

The physiological effects of exposure to nature

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It has been suggested that humans have a genetic predisposition for forming a close affinity with nature. It has long been established that people have a broad range of emotional and physiological responses to nature and that there are positive physical, cognitive, and psychological benefits to forming close attachments to nature. According to Ulrich (1983), experiencing nature is physiologically healthy and has biological value for people. Mayer & Frantz (2004) also established empirical evidence that connection to nature was associated with subjective wellbeing. In light of these noted effects, this review focuses on the impact that exposure to nature may have on mental health and possible explanations for the noted effects. Exposure to Nature and Mental Health Although it has been acknowledged that contact with nature has multiple physiological benefits, it has also been noted that there are specific benefits to an individual's mental health from exposure.

For example, having close contact with nature has been found to foster recovery from general mental fatigue. In addition, seeing nature is effective in relieving stress and improving wellbeing. When people view natural scenes, particularly natural scenes that depict water, human health can be improved and have a positive psychological benefit. In their research, *The Wave Nature of Being: Ultradian Rhythms and Mind-Body Communication*, Rossi and Lippincott (1992) commented: An extensive matching of the clinical-experimental data of chronobiology and psychology suggests that what the biologist calls the "entrainment of ultradian and circadian rhythms by psychosocial stimuli" is the psychobiological basis of what psychotherapists call "hypnotic suggestion to facilitate mind-body healing. There are also

noted effects on specific mental health conditions that have been found in the available research.

Ulrich commented that viewing nature effectively lowers stress. When stress is lessened, levels of stress hormones, such as norepinephrine, often are lowered as well, and this may alleviate the experienced intensity of pain". The stress-reduction theory perspective taken by several authors also supports this, suggesting that "nature reduces stress for evolutionary reasons". Types of Exposure to Nature Research indicates that forming a bond with nature does not have to be a physical activity to hold the benefit. For example, Kaplan and Kaplan (1989) found that office workers who had a view of trees and bushes from their office suffered significantly less frustration than those without such views. Research by Ulrich (1999) also suggests that looking at natural environments as opposed to urban scenes is more effective in restoration from stress. Ulrich (1983) also noted that: "When patients cannot be provided with an actual view of nature or direct contact with nature, representing nature in photographic images and other artwork has also been shown to be beneficial—though the results are not quite as dramatic.

Nature photographs and artwork of natural scenes are common in the more progressive hospitals today. Expanding on this concept is the SkyCeiling, an illuminated ceiling system that provides an illusion of an attractive sky scene that helps people relax" (p. 201). In addition, the sounds of nature have also been investigated as a means of improving mental health. Tsuchiya et al. (2003) found that playing sounds from nature to patients undergoing general anesthesia had a positive impact on blood pressure and heart rate. This then

also corresponded to reduced stress in the patient. Reasons Behind the Positive Effects of Nature on Mental Health There are numerous different explanations as to why exactly exposure to nature has such a notable impact on human mental health. Alexander et al. (1977) noted that “ In some way, which is hard to express, people are able to be more whole in the presence of nature, are able to go deeper into themselves, and are somehow able to draw sustaining energy from the life of plants and trees and water”.

Ulrich (1983) suggests that these positive benefits are largely due to evolutionary causes:

“ Because humans evolved over a long period in natural environments, we are to some extent biologically adapted to natural as opposed to building content. A theme common to this perspective is that individuals are innately predisposed to respond positively to many natural settings. Such evolutionary notions are not new”. It is also possible that it is something which is fostered in adults from an early age, for example, Kellert (2005) commented that “ children’s emotional, intellectual, and evaluative development depends on varied ongoing experiences of natural process and diversity” (p. 88).

Equalizing Brain Hemispheres

One of the most cited explanations behind the impact of nature on mental health is that of the effects which it creates to balance the left and right hemispheres of the brain. Pettigrew (see Blakeslee, 1999), an inventor of the sticky-switch idea of depression, believes that there is a sticky-switch that connects the right and left brain hemispheres, and Chowdhary (2007)

claimed that the key to brain equalization was the corpus callosum. In addition, a psychology professor, Cindy McPherson Frantz (2006) supported the idea that the balanced brain may possibly relate to well-being as per Swara yoga claims. " In our research, we demonstrate that connectedness to nature is a better predictor of environmentally friendly behavior than are attitudes. It also correlates with several health and well-being indices".

Furthermore, in his book, *Of Two Minds: The Revolutionary Science of Dual-Brain Psychology*, a neuroscientist and a medical professor from Harvard University, Schiffer (1998) commented that " a healthy left and right mind with a respectful, cooperative relationship between them can lead to a life of greater meaning, creativity, productivity, and fulfillment. Only when the relationships within yourself are in harmony are you best able to sustain a healthy relationship with another person" (p. 15). Rossi (2007) suggests that when one experiences an equal nasal dominance, our brain is in a balanced state, which could mean that our body and mind are then in a balanced state which allows them to behave in more healthful ways. Furnass (1979) commented that experience with nature can help to restore the functions of the right and left side of the brain in harmony as a whole. Yogendra (1958) also stated that the act of contemplating nature can reduce the brain's nervous system activity.

In their research, Rossi and Lippincott (1992) demonstrated the physiological link toward bi-lateral brain hemisphere activity and stated that The most significant of the[se] studies for understanding mind-body communication are those of Debra Werntz (1981) who reported a contralateral relationship between cerebral hemispheric activity (EEG) and the ultradian rhythm of the

nasal cycle. They found that relatively greater integrated EEG values in the right hemisphere are positively correlated with a predominant airflow in the left nostril and visa versa. An irregular nasal cycle, particularly one in which the person remains dominant in one nostril or the other for an excessively long period of time are associated with illness and mental disorder (Rama, Ballentine, & Ajaya, 1976). (para. 20-22) Research in support of the Swara yoga tradition believes that “nostrils are the windows to the state of our body and mind”, and “when both nostrils are open, this could mean that the body and mind are in balance and more prepared to act in mindful ways from the balanced dialogue between left and right hemispheres and a reduction in stress”. This is supported by a review by Wernts et al. (1981) which found that during the deepest states of consciousness, nostril breathing was equal, indicating a balance between both sides of the brain. Medically-based research by Ri (2008) also found that fMRI brain scans revealed that when subjects watched a nature film they experienced equal nasal dominance and also entered a state in which their brain was completely calm.

This research indicated that there was active communication through the corpus callosum between the right and left hemispheres, which shows that the film put the participants' brains into a balanced state. This supports Schiffer's (1998) theory that: “a healthy left and right mind with a respectful, cooperative relationship between them can lead to a life of greater meaning, creativity, productivity, and fulfillment. Only when the relationship within yourself is in harmony are you best able to sustain a healthy relationship with another person” (p. 15).

Physiologic/Emotional/Psychological Response

The effects which are noted on psychological well-being are actually most likely to be a result of a combination of psychological/emotional and physiological changes relating to psychological, physical, and cognitive aspects. Within only 3-5 minutes of exposure, views of vegetation or garden-like features elevate levels of positive feelings (e. g. , pleasantness, calm) and reduce negatively toned emotions such as fear, anger, and sadness. Certain nature scenes effectively sustain interest and attention and accordingly can serve as pleasant distractions that may diminish stressful thoughts. Regarding physiological manifestations of stress recovery, laboratory, and clinical investigations have found that viewing nature settings can produce significant restoration within less than 5-minutes as indicated by positive changes, for instance, in blood pressure, heart activity, muscle tension, and brain electrical activity.

Conclusions

It is apparent from the literature available that exposure to nature may have a positive impact on an individual's physical and mental health. This may result from activities that create an interaction with nature, or merely from sights and sounds of nature. The health benefits which have thus far been shown focus predominantly on stress reduction, but it is possible that the combination of physical, emotional, psychological, and cognitive effects may also have benefits for recovery across a wide range of mental health disorders. A particularly important element in the physical and psychological interaction which underlies these benefits is the manner in which experiences with nature may be able to facilitate balancing of the brain's two

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hemispheres. It would appear that experience with nature creates a state in which equal nasal dominance is initiated, which then appears to reduce brain activity, putting both brain hemispheres in a state of equal relaxation. It is this effect which then appears to create a sense of balance, which is conducive to a more positive state of mental health.

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