Gardens and health

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In past centuries, green nature, sunlight and fresh air were seen as essential components of healing in settings ranging from medieval monastic infirmaries, to 19th century pavillion-style hospitals, to early 20th century asylums and sanatoria. By the mid and later decades of the 20th century, however, access to nature and the therapeutic value of gardens had all but disappeared in medical settings in many Western countries. Air conditioning often replaced natural ventilation; outdoor balconies and roof terraces disappeared; land costs, building constraints, and the demand for parking resulted in large institutional settings where views out to trees or gardens became a rarity; and indoor settings designed for efficiency were often institutional and stressful for patients, visitors, and staff. (Ulrich, 1992; Malkin 1992; Horsborough, 1995). In the 1990s, however, a reversal of this trend occurred as patient-centered care became the focus of hospital administrators and designers. Panel discussions on healing gardens were highly attended at the annual conferences of the American Society of Landscape Architects in 1998 and 1999. Several books on the therapeutic value of outdoor space in healthcare settings appeared in the United States in the mid 1990s: Gerlach-Spriggs, N. et al. (1998); Tyson, M. (1998); and Cooper Marcus, C. and M. Barnes (1999). Books also appeared that urged readers to consider their own back garden as a healing or sanctuary space (Minter, 1993; McDowell and Clark-McDowell, 1998; Jay 1998). Significantly, an organization that accredits eighty-five percent of United States acute-care hospitals, now requires that for certain patient groups (pediatrics) and those experiencing long lengths of stay, the hospital must provide "access to the outdoors through appropriate use of hospital grounds, nearby parks and playgrounds, and adjacent countryside." (The Center for Health Design, 1998). Spending time in a hospital as patient, visitor, or member of staff can be a stressful experience. Access to gardens and nature can enhance people's ability to deal with stress and thus potentially improve health outcomes.

The reasons for this re-focusing on nature are many, and are interconnected. They include research on the mind-body connection; consumer movements demanding more patient-centered care; a burgeoning interest in health and alternative medicine; and the concerns of the environmental movement. In many Western countries, the therapeutic benefit of spending time outdoors is deeply ingrained in the culture. It is taken for granted that the single family home will have an attached yard or garden; that neighborhoods will be provided with parks; that the public will have access to shorelines and walking trails. In three types of health-

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care facilities – the nursing home, the Alzheimer's facility, and the hospice – the provision of a garden seems to be similarly taken for granted, probably because the emphasis is on quality of life rather than cure, and the overall image of the environment is residential rather than medical. In other types of healthcare facilities, such as acute-care hospitals, psychiatric facilities, and children's hospitals, the provision of a garden is more problematic, however, the emergence of research on access to nature and stress reduction is beginning to have an impact on their design. Nature-oriented spaces which have the potential to promote restoration from stress via passive contact (such as looking out through a window), or via low-level physical activity such as walking, sitting, and talking, are taking on more significance. Such spaces may, or may not, be designated as "healing gardens"; they are mostly outdoors, but in latitudes with extremes of heat and cold some are indoors; they vary greatly in size from small rooftop gardens to expansive campus-like spaces. (For an extensive typology of healing gardens, see Chapter 4 in Cooper Marcus, C. and M. Barnes, 1999). For purposes of discussion, the term "healing gardens" will be used in the remainder of this paper, to indicate outdoor spaces with therapeutic potential.

Healing gardens and relevant research

A recent report by Johns Hopkins medical researchers identified more than seventy scientific experimental studies dealing with the effects of healthcare environments on medical outcomes (Rubin et al., 1997). While none of these rigorous studies addressed gardens per se, research that has considered the effects of light, temperature, noise, and music on medical outcomes has raised the awareness of the positive and negative affects of the *environment* of healthcare.

Categorized by methodological approach, there are four types of relevant research that are significant in the discussion of healing gardens. Firstly, there are carefully controlled experiments where subjects are subjected to stresses and then to potential recovery experiences, such as viewing photographs, slides or videos of outdoor nature scenes. Physiological changes (e.g. blood pressure) are recorded, as are speed of recovery from stress, duration of recovery, landscape preferences, etc. Roger Ulrich, Terry Hartig and colleagues are major contributors in this area of research (e.g. Ulrich 1981, 1984, 1991; Hartig, 1991, 1993). Quasi-experimental studies extend this approach outdoors with subjects' physiological changes being recorded by mechanical recording devices. (Hartig, 1996). All the research in this category indicates a distinct and fairly rapid recovery from stress and improved health outcomes after viewing nature scenes, or spending time in a natural setting. This is the most significant body of research in terms of convincing hospital administrators and medical staff as to the healing potential of outdoor space. However, other approaches to research provide additional supportive findings.

A number of research studies provide self-reported evidence of the significance of nature in stressed, and non-stressed, subjects. A study of 154 university students at five different US locations, found that when dealing with a situation that left them stressed, upset or depressed, 71% chose to spend time outdoors in a natural or semi-natural setting (beach, forest, park, etc.) to find solace or relief. (Francis and Cooper Marcus, 1992). In another study, 300 subjects recalled a time and place when they, or someone close to them, felt helpless, wounded or in pain, and then visualized an environment that would be healing. Every environment cited envisaged *nature* (grass, trees, water, sky, rocks, flowers, birds) as a significant healing agent. (Olds, 1985).

Since contemporary healing gardens are a relatively recent phenomena, systematic post-occupancy evaluations (POEs) of those that exist are essential in guiding the work of designers, though relatively few have so far been published. Four have been conducted by this author and a colleague in medical facilities in the San Francisco

Bay Area (Cooper Marcus, C. and M. Barnes, 1995); one has been conducted at the Children's Hospital in San Diego (Whitehouse, S., et al., 1999); one at a psychiatric facility in Canada (Perkins, N., in Chapter 6, Cooper Marcus, S. and M. Barnes, 1999); one at an urban wildlife preserve jointly used by a grade school and a medical campus (Center for Design Research, 1998); and one comparing two small community hospital gardens in Wales (Singleton, 1994). The findings of such studies are critical in our understanding of the ways in which garden environments impact garden users. The San Francisco hospital studies found, for example, that people appreciated traditional garden designs of lawns, trees, and flowers and that ninety percent of garden users experienced a positive change of mood after time spent outdoors. Responses suggested that these natural elements were critical because they represented a complete contrast to the experience of being *inside* a hospital; they stimulated several senses (sight, sound, touch, smell) and that seemed to be a precursor to a calming or centering experience. The San Diego study found that while children may be initially attracted to an unusual, colorful garden setting, when they find that there is nothing there for them to *do,* they quickly become bored and want to leave. Clearly, many more POEs are needed to fine-tune what is most appreciated and needed by the users of healing gardens, and by particular patient populations.

Finally, another important research category consists of consumer research where data is collected via surveys or focus groups across a number of health care settings. MacRae interviewed former patients differing by age, location and medical problem and found that their most widely shared preference regarding the physical environment of healthcare was for access to nature – gardens, views, balconies, indoor plants and nature pictures. (MacRae, 1997).

Of necessity, this overview of research that can justify and inform the creation of healing gardens is brief. For a fuller discussion see Chapters 2, 3 and 12 of Cooper Marcus and Barnes, 1999.

The Healing Garden: Essential design elements and environmental qualities

Significant in terms of drawing together much of the above-cited research, as well as valuable material from related fields, is Ulrich's Theory of Supportive Garden Design. (See Ulrich, R., Chapter 2, Cooper Marcus, C. and M. Barnes, 1999). In brief, this framework is based on the premise that gardens help to mitigate stress to the extent that they foster a sense of control and access to privacy; provide settings where users can gather together and experience social support; create opportunities for physical movement and exercise; and provide access to nature and other positive distractions. This theory starts to provide a structure from which designers can work in creating gardens with therapeutic benefits. The following elements and qualities are drawn from the research findings cited above, and from field observations by the author at more than 70 healthcare facilities in the US, UK, Canada and Australia.

- *Opportunities to make choices, seek privacy and experience a sense of control.*

Stress stemming from lack of control has been shown to have negative effects on immune functioning and other physiological measures among patients. (Ulrich, 1999, p. 38), and decreased job satisfaction and increased turnover among staff. In the 1980's/-90's, hospital routine and design promoted a greater sense of control in many facilities. Interviews with hospital-garden users suggest that regaining control and thus reducing stress is one of the major motivations for garden use. (Cooper Marcus and Barnes, 1995). Going outside is a means of escape. A patient reported: "It's a good escape from what they put me through. I come out here between appointments.... I feel much calmer, less stressed." (Ibid., p. 27).

For a garden to foster stress reduction by providing a sense of control, users must know it exists, be able to gain access, and use it in the ways they prefer. In addition, a garden design

needs to offer *choice* – places to be private, places to people-watch a variety of walking routes, different kinds of seating, and so on. Involving patients or residents in designing or maintaining the garden may also enhance a sense of control. (Francis, M., 1989; Hester, R.T., 1984).

• *Opportunities which encourage people to gather together and experience social support.*

A considerable body of research has shown that people who receive higher levels of social support are usually less stressed and have better health than those who are more isolated, and that higher social support improves recovery or survival rates for various medical conditions. (See Ulrich, 1999, pp. 42-43 for discussion of this literature.) Hence, a marked trend towards longer visiting hours, social-support groups, and more attractive waiting areas in many hospitals.

Studies of urban open space indicate that spending time with friends or family is often a primary motivation for use. (e.g. Driver, B.L. ad P.J. Brown, 1986; Whyte, 1980; Cooper Marcus et al., 1998). Research on healthcare gardens indicates a high proportion of use revolves around visitors, patients and staff seeking social contact in a setting which is in marked contrast to the hospital interior. (Cooper Marcus and Barnes, 1995; Singleton, 1994; Paine and Francis, 1990).

For a garden to foster opportunities for social support it needs to provide sub-spaces and seating arrangements that permit groups of two or more to sit and talk in relative privacy. A study at a Canadian psychiatric hospital found that patients and staff preferred natural, spatially enclosed settings for "talking with others." (N.H. Perkins, in Cooper Marcus, C. and M. Barnes, 1999, p. 293-304). Studies of non-healthcare open space indicate a preference for seating at the edge of a space, with protection at the back. (Cooper Marcus and Francis, 1998). In locations where cultural and ethnic groups favor visiting in large, extended family groups, sub-spaces need to be provided such that the privacy of those who wish to be alone is not intruded upon. (Cooper Marcus and Barnes, 1995).

• *Opportunities for physical movement and exercise.*

Exercise is associated with a variety of physical and psychological (i.e. stress-reduction) benefits, including improved levels of cardio-vascular health, and reduced levels of depression among adults and children. (Brannon and Feist, 1997; Koniak-Griffin, 1994). The implications for healthcare garden design include looped pathway systems offering a variety of routes; corridors with views out to nature to encourage indoor walking; rehabilitation settings with views out to nature; settings where well children can run and let off steam; walking routes for patients recovering from heart surgery labeled for distance and time; and walking or jogging routes for staff on their lunch hours.

• *Engagement with nature.*

In recent years, considerable attention has focused on the provision of what have been termed "positive distractions" in healthcare environments, including comedy (Cousins, 1983); companion animals (e.g. Friedman et al., 1980); art (Kaye and Blee, 1997); and music (e.g. Moss, 1988). The merits of *nature* as a positive distraction are supported by research as indicating that viewing nature scenes tended to reduce stress (Ulrich et al., 1991; Hartig and Evans, 1993; Hartig et al., 1996); subjects' moods in offices were more positive when plants were present (Larsen et al., 1998); viewing a fish aquarium reduced anxiety among patients waiting for dental surgery (Katcher et al., 1984); and patients recovering from gall bladder surgery who had a view into trees had fewer post-surgical complications, and needed fewer injections of strong narcotic pain drugs than matched patients viewing a brick wall. (Ulrich, 1984). These and many other studies linking a view of nature with physiological measures indicating a reduction in stress and improved health outcomes provide strong support for access to gardens and natural areas in healthcare environments.

This author contends that additional support is potentially available if we regard the phenomenon of human-nature interaction as one of "nature engagement" in addition to "natural distraction." Most existing research measuring health outcomes has involved subjects viewing nature through a window, or viewing nature scenes via slides or video. This has been necessary in order to control the variables in an experiment, and has of necessity, largely focused on sight. Insights from non-experimental evidence suggests that actually being outdoors, in a garden or natural area stimulates *all* the senses, generates experiences of the mixing of the senses, and these in turn are less "distracting" than "engaging." (Sewall, 1999; Abram, 1996).

"At some point you are seeing so intensely that you become what you see, you merge into the drop of water until the 'you' disappears. The hows and whys and wherefores disappear too. Yet when you emerge, you are somehow replenished." (Hejmadi, 1990).

Similar experiences of "merging" and replenishment – more intense, complex and multisensory than "distraction" – are noted in research on the psychology of wilderness experience, (Segal, 1998) and the experiences of people who, when depressed or upset, spend time in nature as a form of therapy or solace. (Francis and Cooper Marcus, 1991; Barnes, 1994). The fact that a large proportion of those stressed through anxiety, depression or grief *choose* to find relief in natural or quasi-natural environments, is further evidence that humans have some "inner knowing" that nature is a powerful antidote to stress.

For a healthcare garden to provide maximum therapeutic benefits, it needs to have a plentiful variety of plant materials, including species which flower at different seasons; plants or trees which attract non-threatening wildlife (birds, squirrels, butterflies); leaves or grasses which move with the lightest breeze; views to the sky and changing cloud formations; pools that reflect the sky and provide environments for fish or water lilies; elements that feature the sight and sound of moving water; and when possible, views to the horizon or to "borrowed" landscape. The garden layout should be such that walking or being pushed in a wheelchair through the garden, provides a variety of open and closed views, experiences of differing sub-spaces, even elements of positive surprise or whimsy; and for those who are seated, views of plants or trees which vary in color, texture, size and massing.

• *Visibility.*
In field visits to over 70 acute care hospitals that had usable outdoor space, only three (!) included signs to the garden in their way-finding system, or included information in printed material given to patients and staff. There are two aspects of visibility which are important. First, on entering a building, or moving along the main circulation routes, people should be able to see that a garden, courtyard, or natural area is potentially available for use. Second, as many patient rooms, waiting areas, staff rooms as possible should have visual access to a garden, natural area, or segment of "borrowed" landscape.

• *Accessibility.*
In many facilities visited, doors to outdoor spaces were kept locked to reduce use and maintenance costs, or because staff were not close enough to monitor use. Accessibility can be enhanced by ensuring that nursing stations have good visual access to gardens used by children or by frail or infirm patients; that maintenance staff understand the therapeutic value of outdoor access; and that the width and materials of pathways make them usable by people with infirmities and those using wheelchairs.

• *Sense of Security.*
Hospital patients often feel psychologically vulnerable. In addition to a garden being visible and accessible, it is essential that users feel a sense of security – both physiological and psychological – or they will not spend time there. Patients who are elderly, infirm or mobility-impaired need the reassurance of handrails, seating at frequent intervals (especially near the entry door), and pa-

ving materials that do not cause excessive glare. Patients, staff and visitors also need to feel psychologically secure: a garden space needs to feel and be safe, with some sense of enclosure and the absence of feeling that users are in a "fishbowl", being stared at. Given the stress that many experience in a hospital, the degree of comfort in a garden should be such that – if they wish – an ambulatory patient or staff on a break could comfortably close their eyes or lay down in the sunshine for a nap.

• *Physiological comfort.*
Some patients may be on medications which require that they keep out of the sun; others may fear they will get chilled sitting outdoors; some may have trouble getting up from a seated position. At the very least, a garden needs to provide for physiological comfort with *choices* of places to sit in the sun or the shade; seating that is protected from breezes by planting or structures; and bench seating which would allow someone to sprawl or lay down, as well as garden seats with arms and backs.

With the banning of smoking in most healthcare facilities, gardens and other outdoor areas are being sought out by smokers. To avoid problems associated with second-hand smoke, smokers need to be accommodated on a patio or other space separate from the garden used by non-smokers.

• *Quiet.*
If a garden is to have therapeutic value in a medical setting, it needs to be quiet – a complete contrast to the public announcements, TVs, and rattling trolleys of a hospital interior. People using the garden need to feel a sense of calm, and to be able to hear birdsong, wind chimes, or the sounds of a fountain. A study of four hospital gardens found that users were disturbed by incongruent mechanical sounds such as air conditioners and street traffic. (Cooper Marcus and Barnes, 1995). At the planning stage, it is essential that future garden spaces are located away from traffic, parking areas, delivery driveways, and helicopter landing pads. The only exception to this recommendation is the case of housing or care facilities for the well-elderly; research indicates that many prefer to sit in a "front porch" location, watching traffic, deliveries and the activity of the neighborhood. The issue here is that people come outdoors to relieve boredom rather than stress.

• *Familiarity.*
When feeling stressed, many seek environments that are familiar and comforting. A depressed person may be reluctant to leave their bed; an anxious person may seek the familiarity of home. Similarly, those in medical settings who are stressed from overwork, illness, or anxiety need to have access to garden settings which are soothing in their familiarity. This could mean an aesthetic which is rooted in the culture of the majority of patients; spaces which are human- or domestic-scaled; plants and furnishings that are familiar. These recommendations are especially important in hospices for the terminally ill and facilities for people with Alzheimer's disease.

• *Unambiguously positive design features.*
There is a human tendency when stressed to project onto nearby objects and people some of the anxiety and discomfort experienced inside. Niedenthal et al. (1994) have developed the concept of "emotional congruence" – when a person is presented with an array of environmental stimuli, those parts that match the emotional state of the viewer will most likely be the focus of attention. Thus, abstract art that is seen as interesting or challenging by a non-stressed person, may be perceived as frightening or threatening by someone in a state of anxiety. (Ulrich, 1999, p. 67-71). Hence in a setting such as a hospital, known to elevate symptoms of stress, it is essential that art, sculpture and other human-made design elements be unambiguously positive in their message. Complex abstract art which may be appropriately challenging in a museum or corporate foyer is not appropriate in a hospital. Research indicates that patients prefer familiar, re-

presentational nature or landscape themes and that patients recovering from heart surgery exposed to landscape photographs of water and trees had lower anxiety and required fewer doses of strong pain killers than those in control groups with no pictures. (Ulrich, et al., 1993). A classic case of the "wrong" kind of art occurred in a US hospital where abstract figures of birds in a courtyard were viewed with dislike and fear by cancer patients in adjacent wards, and eventually had to be removed. (Ulrich, 1999, pp. 70-71).

Design themes in existing healing gardens

Field observations of healthcare gardens in four English-speaking countries (USA, Canada, UK, and Australia) suggest that designers draw upon a variety of themes in their work. It is important to consider these, however briefly, since few existing gardens have been informed by the research-based recommendations cited above, but – to varying degrees – they *do* provide well-used, potentially therapeutic environments.

Traditional approaches used by landscape architects to design a garden or public open space include drawing on *historic precedents, domestic precedents or regional attributes, or creating an innovative "signature" design.*

In the case of healing gardens, some historic precedents are more appropriate than others; some are good approaches for certain patient populations, but not for others. The building-enclosed *courtyard,* which appears in many cultures over many centuries, is a very suitable model for all kinds of healthcare settings as long as it is large enough (and adjacent buildings low enough) to receive some sunlight and as long as the privacy of adjacent rooms is not intruded upon by people in the courtyard, or vice versa. The courtyard is an enclosed and sheltered setting; is clearly the territory of the buildings that surround it; and can be designed to be both visible and accessible from adjacent rooms or corridors. Some good, and some rather poor examples exist in UK hospitals built on the low-rise, chequerboard model.

The monastic *cloister garden* is an excellent (and rarely used) model that would be appropriate in a chronic-care or geriatric facility, with the roofed cloister forming a sheltered and secure environment from which to sit, walk and view the garden. The *English strolling garden,* with lawns, flowers, trees and winding paths is suitable in many healthcare settings since it can provide for all four of the elements of Ulrich's Theory of Supportive Garden Design – exercise, social support, privacy, and natural distractions – and is a form which is familiar in many Western cultures. It is a particularly supportive environment for staff and visitors in acute care and hospice facilities, enabling them to "get away" to an environment in complete contrast to the building interior. (A particularly good example is the garden at Trinity Hospice, London.).

The urban *park* is a suitable model, assuming the site is sufficiently large. At St. Mary's Hospital, Newport, Isle of Wight (UK) the extensive grounds double as a public park for neighboring townspeople and enfold the facility into the community. The botanical *glasshouse* or glazed atrium is a highly suitable solution for northern latitudes where cold weather precludes outdoor use for many months. (Some excellent examples in Canada include Toronto Children's Hospital, and the Royal Alexandra Hospital, Glenrose Rehabilitation Hospital, and Lynwood Convalescent Home in Edmonton). Another urban precedent – the *plaza* – is not a good model for a hospital, given that it is predominantly hard-surfaced, and usually adjacent to city streets.

Shifting out attention to domestic precedents, the *front porch/garden* and the *back garden* are very appropriate models in certain circumstances. Outdoor space with seating at a building entrance is highly valued in facilities for the elderly, and in acute care or chronic care settings where some patients appreciate being able to interact with "the outside world," and outpatients can wait to be picked up by buses or taxis in a pleasing

outdoor environment. Outdoor space modeled on the domestic back garden is particularly appropriate in a hospice facility, where visitors and patients seek privacy and solitude; and in facilities for Alzheimer's patients where a securely enclosed garden visible from a nurse's station is essential for cognitively-impaired residents. (Some particularly good examples can be found in Victoria, B.C., Canada – a city favored by retirees.).

A design based on local *regional attributes* can create an environment which is familiar and comforting as long as basic human needs are recognized. A Zen-like roof terrace at Harrison Memorial Hospital (Bremerton, WA, USA) echoes the nearby rocky shores of Puget Sound. The Leichtag Family Healing Garden at San Diego Children's Hospital presents a colorful, California beach scene, but lack of shade and greenery, and the lack of things for children to *do* renders it less than satisfactory. (Cooper Marcus and Whitehouse, 2000).

Recognition in the design fields often comes with creating innovative "signature" designs, deliberately breaking with precedent and making an artistic statement that no one has attempted before. While this is not in, and of itself, a "wrong" approach in a medical setting, the environments that have so far resulted from this model have been markedly unsuccessful in terms of fulfilling user needs. For example, parallel rough stone walls that arc up into one courtyard to disappear and re-appear in two adjacent courtyards do not provide a familiar, stress-mitigating environment. (West Dorset Hospital, UK). Tilting slabs of travertine leaning out over a rather bleak, formal courtyard at a Cancer Clinic do not create an environment for solace and repose. (Alta Bates Hospital, Herrick Campus, Berkeley, California).

The above examples were created by an artist and an architect, respectively, pointing up the importance of employing professionals who know plant materials and are trained to design gardens – that is, landscape architects. They also remind us that to use the term "healing" in the context of healthcare gardens ethically obligates the garden designer to subordinate or align his or her personal tastes to the paramount objective of creating a user-centered, supportive environment.

Another set of themes which have informed the design of healing gardens can be termed *ecological* or *botanical.* The use and labeling of medicinal plants has been used in a number of recent healing gardens. (For example, Oncology Radiation Marin General Hospital, Greenbrae, CA, USA; and the Healing Garden at Good Samaritan Hospital, Phoenix, AZ, USA). The assumption is that seeing the natural plant sources of drugs will demystify them and make treatment more acceptable. There is no research to support, or refute, this assumption.

A potentially positive approach is to design all the outdoor areas of hospitals to be ecologically sustainable, thus placing people in a setting where attention is focused on the continuing health of all living beings. The Gardens of Makahikilua at North Hawaii Community Hospital have been designed on this theme, though not yet built. (O'Neill, 1996).

Finally, some gardens have been created that draw upon knowledge of the *progression of a disease,* or on *stages in psychological healing.* Many recent gardens for Alzheimer's patients have drawn upon what is known about the stages of cognitive impairment in the development of that disease. (See chapter on "Alzheimer's Treatment Gardens" by John Zeisel and Martha Tyson in Cooper Marcus and Barnes, 1999). Some facilities for AIDS patients have used data on the effects of the disease to guide the design of outdoor space – for example, the Joel Schapner Memorial Garden at Cardinal Cook Medical Center, New York City. Finally, design of a remarkable garden at the Institute for Child and Adolescent Development, Wellesley, MA, USA, employs the use of landscape archetypes (mountain, cave, ravine, etc.) to create settings where severely traumatized children can choose their own spaces in which to do therapy.

Hopefully, more gardens in the future will draw upon existing research to inform design decisions. As Ulrich reminds us:

"Designers who succeed in creating healing gardens will usually be those who seek input form patients and staff, and assiduously utilize the available research to inform their creativity and design approach." (Ulrich, 1999, p. 30).

Conclusions

Clearly there is a need for more research. "...there is no question that the future importance of gardens in healthcare facilities will be strongly affected by the extent to which sound and credible research shows that gardens can promote improved health outcomes, foster higher patient/consumer satisfaction with healthcare providers, and be acceptably cost-effective." (Ulrich, 1999, p. 31).

The healing garden refers to both a process and a place. Discussions of such a facility are at the meeting place of medicine and design. Some of the problems involved in the successful provision of such gardens stem from the fact that the medical professions have an understanding of the internal processes of healing but little recognition of the potential contribution of the surrounding physical environment; while designers know how to manipulate the elements of place but sometimes overlook how these can affect mood and behavior.

Both professions would benefit from more research. It is critical that we learn more about the specific needs of different patient populations. Is a garden equally therapeutic for cancer patients, psychiatric patients and those recovering from heart attacks? How does a garden impact staff health and job satisfaction? Do outpatients experience benefits from waiting for appointments in indoor or outdoor gardens?

Stress in a healthcare setting may be expressed via a variety of emotional states ranging from anxiety and fear in an acute-care setting; to depression among patients with chronic illness; to burnout among healthcare staff; and boredom among nursing home residents. (Ulrich, 1999, pp. 34-35). An important area of needed research is to consider if, and how, different garden elements or forms can help alleviate different stress-related emotional states.

We need to encourage designers to work with potential garden users in a participatory design process; to annotate their garden plans with presumed health benefits; to disseminate this information to medical and maintenance staff; to work with their clients to conduct postoccupancy evaluations; and to disseminate this information to their peers.

Clearly, more research is needed, but we cannot wait until such studies are completed. The evidence we *do* have warrants continuing efforts to establish healing gardens in healthcare facilities so that users might benefit and researchers have more possibilities of assessing their benefits.

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