RESTORATIVE GARDEN DESIGN: Enhancing wellness through healing spaces

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Abstract

Creating gardens as places for restoration of good health and wellness has been observed throughout history, from ancient times up through the present. Current research from a variety of academic disciplines reveals that contact with nature provides stress reduction, which in turn leads to improved health outcomes. This research leads to additional questions—what kind of contact with nature? How much? Are there certain types of plants which are more therapeutic than others? A look at the existing knowledge base reveals a complexity of variables which prohibits a formulaic approach to garden design for best health outcomes. However, careful study of the field reveals factors of garden design which should be considered in order to achieve maximum restoration for garden users.

Gardens which are designed for stress relief have four primary considerations embedded in the design: social support for garden users; provision of privacy and control; opportunity for physical activity and movement; and provision of nature elements. Universal design, which provides accessibility to the greatest possible range of garden users, should also be a consideration of any restorative garden space.

Furthermore, landscape architects and other garden designers must design for the users and the anticipated uses of the garden. Gardens in healthcare settings have three primary user groups — patients, staff, and visitors. The needs of each must be considered in the garden design. Garden designers must be aware of specialized needs of garden users. A garden which is designed for cancer patients undergoing chemotherapy treatments will have very different design requirements from a garden designed for patients recovering from joint replacement surgery. A garden designed for a hospice setting will have a totally different set of design requirements altogether. In addition, it is critically important that the garden designer consult the therapists who will use the garden space for patient activities. Bringing together the expertise of therapist and garden designer yields tremendous value to the garden design.

A landmark study which looks at where people choose to go when stressed is examined, and new versions of the same survey are reviewed. Results of the new surveys are puzzling, and yield new questions. Suggestions for new areas of research are also given.
Health is defined as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity”. (World Health Organization, 1946)

Introduction

Throughout history, contact with nature has been viewed as beneficial for health and well-being in widely different cultures. From ancient healing springs to medieval monastic cloisters and continuing on to tuberculosis sanatoria in the early twentieth century, contact with nature was believed to be beneficial for individuals who were troubled in body, mind, or spirit. However, during the twentieth century the connection between healing and nature was gradually severed, as technology took on a greater role in the medical community — indeed, in Western culture as a whole. Healthcare designers and administrators became preoccupied with creating environments that were functional and efficient. The need to accommodate modern technologies in healthcare facilities overshadowed previously-held beliefs about the importance of providing therapeutic elements such as gardens. As a result, this new functional emphasis produced environments that were efficient but starkly institutional. These types of environments are now considered stressful and unsuited to the emotional and psychological needs of patients, visitors, and staff (Horsburgh, 1995; Malkin, 1992; Ulrich, 1992).

By the late twentieth century, however, a growing awareness appeared in regards to the benefits of patient-centered healthcare facilities. In addition, a body of research began to be published relative to environmental characteristics that help patients cope with psychological and physical effects of sickness. Some of these environmental characteristics related to design of the healthcare facility itself, but other characteristics related to contact with nature, such as in a healing garden or nature views through a window (Ulrich, 1995). Researchers investigated a broader concept of health and wellness, addressing other incidents of contact with nature and its benefits to a larger audience. Much of this research focused on the ways contact with nature provided stress mitigation for everyday situations, and did not focus solely on healthcare environments (Hartig et al., 1991; Kaplan, 1995; Ulrich et al., 1991b; Wilson, 1984).

Current knowledge relative to restorative garden design has progressed. This paper will begin with a cursory overview of a broad concept of health and wellness and proceed to look at Kellert and Wilson’s work on biophilia and biophilic design, proceeding on to examine in detail Ulrich’s Theory of Restorative Garden Design and its implications for gardens in healthcare facilities. The paper finishes with a recent survey that yielded puzzling results and a call for additional areas of research.

Health and wellness

The World Health Organization defines health as “a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity” (Organization, 1946). This holistic definition of health provides a suitable platform for beginning a discussion of restorative garden design. Because the creation of literature relating to restorative gardens is in its infancy, the field has not yet come to authoritative definitions for its component parts. For the purposes of this paper, the following working definitions will be used. A new student of restorative and therapeutic garden design will gain greater conceptual understanding of the field by keeping these definitions in mind.

- **Curing**: is defined as eliminating all evidence of disease.
- **Healing**: is a natural process. Healing goes deeper than curing and must always come from within. Healing involves “becoming whole”.

Dimensions of wellness

A state of wellness is achieved when the many dimensions of a person’s life are in balance — when a person is whole. Many models exist which portray dimensions of wellness — a detailed discussion of models of wellness is beyond the scope of this paper. This particular model portrays a balance between six dimensions of life and health — physical, social, environmental, emotional, spiritual, and intellectual. The wheel portrays each area in balance with the others, calling attention to the importance of nurturing all dimensions of life in order to achieve wellness. When one (or more) area becomes out of balance, wellness is compromised. One common result of being out of balance is experiencing stress. Modern society and life styles are full of stressful events at home and at work; these events result in new states of ill health (Annerstedt & Wahrborg, 2011). Stress interferes with wellness in a myriad of ways. Stress, and ways to mitigate its effects, has been well-studied over the last several decades.
Existing research: Access to nature can enhance wellness

Research from many quarters, including the fields of healthcare, psychology, design, public health, and other disciplines indicates that access to nature can enhance health and wellness. Annerstedt and Wahrborg (2011) propose three main kinds of public health effects related to nature: short-term recovery from stress or mental fatigue, faster physical recovery from illness, and long-term overall improvement on health and well being. Wilson (1984) addressed the premise for using contact with nature in the treatment of diseases more than twenty-five years ago with his biophilia hypothesis.

Short-term recovery from stress or mental fatigue has been well-studied. Studies agree that nature views are more effective in reducing psychological and physiological stress than urban views, and lead to more positive feelings in subjects (Hartig et al., 2003; Ulrich et al., 1991b). Faster recovery from illness has also been documented. The best-known study included surgery patients in a hospital, some having a view of a tree from their bed, and others having a view of a brick wall. The patients with a view of a tree had shorter hospital stays, needed less severe pain medications, and received less negative comments from nurses (Ulrich, 1984). Long-term overall improvement on health and well being has also been well-documented, most recently by a ten-year study of vacant lot greening in Philadelphia, PA USA. In this statistically rigorous study, residents reported less stress and increased physical activity levels in neighborhoods where vacant lots were turned to community garden spaces. Reduced crime rates were also reported in these neighborhoods (Branas et al., 2011). Long-term overall benefits of contact with nature for large population groups were explained by Wilson’s biophilia hypothesis (Wilson, 1984).

The biophilia hypothesis suggests that there is an instinctive bond between human beings and other living systems. In further exploration of this concept, Stephen Kellert (2008) investigated the idea of biophilic design, which he defined as the “deliberate attempt to translate an understanding of the inherent human affinity to affiliate with natural systems and processes into the built environment.” He noted that people living in proximity to open spaces report fewer health and social problems, and that even the presence of grass and a few trees has been correlated with enhanced coping and adaptive behavior. Individual conditions are ameliorated by contact with nature, but benefits translate to the greater community as well. Communities with higher-quality environments report more positive valuations of nature, superior quality of life, greater neighborliness, and a stronger sense of place than communities of lower environmental quality. These findings were found to apply in poor urban as well as more affluent and suburban neighborhoods.

Biophilic designs are based on six elements or attributes. These designs generally include:

- Environmental features
- Natural shapes and forms
- Natural patterns and processes
- Light and space
- Place-based relationships, and
- Evolved human-nature relationships (Kellert, 2008).

Ulrich’s Theory of Restorative Design

Dr. Roger Ulrich’s theory of restorative garden design is based on theory and research in the behavioral sciences and
health-related fields. His theory proposes that gardens in healthcare situations are important stress mitigating resources for patients and staff because they foster:

- Social support
- Sense of control
- Physical movement and exercise
- Access to nature and other positive distractions (Ulrich, 1999).

Research-based evidence exists to show that each of the four restorative components mentioned above can reduce stress and thereby improve other health outcomes. It must be noted that gardens at healthcare facilities serve a wider population group than the patients / residents. Families and visitors, as well as staff, are also important users of these outdoor spaces. An engaging garden can provide a venue for activity, topics of conversation, and memory cues for both visitors and patients. These garden features can enhance the quality of the visit, which in turn enhances health outcomes for the patient and brings visitors back more frequently. Staff are another important user group for outdoor spaces at healthcare facilities. Staff often have stressful jobs and frequently have no place to go for a break. Garden spaces can provide a sorely needed escape from the pressures of the job.

### Social Support

Social support is the first major component in the theory of restorative garden design model. Generally, social support refers to perceived emotional support or caring, and material or physical aid, that a person receives from others (Brannon & Feist, 1997). A large body of research has shown that people who receive higher levels of social support are usually less stressed and have better health status than persons who are more socially isolated (Cohen & Syme, 1985; Shumaker & Czajkowski, 1994) In fact, low social support maybe as great a risk factor in mortality as is cigarette smoking (Berkman & Syme, 1979).

![Figure 3. A pleasant garden setting with attractive seating increases social support, which leads to improved health outcomes. Rady's Childrens Hospital, Marlon’s Courtyard. San Diego, CA USA](image)

**Design considerations.** Social support benefits of gardens will be increased by design that promotes social interaction among small groups. While there may be instances when design for larger social groups is desirable, providing spaces for small groups should always be part of the garden design. Garden settings that do not accommodate the need for privacy will likely be underutilized. Consideration should also be made for diversity in the way different ethnic groups and cultures enjoy using outdoor spaces. For example in some cultures it is customary for large family groups to gather as a way of offering social support to a sick family member. In these instances provision should be made for a large group to gather in the garden.
Sense of Control

Providing a sense of control is the second major component in the theory of restorative garden design model. Much research has shown that a sense of control is an important factor affecting a person’s ability to cope with stressful situations. Control refers to people’s real or perceived ability to determine what they do, and to determine what others do to them (Gatchel et al., 1989). Generally, people who feel they have some control over situations cope better with stress and have better health status than people who feel they lack control. Lack of privacy is also considered a stressor, related to lack of control over regulation of personal exposure. Stress related to lack of control has been shown to have many negative effects, including depression, reduced cognitive performance, elevated blood pressure, higher levels of circulating stress hormones, and suppression of immune functioning (Schulz, 1976; Weiss et al., 1990).

Much of the stressfulness of hospitalization has been linked to loss of control, for example, loss of privacy, inability to choose clothing, meals, and room temperature, unfamiliarity with buildings, and complex wayfinding. In response to these stressful aspects of facility design and operation, many hospitals and residential healthcare facilities have begun to offer more patient-centered care, allowing for more choices and autonomy for patients and visitors. Healthcare staff can also be positively affected by providing a sense of control in their workplace. Greater involvement in decision-making processes has been shown to improve job satisfaction and reduce turnover in a study of nursing home aides (Waxman et al., 1984).

Well-designed gardens offer an opportunity for patients, staff, and other garden users to increase feelings of control. This phenomenon has been well-studied in parks and other recreational facilities (Ulrich et al., 1991a). However, only a small amount of research has focused directly on gardens in healthcare facilities. Cooper Marcus and Barnes (1995) found that garden users reported restoration from stress when they had the opportunity to exercise control over their situation and “escape” to the garden.

Physical Activity and Movement

Providing opportunity for physical activity and movement is the third major component in the theory of restorative garden design model. Regular physical activity goes beyond benefiting the physical dimension of wellness, and in addition contributes significantly to other dimensions. Many psychological or emotional benefits of exercise have been recorded in scientific literature. For example, exercise has been linked to alleviating depression and producing other positive psychological changes in physically impaired older adults, such as patients with chronic obstructive lung disease.
(Emery & Blumenthal, 1991). Similar positive outcomes have been observed in younger age categories (Ulrich, 1999). It is important to note that beneficial physical exercise does not need to be rigorous -- even mild exercise has been linked to positive health outcomes (McNeil et al., 1991).

**Design considerations.** Gardens can be effective vehicles for encouraging both exertion and rehabilitation, offering a much more pleasant setting than facility corridors or the physical therapy laboratory. Careful planning of garden spaces will include input from the various therapists that work with patients — art therapists, horticulture therapists, recreational therapists, and occupational therapists, perhaps. These professionals have great wisdom to offer relative to the movements and exercises that are desirable for their patients. In areas with cold winters or extremely hot summers, viewing opportunities may be important to consider as well. For example, a corridor with windows looking out on the garden may entice a longer walk than a corridor with no outside views.

Other garden user groups should also be considered when designing opportunities for physical activity and movement in the garden. As mentioned previously, the garden is an important place for staff to escape from the rigors of their work. Another important user group is visitors — usually friends and family members of a patient. Well children who come to visit sick siblings or other family members at a hospital or other care facility benefit greatly from the opportunity for physical activity and movement in the garden setting.

**Nature as Distraction**

Natural distraction is the fourth and last major component in the theory of restorative garden design model. Nature can engage a patient’s interest (thereby distracting from pain, stress, or feelings of sickness), without requiring energy input (Kaplan, 1995). Others agree, yet caution that a well-designed garden with optimal restorative design features will engage all the senses, and not just visual sensations (Stigsdotter & Grahn, 2002). Garden designers will do well to heed her caution.

Ulrich (1992) notes that positive distractions, such as those found in nature, may block or reduce worrisome thoughts, and foster beneficial changes in physiological systems such as lowered blood pressure and stress hormones. Even views of certain nature scenes can significantly reduce stress. Stressed patient groups in a variety of settings from a dental office to a pre-surgery ward all experienced more positive health indicators when exposed to serene nature scenes (Heerwagen, 1990; Katcher, Segal, & Beck, 1984). Although studies are rare that examine potentially favorable influences of gardens on patient stress and other medical outcomes, it appears that even acutely stressed patients can experience significant restoration after only a few minutes of viewing nature settings with greenery, flowers, or water. It is also important to note that viewing gardenlike scenes apparently mitigates pain (Ulrich, 1999).
**Design considerations.** It is important to note that sunlight can have distinctly healthful influences on many patients, but negative effects on others. In one study, 25% of the people interviewed in healthcare gardens mentioned sunlight as a garden quality that helped foster improved mood and restoration (Cooper Marcus & Barnes, 1999). Sunlight also plays a key role in enabling humans to benefit from intake of vitamin D. However, some medical conditions, as well as some prescription medications, alter the body's response to sunshine and for these patients, sunshine must be avoided.

Gardens will tend to ameliorate stress effectively if they contain verdant foliage, flowers, nonturbulent water, park-like qualities (grassy spaces with scattered trees), nature sounds such as birds, breezes, and water, and visible wildlife (Ulrich, 1999). Incorporating these features into a garden, in concert with information about garden uses and users, will provide restorative benefits to garden users.

**Conclusion.** These four factors — social support, sense of control, physical movement and exercise, and nature as distraction — all work together to provide restoration from stress and buffering. According to Ulrich’s theory, this restoration then leads to improved health outcomes. Any landscape can be designed with these principles in mind, to promote the healing quality of the particular space, and promote balance and wellness for the users of the space.

**Applications of Ulrich’s theory**

Ulrich’s theory of restorative garden design provides a workable framework for the design of healing spaces. We now turn to some practical applications of his theory in specific healthcare facilities.

**Designing for specific population groups and garden uses**

When designing a garden for a healthcare facility, the designer must research uses and users of the garden. The principles of universal design -- providing accessibility for the greatest possible range of garden users -- should be a first consideration. Detailed specifications are available for interior and exterior applications and new construction in the US must conform to these specifications (Osterberg, 2010). Design for maximum wellness, however, goes beyond the specifications of universal design and works to engage all the senses in experiencing the space.

Landscape architects and other garden designers are well qualified to prepare garden designs and even to anticipate ways the garden will be used. However, additional wisdom can be gained from therapists and nursing staff. It is critical to incorporate their knowledge of potential activities and garden uses into the space design. Therapists such as horticulture therapists, art therapists, recreation therapists, occupational therapists, and physical therapists may all have unique and specific ideas of therapeutic activities that might be conducted in the garden setting. As mentioned previously, better outcomes may be achieved for therapies conducted in a pleasant garden setting, as compared to the same activities conducted inside the healthcare facility.

In addition to gathering input from therapists and nursing staff, the landscape architect or garden designer should research specific needs of the population that will be using the garden. One population group that will be requiring special design attention in the near future is the increasing elder population. Many of the principles of universal design are especially well suited to the needs of elder segments of the population. For example, providing wider sidewalks and walking paths with wheelchair-accessible ramps and paved ground surfaces are helpful design strategies for those with mobility impairments. Some older garden users may want to participate in gardening activities but have trouble bending over to reach the ground. Raised bed planters can be a helpful solution in these cases. Raised beds provide easy access to gardening activities for those who can’t bend over. If the edge of the bed is adequately sturdy and wide, the planter can also function as a place to sit. This is a helpful strategy for those who have trouble standing for long periods of time. Specialized gardening tools which are ergonomically designed may also be helpful for older patients who experience difficulty with arthritis. Container gardens are another easy way to offer accessibility; they can be easy to manage in a variety of locations. Containers that move about on wheeled platforms can also promote garden use by those with reduced mobility.
Figure 7. Wide sidewalks allow plenty of space for circulation in the garden, even for those in wheelchairs. Moving benches off the path enhances feelings of privacy. Methodist Hospital, Des Moines, IA USA

Figure 8. Raised bed gardens offer access to planting activity for those who are unable to reach down to the ground level. Minneapolis Landscape Arboretum, Minneapolis, MN USA

Universal design principles should be followed in nearly all landscape design situations. Specialized gardens for the elderly are appropriate for locations such as nursing homes and assisted living facilities. In addition, there are many other specialized garden typologies in which the theory of restorative garden design can be beneficial. Some special design requirements of those specialized typologies are explored below. This list is neither comprehensive nor exhaustive but is provided as a starting point for the beginning student of healing garden design.

Chemotherapy Garden. Chemotherapy may be administered in an outpatient facility where patients must sit for several hours receiving their treatment. They may be allowed to take their treatment in the garden, or more likely they will view the garden through a window during their treatment, perhaps relaxing in the garden afterwards. Chemotherapy treatments often render patients more sensitive to the sun, and more sensitive to smells. Gardens that will be used by patients undergoing chemotherapy treatments should always provide some type of shelter from the sun. Plants should also be chosen carefully for low-odor flowers and foliage. It is important in all healthcare gardens to provide ongoing maintenance; poorly maintained or dead plants can induce negative thoughts and feelings in patients who use or view the garden. Chemotherapy patients may be the population most in need of well-maintained garden plants and views.

Patients who are undergoing chemotherapy treatment usually visit the facility numerous times over a period of several weeks or months, and a family member or caregiver may accompany them. A pleasant garden space can also provide a place of respite and stress reduction for caregivers, who suffer from their own particular troubles when a loved one is not well.

Figure 9. Gardens for patients undergoing chemotherapy treatment must use plants with minimal scents. Carolyn S. Stolman Healing Garden. San Francisco, CA USA
Hospice Garden. A hospice facility is generally intended for patients who are no longer receiving medical treatments in search of a cure, but who are preparing to die. Comfort in all dimensions of wellness is the principle treatment plan for patients. Hospice facilities are designed to be restful places that evoke feelings of comfort and home. These facilities often have quite lovely gardens, as feelings of home are evoked by strong ties to the out-of-doors. Patients who are receiving hospice care may be confined to the bed, so doorways should be wide enough to accommodate a rolling hospital bed. Some patients will enjoy time spent outdoors, even from their bed. The senses of hearing and smell can be the last senses to depart, so planting designs should consider those senses when plants are being selected. Places for solitary meditation and contemplation are important at hospice facilities, as well as places for small groups of family members to talk and gather.

A hospice facility is sure to host family members of all ages. Hospice gardens should provide features that would engage a young child’s attention and provide an invitation for activity.

Rehabilitation Gardens. Rehabilitation gardens host more vigorous activities. They provide opportunities for patients to develop life skills and rebuild strength. Patients may be in rehabilitation for physical, emotional, or mental disabilities. This type of garden should be very specifically tailored to the
needs of the garden users. When designing a garden of this type, landscape architects and garden designers should work closely with therapists who will bring their patients to the garden for therapy activities.

It is extremely important for landscape architects and garden designers to be well-educated and prepared when undertaking restorative garden design. Learning should never end—the state of research relative to health benefits of contact with nature is in its infancy and a wise designer will stay abreast of new information. This saves time and money for healthcare facilities, and provides best quality of life and optimum wellness for those who use the garden.

As described above, a wealth of research exists which gives convincing evidence that contact with nature is linked to positive outcomes for human health and wellness. Kellert (2008) writes that with humility and understanding, effective biophilic design can potentially enrich both nature and humanity. In addition, he maintains that human wellbeing is highly contingent on contact with the natural environment, which is a necessity rather than a luxury for achieving lives of fitness and satisfaction even in modern urban society (emphasis added). However, Kellert writes that human affinity for contact with nature, biophilia, is a weak biological tendency that is reliant on adequate learning, experience, and sociocultural support for it to become functionally robust. In addition, if human biophilic tendencies are insufficiently stimulated and nurtured, they will become atrophied and dysfunctional.

Modern urban society, therefore, must integrate contact with nature into the design of places where people live, work, learn, and play in order to achieve maximum wellness for people individually and for society as a whole. This may be a difficult challenge, on two fronts. People are spending more and more time indoors in sedentary pursuits, often in front of a screen of some type — television, computer, electronic games for example. When people do venture outdoors, they may lack access to natural environments, or even environments with restorative properties (Louv, 2005, 2011).

All people may not respond the same way to natural environments. Certainly some elements, such as inner peace and a deep experience of love are universal to nearly all people as healing qualities. There are also common conditions of healing, such as care from friends and family, laughter, music, and great art. There are also unique conditions of healing which apply to individuals and which are based on individual personality and preferences (Lerner, 1996).

Questions about stress restoration and individual preferences were raised in a recent survey of university
Individual preferences relative to stress responses and restoration

A landmark study was performed in 1992 which investigated where people choose to go when stressed. The study, by Francis and Cooper Marcus, involved a sample of 154 university students, mostly from the department of Landscape Architecture. They were asked to recall an occasion when they had been feeling particularly stressed, upset, depressed, angry, confused, or grief-stricken, and they had gone to a particular place that helped them feel better. They were asked to describe the place, what happened to them there, and which specific elements or place qualities seemed to lift their mood. In survey results, respondents showed a marked preference for outdoor settings — 71% of the sample of 154 students. 40% of the students described natural settings and 31% described designed outdoor settings such as a park or college campus (Cooper Marcus & Barnes, 1999; Francis & Cooper Marcus, 1992). Findings from this survey align quite well with Ulrich’s theory of restorative garden design, the principles of biophilia, and available research about the health benefits of contact with nature.

Two more recent surveys, conducted in 2011 and 2012, yielded puzzling results which raise more questions than answers. They are included here as an invitation to further inquiry by the scientific community.

In the first survey (Iowa, 2011), 78 American university students were asked the same questions as in the previous study by Francis and Cooper Marcus: Recall an occasion when you felt particularly stressed, upset, depressed, angry, or confused, and you went to a particular place that helped you feel better. Respondents were asked to describe the place, how they felt after spending time there, and what qualities were important in the place. Students were not from an environmental or design background. The study was administered in a sophomore-level housing class; students were primarily from the College of Human Sciences. These students’ responses were quite different. Where in the 1992 survey, 71% preferred some type of outdoor environment, only 29% of the 2011 survey group mentioned an outdoor environment — 19% mentioned a natural setting, and 10% mentioned a designed outdoor setting such as a park. In contrast, 54% of the students mentioned a home setting — whether their own home, their family’s home, or their university residence. 17% chose an urban or built setting such as the gym or a coffee shop, and a very few respondents — 3%, mentioned their car.
Kellert suggested. Also, the students from the 1992 study were mostly landscape architecture students and were likely more environmentally conscious and in tune with human biophilic tendencies. The second study, conducted in early 2012, raises even more questions.

This study was conducted in Taiwan, and administered to a university group. This survey population was a combination of students and faculty. Only the responses from the 18-29 age group are included here, in order to eliminate age bias in responses. This survey is very small in comparison, with 22 respondents. The survey questions were the same as in the 2011 study. Responses from this study were much closer to the 1992 survey responses. 63% of respondents recalled going to an outdoor setting when they were stressed — 45% mentioned a natural setting and 18% mentioned a designed outdoor setting. 32% mentioned a home environment, in contrast to 54% in the 2011 survey of American students.

![Figure 17. Comparison of all three studies](image)

After looking at these three surveys, it appears that more data is needed before firm conclusions can be drawn. If further surveys are undertaken, data should also be recorded about when and where the survey is administered. In spite of all the questions raised above, some preliminary conclusions can nevertheless be proposed from the survey results. Certainly one can infer that, as Lerner proposed, a common element of places that provide healing and restoration for some people is an outdoor space of some type. Universal elements of places that provide healing and restoration are not evident from this data set. Many people — from 29% to 71% -- report that they are restored by immersion in an outdoor environment, and a slight preference is seen for natural settings over designed outdoor settings.

**Conclusion**

Over the last quarter century a good deal of research has been performed to investigate the health benefits of contact with nature. A solid foundation of evidence exists which confirms positive health benefits when people have access to nature, either by immersion, such as being in a park or garden setting, or by visual access, such as a view through a window. These health benefits are valid for many population groups — patients in healthcare settings such as hospitals, medical offices, dental offices, nursing homes, and assisted living facilities; they are also valid for college students under stress as they prepare for a test, retail employees at the end of a mentally taxing day at work, or children on their way to school.

Incorporating the principles of Ulrich’s theory of restorative garden design has many potential benefits to society in diverse arenas, from gardens in healthcare facilities to public parks, schoolyard designs, and civic plazas. The value of implementing these principles is difficult to quantify, due to
the complex nature of the question. Certainly research shows us that benefits would accrue to society as a whole if these design features were implemented on a wide scale. Future research that can begin to quantify the benefits would be valuable indeed to convince decision-makers to incorporate the principles of restorative garden design in a wide range of locales — from rural communities to major urban centers.

Other valuable factors for future research studies are specific causal factors of therapeutic design. It will also be valuable to track biophilic tendencies of future generations who have spent much less of their childhood outdoors experiencing nature. Will they be drawn more to electronic screens for restoration from stress?

The puzzling survey questions will also merit further study. This survey likely needs a larger sampling of the population before meaningful conclusions can be drawn.

References


