the garden, making teaching and learning relevant and meaningful to students and teachers alike. The recent adoption of the Next Generation Science Standards, which emphasize application of knowledge, higher-order thinking skills, and demonstration of proficiency through performance, present the educational community with a unique opportunity to make better use of such spaces for teaching and learning. To help move our community closer to this vision, we offer a few suggestions to help in this process: Think big, start small—meaningful change takes time. It is important to spend time envisioning and planning in the early stages so that your garden-based aspirations can be turned into reality. Whether you are new to outdoor, garden-based education or an experienced practitioner, it is important to set shared expectations and norms with your students. Too many children have not spent a lot of time outside in nature. Furthermore, when they have been outside during school hours, it is often recess, not learning time. It is important to be clear that even though students are outside the classroom, it is still time for learning. Related to number two, get outside regularly. Nature time is as important as screen time. Share your successes and challenges with colleagues, your principal, parents, and your students. Connect with other educators and resources. For instance, the following websites can provide even more links to others interested in learning gardens: Oregon School Garden Summit <http://www.osgschoolgardens.org/>: Most of all, have fun! Learning should be a fulfilling lifelong endeavor. That will only happen if it is fun, engaging, and meaningful. Learning gardens are the perfect milieu!

Chapter 7 : CDC - Healthy Places - Healthy Food - Community Gardens

- The number of gardening-based mental health interventions is increasing, yet when the literature was last reviewed in , limited evidence of their effectiveness was identified.

Additional evidence is needed to determine long-term effects Savoie-Roskos , Davis b. A New Zealand-based study associates school gardens with lower BMI and reduced prevalence of overweight among children Utter School gardens are associated with higher test scores among fifth graders Ray , as well as increased science knowledge among elementary students Wells More intensive garden interventions are associated with greater knowledge gains Wells Research suggests that establishing, integrating, and sustaining successful school gardens over time requires ongoing attention to the physical garden, student experience, school community, as well as dedicated resources and support Burt School gardens appear to be more prevalent in urban districts than rural ones, and in the western US than in other regions. School gardens are less prevalent in schools with high proportions of students from families with lower incomes than schools in more affluent areas. School gardens are also more common in schools with farm to school programs Turner State laws that support school gardens are associated with the use of garden produce in school nutrition programs Turner Over 30 WI schools are listed in the Kidsgardening. Serving school garden produce SGP in the cafeteria. The Edible Schoolyard Network connects educators around the world to build and share a K edible education curriculum. Accessed on February 16, Kidsgardening. Helping young minds grow. Rural Childhood Obesity Prevention Toolkit. Competitive foods in school. School garden guide SGG: Standards-based nutrition education from the ground up. The great garden detective adventure: A standards-based gardening nutrition curriculum for grades 3 and 4. Nutrition and physical activity program: A youth garden-based nutrition education curriculum. Population approaches to improve diet, physical activity, and smoking habits: School gardens enhance academic performance and dietary outcomes in children. Journal of School Health. The child in the garden: An evaluative review of the benefits of school gardening. Journal of Environmental Education. An evidence-based model for school garden integration. Journal of the Academy of Nutrition and Dietetics. School health guidelines to promote healthy eating and physical activity. Strategies to prevent obesity and other chronic diseases: The CDC guide to strategies to increase the consumption of fruits and vegetables. School-based obesity prevention strategies for state policymakers. A randomised controlled trial. Impact of the use of produce grown in an elementary school garden on consumption of vegetable at school lunch. Maximizing the impact of school gardens on health outcomes. An evaluation of the junior master gardener program in third grade classrooms. Exposure to multiple components of a garden-based intervention for middle school students increases fruit and vegetable consumption. A garden-based nutrition intervention pilot program influences motivation and preferences for fruits and vegetables in Latino youth. Use of school gardens in academic instruction. Journal of Nutrition Education and Behavior. California teachers perceive school gardens as an effective nutritional tool to promote healthful eating habits. Journal of the American Dietetic Association. A cluster randomised controlled trial. Local government actions to prevent childhood obesity. National Academies Press; SC farm-to-school programs encourages children to consume vegetables. Eat Your Way to Better Health: Evaluating a garden-based nutrition program for youth. The effect of a school gardening program on the science achievement of elementary students. The effect of a summer garden program on the nutritional knowledge, attitudes, and behaviors of children. Gardening increases vegetable consumption in school-aged children: Garden-based nutrition education affects fruit and vegetable consumption in sixth-grade adolescents. The impact of nutrition education with and without a school garden on knowledge, vegetable intake and preferences and quality of school life among primary-school students. First-grade gardeners more likely to taste vegetables. An after-school gardening club to promote fruit and vegetable consumption: The assessment of social cognitive theory constructs. The effects of school gardens on students and schools: Conceptualization and considerations for maximizing healthy development. An experiential learning approach for a nutrition education program to increase fruit and vegetable knowledge, preference, and consumption among second-grade students. Effects of a gardening program on the academic

progress of third, fourth, and fifth grade math and science students. A comparison of a gardening and nutrition program with a standard nutrition program in an out-of-school setting. An evaluation of the school lunch initiative final report: University of California Berkeley: School gardens in the city: Does environmental equity help close the achievement gap? Impact of garden-based youth nutrition intervention programs: Increasing fruit and vegetable intake among children and youth through gardening-based interventions: Increasing prevalence of US elementary school gardens, but disparities reduce opportunities for disadvantaged students. State laws supporting school gardens are associated with use of garden-grown produce in school nutrition services programs. School gardens and adolescent nutrition and BMI: Results from a national, multilevel study. School gardens and physical activity: A randomized controlled trial of low-income elementary schools. International Journal of Science Education. Nutrition to grow on: School garden network SGN: Accessed on February 22, Kidsgardening. Encouraging children to garden. Wisconsin school garden initiative WSGI.

Chapter 8 : Pain, Pain, Go Away!: Evidence-Based Gardening

The CPSTF recommendation is based on evidence from 14 studies that examined gardening interventions conducted with children ages 2 to 18 years (search period January - October). The finding of sufficient evidence was based on the magnitude of effect estimates, number of studies, and consistency of effects shown in Table 1 below.

Chapter 9 : What Works - Community gardens

Community gardening may also reduce fossil fuel energy used to produce, process, and transport food (SSSA-McIvor , CCAFS-Campbell), and can reduce the energy intensity of an individual's diet if more plant-based foods are consumed in place of animal products (Harvard Ext-Adamkiewicz).