A New Paradigm of Design and Health

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The problem of psychosocially supportive design or healthy workplace design is one of the most mysterious and meaningful challenges for architects and designer that create our daily workplace. This paper poses the question of *healthy workplace design* the very need of human beings that spend more than 80 % of their time in man-made indoor environments.

Earlier research in environmental psychology has shown that architectural dimensions such as *stimulation* (intensity, variety, complexity, mystery, novelty, noise, light, odor, color, crowding, visual exposure, proximity to circulation, adjacencies), *coherence* (legibility, organization, thematic structure, predictability, landmark, signage, pathway configuration, distinctiveness, floor plan complexity, circulation alignment, exterior vistas), *control* (crowding, boundaries, climatic & light controls, spatial hierarchy, territoriality, symbolism, flexibility, responsiveness, privacy, depth, interconnectedness, functional distances, focal point, furniture arrangement), and *restoration* (minimal distraction, stimulus shelter, attraction, solitude) are closely linked to the perception of stress both in terms of positive and negative. The question is: Are the positive characteristics from a stress-reducing point of view, of the above mentioned architectural dimension, possible to verify and implement in current workplaces and the overall built environment?

The traditional working environment – from management systems and communication patterns to the physical layout – reflects the assumptions and thinking patterns of the past industrial era. We know that the physical and psychosocial environment has a great impact on people's motivation, creativity, state of mind and general well being. Yet, limited research is available on how the combination of workplace design factors affects health and well being in a holistic structural manner.

The physical workplace has often been controlled by the fact that the organisation of space was functional. This means the workplace functionality and its measurable qualities are of great importance while the psychosocial aspects and the individual's needs and preferences, that could become a wellness factor to promote health and reduce stress, are largely neglected.

Holistic evaluation of workplaces from a multidisciplinary perspective, considering psychosocial, physical and cultural as well as ergonomics factors

has so far been limited. Despite huge investments on workplaces and their impact, there has been a lack of evaluations and feedback. Through evaluations in an early stage we can avoid consequences of an unsuitable working environment and limit added costs for the future on both personal assets, in the form of sick days and reduced production.

Health-promoting processes are becoming much more central as factors in the creation of new healthcare facilities. In this new paradigm, the focus is on the patients: along with their physical health needs the patients' psychological and social health needs are given major emphasis in the delivery of care activities and in the design of health care environments.

Theoretical background

A salutogenetic perspective and Health

Salutogenetic is a word derived from the Latin word 'salut' that means health and well being. If the designers and architects who create our daily environments are seeking to promote "health" through environmental qualities, it is necessary that they should learn about the health and design factors that create healthy environments.

Health

The concept of health is probably as complex a phenomenon as is the concept of illness. However, there is far less theoretical foundation, comparatively less theoretically based results and fewer experiences from practical applications of health than that of illness.

As early as 400 B.C. Hippocrates and Plato described health and illness with a holistic perspective in which the body was viewed as interacting with the environment surrounding the individual. It was believed that health could be retained by man living in co-existence with nature or by living in true unity with nature and our senses (Alexandersson K, Medin J. 2000).

A generally accepted definition of Health according to WHO:

"Health is a state of complete physical, psychological and social well being; not only the absence of illness!"

State of the health is highly dependent on our lifestyle. Therefore health cannot be explained, as freedom from disease but rather as a state of balance between health process and disease processes. According to Konarski, human beings are creative, innovative and unpredictable. There are two parallel ongoing processes in our daily life; disease processes and health processes. These are composed on psychosocial factors, life style, emotion and experience, that create health processes. The placebo effect is an example of a health process. (Konarski, K. 1992, 1999).

The goal of increased public health cannot be achieved without 1. basic knowledge of the wellness factor phenomenon and 2. the understanding of how the social, mental and physical environment is shaped for public use. In reality, there is a great difference between reducing exposure to risk factors in the physical environment and increasing the amount of wellness factors within the building environment.

A risk factor is an aspect or a component of the physical or urban room/space which constitutes a physical, psychological or social risk for the individual. This in turn increases the risk for the escalation or the acceleration of the disease processes. The focus of the pathogenic perspective is to impede risk factors thereby preventing illness. Consequently, the qualities of architecture are more functionally tailored and factors affecting emotions and experiences have been set aside.

A wellness factor is an aspect or component of the physical or urban environment which may affect emotions, experiences and sometimes also behaviour in a positive manner. In other words, these wellness factors increase the probability of the strengthening health process in some groups of the population compared to other groups who lack similar preconditions.

Inviting entrance to reduce stress. Designed by Anshen and Allen.

Room for relaxation and thought. Designed by Anshen and Allen.

A salutogenetic perspective and sense of coherence,

Antonovsky has developed the term "salutongenes" that means causes of health as the opposite to "pathogens" which means causes of sickness. He therefore wanted to try and persuade individual focus from sickness to health in order to strengthen a healthy thinking. The Pathogen viewpoint questions and searches for new explanations on why some humans get sick, what risk factors contribute to sickness and how the sickness can get cured. In comparison to this, the salutogenetic perspective focuses on the origin of health, where the greatest importance is to see health as a resource. The salutogenetic interpretation asks question of why some people survive when they are faced with hardship in their life, while others do not and what factors that persuade humans to remain healthy. Antonovsky sees health as a continuum at which the individual often changes their position with a constant aim to maintain and improve their health (Antonovsky, A. 1979, 1991).

What decides where people are placed on this health continuum is the individuals feeling of connection (Sense of Coherence) in their life. Sense of Coherence is the humans overall apprehension of life depending on how ***comprehendible***, ***manageable*** and ***meaningful*** it is to them.

Comprehendible;: describes to what extent the world is experienced as understandable, in relation to both outer and inner stimuli. Experiencing unpleasant situations may be understandable and describable to a greater or lesser degree. This is the controlling component in "Sense of Coherence".

Manageable;: pertains to the experienced ability of having the resources to meet and manage surrounding stimuli. These resources may be in the form of personal qualities and individual knowledge but may also include resources outside the individual, such as human beings included in one's social network.

Place for contemplation and relaxation. Designed by Niels Torp.

Meaningful refers to the human perception that life has a meaning and that through life, when problems arise, life merits the investment of human effort or energy.

Sense of Coherence is the overall human understanding of life based on how Comprehendible, Manageable and Meaningful it is. If the individual has a good Sense of Coherence, it is easier to manage tension/stress and thereby achieve better health (Antonovsky, A. 1996). The physical environment creates the framework and the necessary conditions to support a Sense of Coherence, thereby strengthening health processes. This is explained by how the individual interprets the perception of stimuli and how one experiences one's environment.

Sense of Coherence is related to the ability to value and handle stress factors which may affect overall health. Antonovsky means that with a good feeling of connections, individuals are able to handle tensions better and therefore achieve better health.

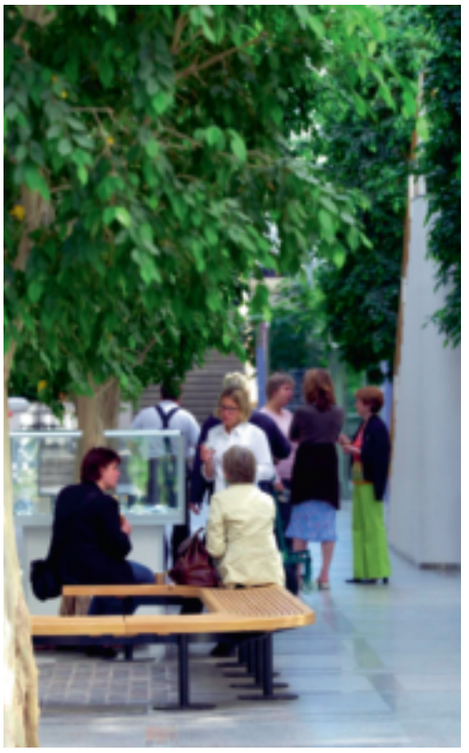
Antonovsky describes that health emerges from the human Sense of Coherence. Health and illness are seen from the perspective of a continuum where the individual often changes their position, and always strives to maintain or improve health. Life is not a simple state of being but a dynamic process in which the individual tries to understand, manage and find meaning in life.

Stress and the physical environment

Stress may be defined as a state tending to disturb our normal sensory and physical functions. It is an experience of discomfort in a situation where the basic trust of an individual is threatened. During the stressful experience, a series of biological and physiological reactions are released in the organism which in turn leads to behavioural changes of the individual. This reaction may be of shorter or longer duration depending of the individuals ability to master the experiences (De. La.Torre B. 1998).

The experience of being admitted to a hospital is a source of psychological stress, regardless of the reason for disease. Isolation from family and friends, new and unknown environments, fear of treatment and outcome, lack of control and privacy, employment or financial concerns and unavailable or lacking information can be mentioned as contributing factors of stress in the hospital setting (Dilani, A. 1998).

Humans are exposed to various demands which may lead to physiological and psychological reactions. The experience of demand, the reactions which follow and the consequences which arise are all subjective. A stress reaction may be caused by noise, cold, heat or changes in the physical environment which we cannot master or control, such as a complex physical environment made difficult in terms of orientations.



Place for social support. Designed by Niels Torp.

Landmark within the complex building facilitate orientation. Designed by Anshen and Allen.

In general the causes of stress are to work, often intensively, without time for relaxation; to have high responsibility (high demand) but without equivalent decision latitude (lack of control); inappropriate leadership and unclear goals in the organization; lack of social support and finally the lack of psychosocially supportive work environment - where people have not access to places for social interaction, contemplation, recreation, relaxation, and a place for social support (Theorell, T. 2000)

According to Levi, L. 1972, the stress theory and his theoretical model for psychosocially mediated disease, the physical environment is a point of departure that creates social organisation, structure and function in the society that leads a combined effect of psychosocial stimuli and psycho-biological programs which determines the psychological and physiological reactions. This process develops a mechanism that we call stress of each individual. This may under certain circumstances, lead to precursors of diseases and disease itself. By providing wellness factors and creating a psychosocially supportive environment can counteract the sequence of this process (Dilani, A. 2001).

Brain exposure to demands from the architectural environment

The brain has as we know, two hemispheres, each with specialized functions to some degree. The left hemisphere has functions such as logic, mathematics, attention to details, language, etc. These are often known as "rational/logical" functions. The right hemisphere has specialized functions such as seeing entirety, intuition, art, musical experiences, generating ideas and many

other holistic functions. For most humans, one or the other hemisphere is the dominant one; this is particularly the case in situations of learning or of stress. The dominant hemisphere then takes command and we have to live with the subsequent drawbacks (Emdad, R. 2002).

The brain neurons (the cells) build an inner network inside the brain which is called the neural network. These networks run our bodies, our speech, participate in our decision-making processes and carry out our decisions. These neural networks are strengthened each time we use them! For example, many adults have a strong neural network for how to drive a car. The more we drive, the stronger the neural network and the more experienced and skilled we become as drivers (IBID).

For the brain to function at full capacity, it needs nourishment. The brain utilizes 20% of the total oxygen intake, yet the weight of the brain is only 2-3% of the total body weight. Therefore it is important to breathe properly and deeply. Besides oxygen, the brain requires energy, vitamins, minerals, etc. making it stronger and more functional. Between the brain hemispheres, there is an area called Corpus Callosum', a canal in which there runs an enormous amount of cell connecting tissue. This area connects the right and the left brain hemispheres. The stronger and more developed network is in this area, the more 'whole-brained' the individual can count on being. A person which has a balanced brain where both hemispheres are equally dominating, communicating and cooperating with each other is referred to as "Wholebrained". Such a person will take an entire situation into account when encountering a problem. They have full access to logic and rational thinking, language, seeing it's entirety, ideas, creativity and emotions.

It is well known that females have a built in connective link with high transference capacity between left and right brain hemisphere functions. Since the two hemispheres in males are connected by less nerve linking tissue then in the female, the holistic ability suffers among men (B. Habib, H.1998) .

This contributes to improved preparedness for managing different types of situations at work. We can practise the integration of our brain to create more functional neural networks between the brain hemispheres.

We can with the help of experiences from the physical environment, bypass verbal barriers and reactions by shifting back and forth between the two brain hemispheres. Architectural experiences may sometimes have a surprising effect which stimulates the parts of the brain governing our emotions (Emdad, R. 2002).

In order to be creative and generate ideas, the context, i.e. the work environment, is pivotal. The process in our brain is central and is dependent on the hippocampus as the switchboard station in the limbic system. The limbic system is the "librarian of the brain" which sorts nerve impulses thereby storing them as memory and knowledge in the library of the brain. Exposure to stress affects the function of the hippocampus which may need ample time to be repaired. Damage to hippocampus complicates storage of new memory. Harmonious and inspiring buildings and environments affect the storage of information in hippocampus.

The hippocampus helps to encode memories, and then helps in finding them when you want to remember something. When you remember something, it is not like finding a picture in your brain. Instead, your brain has to construct pieces of the memory from different clues. It is easier to remember events that you had strong feeling about. The environmental quality has a strong effect on our memorizing ability as well as strengthening our memory itself (Emdad, R. 2002).

Good design will create a mental map which means we can remember architectural environments for long time in our life. Our memory will be triggered to place and design when we see a landmark or attractive design that attracts

our attention and mental process. When you visit Sydney once you will remember the building of the Sydney Opera House for all your life and you can associate the city with the architectural quality of the place.

More research into the working life, together with applying the results of the research, in order to promote health and increase the number of healthy working days. The basic function of workplaces should be to start a mental process by attracting human attention that can stop or reduce anxiety and bring about positive psychological changes. Comprehensive evaluation of workplaces is needed from a salutogenetic perspective in order to find out not only the causes of stress but also how we can implement wellness factors to strengthen the healthy processes in the working life.

The basic function of design is to challenge our minds and to start a mental process by attracting human attention. This can stop or at least reduce anxiety and can thereby bring about positive psychological changes. Psychosocially supportive working environments should challenge our mind in order to create emotion, pleasure, stimulation, creativity, satisfaction, enjoyment and admiration (Dilani, A. 2001).

Hospital stays are inherently stressful, and poor decisions can increase that stress in ways that have specific, measurable effects on patient health. Psychological results of stress on patients include feelings of helplessness, anxiety and depression. Physiological symptoms such as muscle tension, increased blood pressure and higher levels of stress hormones are common. In addition, patients may exhibit behavioural problems: emotional outbursts, sleeplessness, withdrawal, substance abuse. Any one of these can be a serious hindrance to the healing process. These same stress factors affect members of the health care staff. Studies have shown that high stress levels often result in high rates of burn-out, low job satisfaction and excessive absenteeism (Beth Frankowski, J. 1996).

Noise, whether positive or negative, is defined as environmentally-generated sound with no specific human purpose. High Noise levels have been shown to enhance patient's perception of pain, resulting in increased need for medication, and certain antibiotics can add to a patient's vulnerability. Among the elderly, broad swings in noise levels are a significant source of sleep deprivation and can cause confusion and disorientation (IBID).

Natural sounds, especially water, have a calming, relaxing effect and effectively mask other undesirable noise. Music, which stimulates the body's release of endorphins and lowers heart rates, can have similar positive results. Classical music played in operating suites has been shown to lower patient anxiety and even reduce the need for anaesthesia, while certain types of New Age music, tuned to natural body rhythms, also have significant relaxing effects (IBID).

Colour is an essential element of visual stimulation with well-documented psychological and physiological effects. Warm colours, especially when accompanied by high illumination levels, have been found to encourage activity, while cool colours promote more passive behaviour. These effects are so significant that, in Sweden, patients are assigned to hospital rooms in certain colours based on the nature of their illness; as the healing process progresses, they are moved to rooms with gradually higher levels of colour stimulation (IBID).

Colour also is vital in setting objects apart from their backgrounds. Contrasts in hue, brightness and saturation help the human eye define objects by distinguishing shapes and edges. This is an important scientific concept to bear in mind, especially when designing for those with impaired vision. Nursing homes and other facilities for the aging may require special consideration. Many of the elderly have colour-related visual problems, among them reduced sensitivity to colours at the blue end of the spectrum and less ability to distinguish between closely related colours.

Light is likewise essential to good vision, and also has proven physiological effects. In addition to its influence on the synthesis of certain vitamins, along with biochemical and hormonal body rhythms can be influenced by the amount of light exposure.

Light and colour are inherently linked, in that light temperature significantly affects colour rendering. As a result, a designer's choices can have a psychological influence, making a well person look sick or an ill person look healthier.

The elderly often have special needs, requiring up to three times the light needed by young

adults for identical activities and tasks. Improperly directed light can cause glare, however, intensifying existing vision problems and resulting in eye fatigue and loss of concentration, especially within this age group. Place for socialization and relaxation are very important factor of social support and how we can exchange the ideas during daily work.

Conclusion

Preventative work in the traditional public health field is suppressed by the increasing pathogenic orientation of the established health care system. The focus is too much on identifying risk factors, emphasizing small population groups and individuals, which are particularly vulnerable while neglecting the factors involved in maintaining good health.

Health care activities geared towards health promotion involve a shift of paradigm away from the pathogenic perspective still dominating in the health care system today. The salutogenetic perspective must replace this perspective. Modern medical science increasingly resembles the philosophy of industrialism and is in the process of changing into a "technoscience" which lacks the humanistic profile.

The alternative to this currently dominating view must shift away from the pathogen i.e. risk factors to the salutogenic i.e. wellness factors creating health in society. By mapping out the reasons why people maintain good health in spite exposure to risk factors, we build the foundation for a more health promoting view and thereby more healthy environment for our daily life.

The pattern of causality creating health consists of 50 percent **Activities within working, living, recreation and** it is estimated that the qualities of the environment surrounding us at work, in the home and in our recreational spaces make up 20 percent of health promoting conditions while the contribution of health care system only create 10 percent. The other 20 percent consist of genetic factors, which are difficult to influence (Norling, I. 2001).

More research is needed along with applied study results in order to promote health and increase life qualities by design. The concept of wellness factors should inspire planners to develop design criteria, which stimulate wellness. An increase in the consideration of wellness factors within design could have beneficial effects on well being and health processes thereby creating environments which are not only functionally efficient but also highly psychosocially supportive.

References

Alexandersson K, Medin J, 2000. Begreppen Hälsa och hälsofrämjande - en litteraturstudie, Studentlitteratur, Lund

Antonosky, A. 1979. Health, Stress and coping: new perspectives on mental and physical well-being. Jossey-Bass, San Francisco.

Antonosky, A. 1996. The salutogenetic model as a theory to guide health promotion. Health promotion international, vol. 11, no 1, pp. 11-18.

Antonosky, A. 1991. Hälsans mysterium, Narur och Kultur, Köping

Bel Habib, H. 1998. Från diagnos till dialog, Salutogenes I teori och praktisk tillämpning, Dalarnas forskningsråd. Falun.

Beth Frankowski Jones 1996. Environments that Support Healing. Design works hand in hand with the technology of healing

De. La.Torre B. 1998. "Stress" definitioner, mätmetoder, mekanismer, Karolinska Institutet, Stockholm

Dilani, A. 1998. Healthcare Building as Supportive Environments. KTH, Landstinget Härnösand.

Dilani, A. 2001. Psychosocial supportive design — Scandinavian Healthcare Design. In: Alan Dilani (2001) Design and Health-The Therapeutic Benefits of design, p. 31-38.

Dilani, A. 2000. Architecture and Design, Healthcare Buildings as Supportive Environments. World Hospitals and Health Services, IHF, Vol. 36, nr. 1.

Dilani, A. 2000. Design and Care in Hospital planning, Karolinska Institutet, Institute for Psychosocial Factors and Health, Design and Health. Stockholm.
Emdad, R. 2002. The EPOS- Emdad's Pyramid of stress (Demand, Effort, Satisfaction. Karolinska Institutet, Stockholm 2002

Konarski, K. 1999. Ideologiska överväganden, Arbetsmaterial till Nationella folkhälsokommitten (Report to National Health Committee). Kapitel 3, Karolinska Institutet, IPM. (in Swedish) Stockholm.

Konarski, K. 1992. Jordmån för ett gott liv, (Fertile soil for good life), Karolinska Institutet. (in Swedish) Stockholm.

Levi, L. 1972. Psychosocial Factors in Preventive Medicine. In background papers to Healthy People: The Surgeon General's Report on Health Promotion and Disease Prevention. Washington, D,C, US Public Health Service.

Norling, I. 2001. PNturens och trädgårdens betydelse för hälsa och livskvalitet. Göteborg botaniska trädgård. Göteborg.

Theorell, T. 2000. På jobbet, Stress ur ett Medicinsk Perspektiv (In working place, Stress from a medicine perspective). Karolinska Institute. (in Swedish) Stockholm.

Theorell, T. 2000. Hälsa på lika villkor- Nationella mål för folkhälsan. (Health for equal condition, the national goal for public health). Social department 2000:91 and Karolinska Institute. (in Swedish) Stockholm.

WHO, 1983. The principles of Quality Assurance. Euro reports and studies 94. Report of a WHO meeting in Barcelona May 17-19, 1983. Copenhagen: World Health Organization. Technical Report on Quality 1983:1.