

RESEARCH · DESIGN  
connections

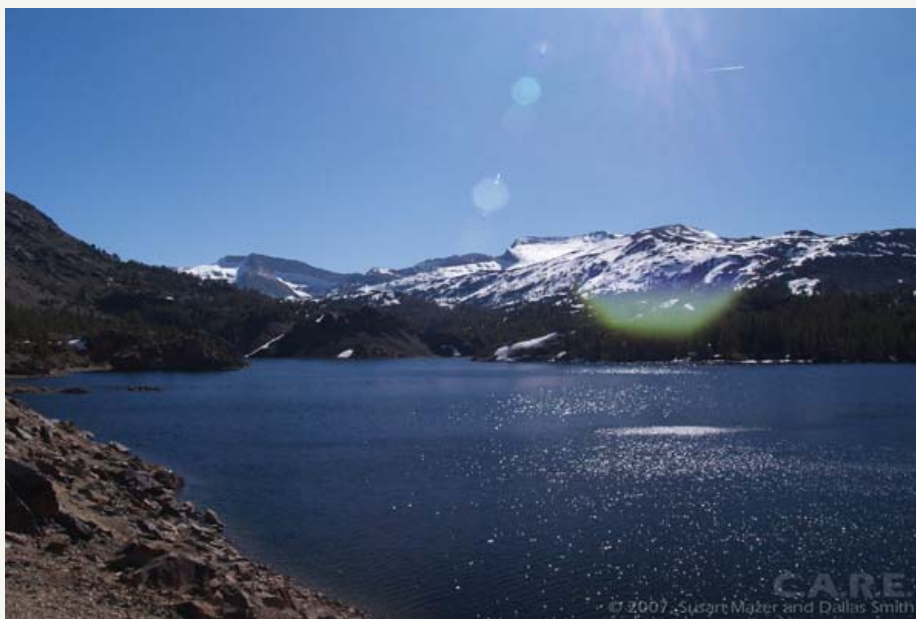
The knowledge tool to create great places

[About Us](#) [Editorial Board](#) [Top 5 Mistakes](#) [Testimonials](#) [Consulting](#) [How We Work](#) [Contact Us](#)

Visit [Wiley.com](http://Wiley.com) to save 20% on *Place Advantage* by Sally Augustin, PhD, editor of Research Design Connections. Your discount will be applied automatically upon checkout. If you do not see the discount being applied, please enter code **aff20** in the Promotion Code field and click the Apply Discount button.

[Home](#)[Login](#)[Subscribe / Renew](#)[Search the Archives](#)[Blog](#)[RSS](#)[Free Issue](#)[Home](#)

## Music and Nature at the Bedside: Part II of a Two-part Series

**Byline:** Susan E. Mazer, BM, MA, MA-HOD

Credit: Healing HealthCare Systems

Published in Issue 1, 2010

*Two sets of smoky glass doors slide open automatically, widening onto a blank corridor of sterile linoleum. The walls are nondescript, with overhead fluorescent lights and painted arrows on the floor. The sounds are a combination of crying, laughing, talking, machinery, beepers, Muzak®, loudspeakers, all mixed together with an ominous silence. Upon entering the aloneness of the hospital room, the sounds continue to intrude beyond the four visible walls. The noises are exaggerated, distorted, unending. The din coming from everywhere soon blends into the still characterless walls, never yielding to the fear it creates, enrolling all present in its relentless chorus. (Mazer, 1994)*

While the description above may not detail every modern hospital, it does portray an uncomfortable reality that patients and families fear the most. Further, it is the antithesis of a healing environment that is supportive of patient recovery bringing warmth, assurance, and comfort, along with the best medical science and clinical care. In Part I of this two-part series (in RDC 2009, Issue 4), we looked at the history of the healing environment through the writings of Florence Nightingale and then focused on the auditory environment.

“... [The] physical environment of hospitals can convey different messages.... landscape pictures, plants and comfortable chairs can convey positive messages, while sparsely decorated and run-down environments can convey negative values.” (Edvardsson, Sandman, & Rasmussen, 2006) In this article, we will look at the impact of the “characterless walls,” as they define the patient space and how nature elements mitigate some of the generic, impersonal features common to institutional care.

### Nature at the Bedside

*I have seen, in fevers (and felt, when I was a fever patient myself), the most acute suffering produced from the patient (in a hut) not being able to see out of window, and the knots in the wood being the only view. I shall never forget the rapture of fever patients over a bunch of bright-coloured flowers. I remember (in my own case) a nosegay of wild flowers being sent me, and from that moment recovery becoming more rapid. (Nightingale, 1860)*

Florence Nightingale could not have better validated studies that were to define the benefits of nature and natural

elements done over a century after she wrote her *Notes on Nursing*. She further characterized the environment of care, the “sick room” as requiring fresh air and natural sunlight, something to stimulate the mind and body, beauty as well as functionality. She was most sensitive to the need for patients to have hope symbolized in all that they saw, heard, and experienced. (Nightingale, 1860) Nightingale did not isolate nature or quiet, fresh air or warmth, cleanliness or good diet from patient care. Rather, in the middle of the 19<sup>th</sup> century, prior to penicillin and other modern drugs, the environment of care was primary care. Well integrated into daily life, “nature” was linked to Godliness and considered requisite for recovery from illness. Therefore, to not mandate and arrange for its presence was foreign to culture and practice.

Without question, the role of nature, its prominence in our daily lives and in our health, is not only undisputed, but is also well documented. Walks in the park, gardening, fresh sunlight and the smell and sound the surf, as well as birds singing...all of these are considered the best of our life experiences. To the hospitalized patient confined to a narrow bed, who is tethered to IV poles and constrained by illness and debilitation, these experiences exist only in memory, in the abstract, or as provided in some symbolic way.

Sunlight streams through the hospital window for the patient who has access to one. Of course, if the direct sunlight hits the bed, glare and uncomfortable heat could also plague that same patient. Views to nature, so clinically significant following the breakthrough study by Ulrich (1984) are availed by patients whose rooms are not on the upper floors. For those patients whose windows are far above the surrounding grounds, sky or the tops of other buildings may be the only accessible view. Furthermore, any connection to nature for a patient who cannot ambulate may be limited to potted plants removed from their natural habitat, flowers that are cut and bloom for only a few days, and photographs or videos of natural settings. The question here is, how effective is nature when it is provided in unnatural settings, in technologically dominated spaces, where actual nature is not accessible?

### **The broader background**

In a study that looked at the ways in which people feel a “connectedness to nature,” Mayer and Franz created a scale that could be used to quantify the relationship between humans and nature. (F. Stephan Mayer & Frantz, 2004) The study supported connection to nature as “an important predictor of ... subjective wellbeing.” It also saw an overlap into altruistic behavior and self-reflection. Perrin and Benassi subsequently defined what the scale measured and, as opposed to emotional connectedness, claimed that it indicated one’s cognitive beliefs. (Perrin & Benassi, 2009). In reviewing both studies, what seems more relevant is that the perception of nature as part of one’s self, life, values, or beliefs, has an impact on behavior and health.

While individuals may feel connected to nature, there is a clear distinction between what is considered “natural” and “unnatural.” Studies have revealed that natural environments were thought of as those without human interference, environments devoid of human artifacts and, as well, devoid of people. (Vining, Merrick, & Price, 2008) Within the study, Vining, et al. also asked, “What words come to mind when you think of a natural environment?” and, “What words come to mind when you think of an unnatural environment?” The responses included, respectively, beauty, serenity, calm, peaceful, pristine, tranquil, pleasing, soul satisfying, beautiful, and quiet and, on the other hand, jarring, discordant, tainted, busy, noisy, populated, and out-of-synch. While this study looked at the dichotomy between natural and unnatural on a global framework, having nothing to do with healthcare, the responses offer some insight into the attitudes and expectations that are held regarding natural settings or the symbols of nature, and the built urban industrial environment.

### **Evolutionary Theory: Biophilia**

When Edward O. Wilson came out with his evolutionary theory that posited human beings to be inherently attracted to life and all living things, it added substantially to the overall discussion regarding human beings and nature. While remaining a hypothesis, when applied to research considering how human beings respond to nature, biophilia replaced a psychological or emotional rationale with one of inherency. Nonetheless, although a welcome explanation to what could not before be explained, the direct proof that *Biophilia* is factual has not been found. Rather, the theory is used to justify or explain patterns of behavior, beliefs, and responses. (Schroeder, 2005; Kellert S, Wilson E O, 1993)

When we consider the hospitalized patient as profiled by their confinement, nature is most often provided as potted flowers, artificial plants, photographs, paintings, prints, or any other representation. Therefore, the very environment it is intending to affect, in this case, delineates nature. Ulrich et al (Roger S. Ulrich, et al., 2008) further points to the restorative impact of nature images on patient outcomes, implying some parity between real nature and mediated nature. In this case, only visual stimuli was considered, although natural experiences stimulate all the senses. And, even with this limitation, nature, whether as a symbol or icon, is therapeutic.

In its most “real” state, natural environments are multi-sensory experiences, with each sense being aroused to some degree. Flowers and plants, grass and trees have identifiable scents; the wind, birds, insects, and other creatures make sounds; the wind brushes on ones cheeks and the sunlight is warm. For the acute care patient, while the object represented, a flower, tree, or landscape, will be identifiable, the accompanying sounds or scents are more difficult to provide. For this reason, nature, whether real or simulated, actual or mediated, is actually a representation of a larger experience, providing a positive distraction and a time for reflection (F. Stephan Mayer, McPherson Frantz, Bruehlman-Senecal, & Dolliver, 2009; Roger S. Ulrich, et al., 2008)

Dijkstra points out that the exclusive or singular value of specific environmental stimuli is far more difficult to verify than the value of multiple factors working in tandem. (Dijkstra K., 2006) According to Craik’s person-environment theory that claims there is no separation between an individual and his or her environment, the senses serve to integrate the two, as to be inseparable. The role of nature can then be assumed to be even more pronounced to the patient whose sensitivities are heightened. (Salthouse & Craik, 1991)

### **Attention Restoration Theory: Critical for both staff and patients, families and visitors**

Attention Restoration Theory (ART) addresses the mental fatigue that can occur when direct attention held over long period of time causes diminished capacity. "...Attentional fatigue is a manifestation of overuse of the neural inhibitory mechanism underlying the capacity to inhibit competing stimuli." (Kaplan & Kaplan, 1982 as cited in (Tennessen & Cimprich, 1995). "The result is a lowered ability to concentrate and suppress distraction, heightened irritability, and a greater likelihood of accidents or errors in functioning." (Herzog, Chen, & Primeau, 2002), In this state, noise, discomfort, lights, or any other distraction becomes strongly intrusive, rather than mild annoyances. ART claims that a restorative environment can assist an individual in recapturing their attention ability. Given the nature of the healthcare environment and requirements for critical levels of attention, the diverse risks of attention-fatigue are relevant to this discussion.

The qualities of the restorative environment must meet four criteria: (1) It must feel like a person is being taken to another place, sufficiently different from where they normally are; (2) It must coherent, understandable; (3) It must be complex enough to be engaging, have a quality of "fascination"; and (4) It must be compatible with the individual and serve the expectations or purpose of the environment. (de Korta, Meijndersa, Sponseleeb, & IJsselsteijna, 2006; Herzog, et al., 2002; F. Stephan Mayer, et al., 2009; Tennessen & Cimprich, 1995; Roger S. Ulrich, et al., 2008)

Relevant to our discussion about nature is that these four qualities can definitively serve as standards for effectively introducing nature in the healthcare environment.

Another point of view on this topic that is worth considering is described by Schroeder (2007) as the "good gestalt," when a place or view is experienced as in the right order, having a balanced aesthetic and devoid of any detractor. This is also in keeping with the concept of the natural environment being one without human intervention or disturbance, artifacts, or incongruence.



Credit: Healing HealthCare Systems

In the picture of the Colorado River and red rock (above), the fence could be seen as a barrier, an interruption . . . which would be disturbing to the sense of place the picture represents. This perception could interrupt the restorative qualities of this pictorial view of nature.



Credit: Healing HealthCare Systems

In contrast, the picture of the garden in Sri Lanka (above) is completely devoid of human interaction and is, itself, 'nature made' as opposed to a well-groomed human-made garden. In addition, there is a depth of field that offers both complexity and accessibility, a sense of place and possibility beyond itself. The picture, as a whole, if considered a "view of nature" is wholly undisturbed, even by the photographer, who is the surrogate viewer.

However, before we move into operational issues, other studies are equally important in considering mediated, artificial, or representative nature. Hartig, et al. (Hartig, Book, Garvill, Olsson, & Garling, 1996) looked at the pictorial responses to different environments: urban/technological and natural environments. Through self-report, it was found that natural environments generated a positive emotional response. However, this was not significantly transferred to job performance or productivity, which, it was concluded, is more complex to measure.

Bringslimark et al. (Bringslimark, Hartig, & Patil 2009) point to Ulrich's psychophysiological theory, which involves stress reduction and positive emotional response, rather than attention restoration. In a review of studies looking at indoor plants, especially flowering plants, outcomes showed positive differences in reports of pain intensity and distress. However, corresponding changes in psychophysiological measures were not found.

The symbolism of flowers is long held as embedded in social and cultural practices. Bringslimark makes a strong argument in defining a clear distinction between "nature" as a multi-sensory, interactive experience and indoor plants as a passive relationship, often involving only one or two stimuli. Further, she points out that indoor plants are separated from their natural habitat, surrounded and housed by built and technological structures. Another distinction pointed out is that outdoor nature experiences involve active participation, taking a walk or hike, planting a garden, being immersed in an interactive natural setting. Indoor nature experiences, whether with a potted plant or other mediated object, are quieter experiences, involving people "... sitting quietly while taking a brief respite from work, or who may notice plants in passing as they proceed with their work, or who are receiving treatment for a health problem." (p. 430)



Credit: Healing HealthCare Systems

The pictures of the single bud (above) and single fall leaf (below) offer a point of undisturbed focus within a perceived context of their environment, a bud on its stem and the leaf on the tree. The potential for engagement and the mind perhaps adding the environment in which these single elements exist satisfies the qualities needed to be restorative.



Credit: Healing HealthCare Systems

Herzog (Herzog, et al., 2002) goes further in investigating preference and choice between what has been shown to be restorative, having what one might consider a more subtle, or softer effect, from other kinds of activities, such as entertainment or exercise. The study was complex, not only considering the variety of responses, but also considering social context. He looks at the phenomena of making choices based on “should” or “would,” an interesting factor that other studies do not consider. Herzog found that preference for nature over entertainment was influenced by the social and physical context. For example, an individual might chose nature over entertainment if he/she perceived that this choice would gain approval. This would not be unlike picking vegetables over sugar cookies if one were eating with a dentist. However, the question also remains open as to when nature is authentically preferred because of its restorative effect and entertainment set aside because of it generating strong arousal. Although Herzog does challenge the dialectic between nature and entertainment, he concludes that much more must be considered to fully understand the many factors that comprise one’s relationship to the natural world.

Relevant to the hospital environment, however, is the circumstance of “patient-hood,” being hospitalized and in an

environment so controlled by factors out of the patient's control. While Ulrich's theory of Supportive Environments (R. S. Ulrich, 1997) refers specifically to the importance of patient control, when it comes to nature elements, other than visitors sending flowers, it is the hospital that must be proactive by making decisions that will optimize the process of recovery. Going back to the "view from the window," one must be able to get to the window to see out of the window, a challenge for the most acute patients.

### Mediated Nature

"Mediated environments can...shape our "reality" and, contrary to much belief, may even constitute our "realities" of various phenomena." (Adams, 2005) This statement brings to the fore powerful options for nature at the bedside. Adams distinguishes between authentic nature, simulated nature, and televised nature. I would add to this, representative or symbolic nature. "Authentic nature" is the real thing: the places we go, the flowers that bloom in the forest, the rivers and lakes we sail-swim in. "Simulated nature," according to Adams, is nature in unnatural settings: zoos, shopping mall landscapes, botanical gardens, and the like. "Televised nature" and, for this discussion, "Representative nature," includes the Discovery Channel, National Geographic productions, documentaries about the earth, plus nature photography, art, and artificial and virtual representations of plants, flowers, rocks, whole vistas. These are *mediated nature*: natural images or figures translated into another medium.

Ulrich (1984) points to views of nature having a therapeutic effect; windows bring the outdoors indoors to some degree. John Portman, the architect who launched the "natural atrium" model in the first Hyatt Regency in Atlanta in 1967, was so successful that for guests, the "outdoors" is the lobby, the hallways and the sidewalks. Portman launched a new revolution in the experience of indoor space which, to some critics, excluded those actually on the streets. And, while the Portman innovation became well known for the glass elevators, the use of outdoor elements contributed to how the space functioned. Basically, the atrium model became self-contained and included much natural ambience as an outdoor environment. (High Museum of Art, 2009)

The "indoors" to the acute care patient, however, is limited most often to their hospital room, if not the bed in which they are hoping to recover. Regarding televised nature, not all available nature programming is therapeutic or appropriate for a highly medicated or otherwise impaired patient for whom the television takes on a profound role. Since television offers both visual and auditory information, its impact is greater than, for example, a potted plant.

Aggressive animals, reality TV depictions of hurricanes (or Tsunamis), flooding, restless oceans and fast moving rivers can be fearful, over-stimulating, and increase anxiety.

The most common use of nature in hospitals today is simulated nature, such as healing gardens, landscaping, aquariums, fountains, and mediated nature--indoor plants, artificial plants, nature pictures (photography and artwork). With the multidisciplinary research that has been forthcoming, together with the onset of evidence-based design, nature has become ever more prominent in the design of hospitals, both in architecture and interior design.

What is not discussed, however, and is an issue that I believe deserves more study -- sensory habituation. This occurs when a stimulus is repeated or is unchanging, diminishing arousal over time and exposure. Change is what stimulates; sameness desensitizes us to our surroundings. For that reason, hospital smells are most noticeable to visitors; continuous noise becomes unnoticeable to the staff; views are most attractive the first time we see them.

This phenomenon, well researched in humans from birth through death, offers several challenges when we consider what is most effective for the patient.

First, nature sounds -- to the human ear these are repetitive. They are also heard out of context to the patient who has no corresponding visual cue. They have been effective for patients who hear them with still photographs for a short period of time. (Diette, Lechtzin, Haponik, Devrotes, & Rubin, 2003) However, over a long period of time, they may become ineffective.

The use of nature sounds, first introduced in audio recordings since the New Age genre started in the late 70's, became popular in meditation recordings, and is a style of music intentionally selected to be stress reducing. However, for the immobile patient, the sounds of birds or rushing water may not be restful when they are out of context, broadcast through two-inch bedside speakers. Furthermore, in the natural setting, these sounds are hardly continuous. They vary in intensity, in quality, in location...and our attention also varies. Considering the patient who is listening through bedrail speakers or a single pillow speaker, over time, or separated from the visual context, these sounds take on a different character and, as such, may be more disconcerting than helpful.

Second, visual habituation occurs when the same view is unchanging. This can occur if the same picture is on the same wall for an extended period or if the viewer has no option of alternate views. This factor becomes meaningful not only to the patient, but to the staff whose relationship to the hospital environment is longer term and demands that they be alert and aware of where they are.

These two issues provide some interesting alternatives to consider.

### The need for Variety

"... The nerves of the sick suffer from seeing the same walls, the same ceiling, the same surroundings during a long confinement to one or two rooms. ... The effect in sickness of beautiful objects, of variety of objects, and especially of brilliancy of colour is hardly at all appreciated. ... Variety of form and brilliancy of colour in the objects presented to patients are actual means of recovery. ... You little know.... how the very walls of their sick rooms seem hung with their cares; how the ghosts of their troubles haunt their beds; how impossible it is for them to escape from a pursuing thought without some help from variety. ...A patient can just as much move his leg when it is fractured as change his thoughts when no external help from variety is given him. (Nightingale, 1860, p. 20)

Over a century after Nightingale wrote the above statement, the value of positive distractions was verified as being a solution to a negative distraction, requisite to the health of the mind and body, and included in healthcare design.

Dijkstra points out that in relationship to color, the environmental context informs preference. (Dijkstra, Pieterse, & Pruyn, 2008) The concept that the patient environment is distinct from other everyday experiences is highlighted not only by Nightingale and Dijkstra, but also by ART and the theory of Supportive Environments that both claim the degree of restorative effectiveness is relative to the acuity of the patient. Because acuity is changeable, the patient environment, including the use of nature and music, must be dynamic rather than stagnant.

### **For the patient**

Authentic nature is in constant flux: buds become flowers and then die; seasons bring on total changes in the palette of nature; the tides given dynamic changes to oceans and the winds make streams into rivers. The most obvious change is the way the sun rises and how the light changes continually until the sun sets. The use of mediated, artificial, or virtual nature must not be stagnant. Whether changing a picture or photograph or assuring that the video programs are not unduly repetitive, the value of a positive distraction based on quality and variety is well documented. (Malkin, 2003; Roger S. Ulrich, et al., 2008) A restorative environment for one or two hours, or an evening, may be a different environment if the time period for recovery is a series of days, weeks, or months.

A variety of landscapes, flowers that are changed, and sensitivity to the experience of the patient, broadens how much nature can be therapeutic and what is required over time.

### **For the Staff**

While statistically, the average patient stay is only a few days, the staff stay is far longer. Nursing, therapists, physicians, those who work in the same unit day after day, become blind to the walls and floors, no longer smell the cleaning fluid or the medicinal agents, no longer hear the HVAC system. If the staff is to benefit from nature elements, then the elements, whether a picture or a plant, need to be changed periodically to renew or re-sensitize the staff to their environment. ART is real and, for the nurses whose work is repetitive and critical, the environment needs to both stimulate and de-stress, a complex balance of two opposing responses.

### **The Art Cart**

The Art Cart, a revolving library of framed artwork including nature photography implemented by many hospitals, is effective for many reasons. First, this offers the patient a choice in what they would like to see. Second, each room changes either with a change of patient, or a change of preference. For the nurses, it is optimal to have the room environment individualized for each patient, if only in the wall art and to have the pictures be restorative.

### **About Nature and Music**

While the challenge of nature sounds has been discussed, the benefits of nature imagery with accompanying music have yet to be studied significantly. Nonetheless, there is ample research to point to the effectiveness of music and nature separately and in combination. Music that offers enough complexity and accessibility can fulfill the requirements to be a positive distraction. Because of the ways in which visual and auditory senses are integrated, the music can bring a richer multi-sensory experience with which to engage than just passive nature alone. Also, music offers an increase in pleasure and relaxation while masking other distracting sounds.

### **Conclusion**

When Nightingale wrote her *Notes on Nursing*, institutional care had become the work of religious women whose task was to save souls. This book was written for domestic care givers who, at that time, were women, wives, maids, and daughters. And, the detail Nightingale offered in ways considered today non-medical, outside of the medical domain, remain those very details that determine the experience of patients and influence their recovery.

The style of her writing was not to merely provide directions on what to do, but included the consequences of neglecting these details. The subtitle of her book was *What Nursing is and What it is Not*, appropriate and understandable regarding her consideration of the risks present when not addressing the very nature of confinement and illness.

We began, in Part I, a discussion of the environment of care in the context of history, referring not only to Nightingale, but also to the conditions that preceded her and drove her to seek a better way. Within the context of the *sick room*, we considered the auditory environment through the research regarding the therapeutic use of music and, as well, the negative effects of ambient noise.

In Part II, we have looked at the role nature plays in health and well-being specifically for the confined patient. There is nothing natural about being ill. Whether one accepts Nightingale's theory that all illness is reparative or Pasteur's Germ Theory where symptoms are related to invasive bacteria, the environment of care is not restorative unless mediated by informed design and practice.

The circumstances surrounding the hospitalized patient are unique and require due consideration regarding the details that make up the patient experience. Furthermore, while it may seem, next to the most complex and effective medical technologies, that music and nature are of little consequence, for the confined patient, for the family, for the nurse whose task it is to care for the ill, they both offer and symbolize care and healing.

*Susan E. Mazer is acknowledged as a pioneer in the use of music as environmental design. She is the President and CEO of Healing HealthCare Systems ([www.healinghealth.com](http://www.healinghealth.com)) which produces the C.A.R.E. Channel. In her work in health care, she has authored and facilitated educational training for nurses and physicians and is well published in the field of the effects of noise on patients. She can be reached at [smazer@healinghealth.com](mailto:smazer@healinghealth.com)*

*Note: All the photographs except for the Colorado River, are available for desktop downloads at [CARE Desktop images](#)*

## References

- Adams, T. E. (2005). Phenomenologically Investigating Mediated "Nature". *The Qualitative Report* 10(3), 512-532.
- Art, H. M. o. (2009). *John Portman: Art and Architecture*. Atlanta: University of Georgia Press
- Bringslimark, T. a., Hartig, T., & Patil , G. G. (2009). The psychological benefits of indoor plants: A critical review of the experimental literature a Department of Plant and Environmental Sciences, Norwegian University of Life Sciences, Box 5003, N-1432 Ås, Norway
- b Institute for Housing and Urban Research, Uppsala University, Box 785, SE-80129 Gävle, Sweden. *Journal of Environmental Psychology* 422-433, 29, 422-433.
- de Korta, Y. A. W., Meijndersa, A. L., Sponseleeb, A. A. G., & IJsselsteijna, W. A. (2006). What's wrong with virtual trees? Restoring from stress in a mediated environment. *Journal of Environmental Psychology*, 26, 309-320
- Diette, G. B., Lechtzin, N., Haponik, E., Devrotes, A., & Rubin, H. R. (2003). Distraction therapy with nature sights and sounds reduces pain during flexible bronchoscopy: a complementary approach to routine analgesia. *Chest*, 123(3), 941-948.
- Dijkstra, K., Pieterse, M. E., & Pruyn, A. T. H. (2008). Individual differences in reactions towards color in simulated healthcare environments: The role of stimulus screening ability. *Journal of Environmental Psychology*, 28(3), 268-277.
- Dijkstra K., P. M. P. A. (2006). Physical environmental stimuli that turn healthcare facilities into healing environments through psychologically mediated effects: systematic review. *Journal of Advanced Nursing*, 56(2), 166-181.
- Edvardsson, D., Sandman, P. O., & Rasmussen, B. (2006). Caring or uncaring--meanings of being in an oncology environment. *J Adv Nurs*, 55(2), 188-197.
- Hartig, T., Book, A., Garvill, J., Olsson, T., & Garling, T. (1996). Environmental influences on psychological restoration. *Scand J Psychol*, 37(4), 378-393.
- Herzog, T. R., Chen, H. C., & Primeau, J. S. (2002). Perception of the restorative potential of natural and other settings. *Journal of Environmental Psychology* (2002) 22, 295-306doi:10.1006/jevp.235, available online at <http://www.idealibrary.com>, 22, 295-306.
- Kellert S, Wilson., E O (Ed.). (1993). *The Biophilia Hypothesis* Washington, DC: Island Press.
- Malkin, J. (2 0 0 3). *The Business Case for Creating a Healing Environment*.
- Mayer, F. S., & Frantz, C. M. (2004). The connectedness to nature scale: A measure of individuals' feeling in community with nature. *Journal of Environmental Psychology*, 24(4), 503-515.
- Mayer, F. S., McPherson Frantz, C., Bruehlman-Senechal, E., & Dolliver, K. (2009). Why Is Nature Beneficial?: The Role of Connectedness to Nature. *Environment and Behavior*, 41(607-643).
- Mazer, S. E. (1994). Sing a Song for the Sick and Tense. *The Healing Journal*, 4(3), 4.
- Nightingale, F. (1860). *Notes on Nursing: What it is and What it is not* (First American Edition ed.). New York: D. Appleton & Co.
- Perrin, J. L., & Benassi, V. A. (2009). *The connectedness to nature scale: A measure of emotional connection to nature?* (Vol. 29). Amsterdam, PAYS-BAS: Elsevier.
- Salthouse, T. A., & Craik, F. T. (Eds.). (1991). *Theoretical Perspectives on Cognitive Aging*. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Schroeder, H. W. (2005). *The Meaning of "nature": Insights from cognitive linguistics* Paper presented at the Northeastern Recreation Research Symposium, Bolton Landing, NY.
- Tennessen, C. M., & Cimprich, B. (1995). Views to nature: Effects on attention. *Journal of Environmental Psychology*, 15(1), 77-85.
- Ulrich, R. S. (1984). View through a window may influence recovery from surgery. *Science*, 224(4647), 420-421.
- Ulrich, R. S. (1997). A theory of supportive design for healthcare facilities. *J Healthc Des*, 9, 3-7; discussion 21-24.
- Ulrich, R. S., Zimring, C., Zhu, X., DuBose, J., Seo, H.-B., Choi, Y.-S., et al. (2008). A Review of the Research Literature on Evidence-Based Healthcare Design (Part I). *Health Environments Research & Design*, 1(3).
- Vining, J., Merrick, M. S., & Price, E. A. (2008). The Distinction between Humans and Nature: Human Perceptions of Connectedness to Nature and Elements of the Natural and Unnatural. *Human Ecology Review*, 15(1).


[2010 - Issue 1](#) [Expert's Corner](#) [Health Care Environments](#)

[Subscribers: Click here to login and read the full story](#)

[Non-Subscribers: Click here to subscribe](#)

[Money-Back Guarantee](#) [Order Form](#) [Privacy Policy](#)

Copyright © 2009-10 Research Design Connections. All Rights Reserved.

Designed+Built by  Data-Scribe