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Mechanisms of Rehabilitation Gardens for Stress and Mental Fatigue Reduction

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Abstract

Abstract The issue of stress, mental fatigue and othe types of psychitric disordrs has gained a considerable importance in different societies because of various changes in lifestyle and the growth of modern Urbanization. According to the American Psychological Association (APA), the prevalence of anxiety between students these days is at the same level as psychiatric patients in the 1950`s. On the other hand, in the modern urbanization areas, peole are exposed to many stressors such as traffic, fear, crime and obstructive population. Therefore, the approaches toward stress reduction have been given much more attention than before. One of the most intresting methods to reduce the general stress of the patients and normal people suffering from stress is to utilize rehabilitation gardens. The gardens make use of special features to reduce the level of stress and mental fatigue in visitors without special needs for medical treatments, by getting involved in garden`s space and doing certain activities. This research aims to investigate the role, and mechanism of the rehabilitation gardens, for reduction of stress and mental fatigue. It may be concluded from the research that rehabilitation gardens cause a reduction in stress and mental fatigue through three different mechanisms, active, semi-active and passive mechanism.

Keyword: Garden Therapy, Mental Fatigue, Rehabilitation Gardens, Restoration, Stress

1.Introduction

Test Urban and modern lifestyles cause an increase in quantitative and qualitative amount of stressors in human life. Urban life structure, economical issues, social issues and … are the reasons of increase in the amount of stress that affects people. Due to the modern life approach, it is not possible to eliminate all the environmental stressors. All the factors that cause direct attention or ambiguity have stressors, so because of the importance of these factors in modern life, it is not possible to eliminate all these factors. The optimized situation is trying to rehabilitate from these stressors and controlling them. As we study the history of interaction between human and nature, we understand that human have used nature as a rehabilitating means. This fact expresses the unconscious tendency of human towards natural spaces, which is so rare in today modern cities. Rehabilitation gardens can help people through psychological rehabilitation as a space, independent from the city and provide people with their psychological needs, which is not available in urban environments.

2. Research progress

The research progress starts by defining the psychiatric disorders that can be affected through connection to nature and the plants. By defining these kinds of psychiatric disorders, it is aimed to indicate the main goals of using rehabilitation gardens for stress and mental fatigue reduction. Then, the role and the mechanism of nature is being analyzed in field of stress and mental fatigue reduction and the previous finds are discussed about the role of nature in psychiatric disorders reduction, which has many similarities with rehabilitation gardens mechanisms. By synthesizing the above mentioned information, many expected reasons that being in a rehabilitation garden cause a reduction in chronic psychiatric disorders are defined. Then based on this information and the rehabilitation gardens features three simple mechanisms are presented in order to stress and mental fatigue reduction by rehabilitation gardens.

3. Stress: what stress really is and why do we experience stress?

Many researchers believe that architecture is able to affect human health through stimulation
[1]. Stimulation by means of architecture is the amount of information in a space, that has relations to the user [2]. Human optimal function happens with moderate levels of stimulation. Absence of stimulation, insufficient stimulation and high amount of stimulation can cause a sense of distraction and deprivation. For a moderate stimulation, some architectural factors such as control, circulation, flexibility, privacy and … play key roles [1,3,4]. Stress is a dynamic process that depends on individual coping resources [1]. Feelings of

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stress, such as the feeling of being chased, harassed and of not being able to control a situation, have therefore a direct effect on pulse, blood pressure, intestinal functions, and so forth [5]. One situation that causes stress, is when there is no balance between environmental demands and person`s ability toward responding, evidently linked with psychological ill health [6] and deteriorated mental health [7]. According to busy lives in this era and the flood of information that every human faces each day, the issue of restoring from this stress faces much more difficulties and makes it harder to rehabilitate people from these psychological disorders [8,9]. The negative effects of stress can be measured in various ways, inside and out of laboratory. These methods can be classified in three categories: (1) studying the neurophysiological or bodily changes while experimenting stress, (2) behavioral and performance changes, (3) individual self-report [10]. In theory of psychology, there is a U-hypothesis relation between environment stimulators and the amount of stress people receive that effects on their performance. This means with both high and low levels of arousal causing reduced performance [11]. However, there are other theories about the relation between stress and environment, specially the discussion about attending the sounding environment. This theory declares that need of attention causes stress [12].

4. Chronic fatigue syndrome: why do we experience mental fatigue?

Mental fatigue which is known as chronic fatigue syndrome is another psychological disorders that the majority of people engage with. Chronic Fatigue Syndrome is a complex mental disorder defined by unexplained disabling fatigue as the main feature, and a combination of other symptoms such as diffuse pain, subjective cognitive, impairment and sleeping problems [13].In the last two centuries variety of names has been used to describe these signs as a mental decease, such as: Neurasthenia, Neuromyasthenia, myalgic encephalomyelitis, myalgic encephalopathy, poliomyelitis, Akureyri disease, Post viral fatigue, Chronic mononucleosis, Postexertional fatigue [14,15]. Finally, in 1994 the name, mental fatigue syndrome was chosen for this symptom, and the researchers working on the case gave a final definition for it [16]. The 1994 case definition necessitates at least 6 months of continuous fatigue; this fatigue cannot be relieved by rest, is not the result of ongoing efforts, and is associated with substantial reductions in occupational, social, and personal activities. In addition, at least four out of eight of following symptoms must occur with fatigue in a 6-month period: (1) impaired memory or concentration;
(2) sore throat; (3) tender glands; (4) aching or stiff muscles; (5) multijoint pain; (6) new headaches; (7) unrefreshing sleep; and (8) postexertional fatigue [13].

5. Direct attention and its relations with mental fatigue

One primary theory about direct attention`s effect on mental issues is presented by William James (1892) [17]. In this mentioned research, James concluded that attention toward something is either voluntary or involuntary. Voluntary attention is a kind of attention fellow with effort [16]. Although James pointed out the role of effort in voluntary attention concept, he did not point out the possibility that voluntary attention mechanism was susceptible to fatigue. Eventually, the direct research on mental fatigue and direct attention was done by Fredrick Olmsted in 1865 [17]. Fredrick Olmsted not even understood the effects of direct attention on mental fatigue, but also understood the possibility that intention to focus may cause mental fatigue. He also understood the need of urban dwellers to mental recovery in the context of nature. We can see the evidence of this approach in his design of parks and his writings as well [18]. In a research held in 1985 by some clinical neurologists, working with brain-damaged patients, a remarkably similar mechanism has been identified between these patients and direct attention [19]. They related deficts in direct attention to damage to prefrontal cortex, a portion of the brain that has long been associated with some brain`s functions such as planning [20].
According to above mentioned definitions, mechanism of fatigue caused by direct attention can be explained as:
1. Needs effort
2. Has a vital role in concentration
3. Based on a voluntary action
4.Controls distraction by avoiding attention toward some elements.
In other words, when man concentrates on something, it causes an increase in mental fatigue. The issue that increases the intense of mental disorders in the modern societies is the distinction between attractive and necessary activities. People should concentrate on necessary activities and consume energy not to be distracted by attractive activities [16].
Considering all these factors, we cannot neglect the importance of direct attention in the modern society. Having any goal can cause mental fatigue. It can be said that the value of human being is associated with having goals in life. Therefore, it can be said that working on theories about reduction of stress and mental fatigue is much more functional than eliminating these factors [17].

6. Mental effects of nature versus mental effects of urban spaces

Some people may define their relation with natural environments in urban spaces as a romantic anti-urban approach, but many psychological researches indicate that, interaction with nature causes mental restoration

and optimize function of brain [21]. Researches on restorative spaces also imply that combining natural and urban spaces is not only a romantic approach but an action to optimize the psychological factors of space [9]. According to a report by health council of the Netherlands, interaction with natural spaces has much more positive effects on stress and mental fatigue than interaction with urban spaces [22]. There are also many self-reports by the people living in urban spaces about the effect of interaction between nature and the city. Many people living in urbanized societies believe that interaction with nature cause a reduction in their stress levels and has benefits for their mental health [21]. For instance, in a nationwide survey among population of the Netherlands, 95% of the respondents acknowledged that they believed that nature can cause relieving from stress [23]. People also believe that stress reduction through nature is related to the people`s motivation for entering the nature. A research indicates that stress reduction, cleaning the mind and being away from routine life are the main purposes of people for interacting with nature. All these motivations are related to mental rehabilitation [24]. There is also a research, studying the amount of referring to doctors in two separate groups. One group living in a residential complex with high green space and the other group living in a residential complex with no green space. According to the above mentioned research, people living in residential complexes with green space had less referring to doctors [25,26]. These health benefits of green space were found not only in spaces close to homes, but also in spaces in 1-3 kilometers further away [21]. Mental rehabilitation effects, explains the potential of landscape in therapy and reduction of mental fatigue caused by direct attention and other stressors. Direct contact with natural elements and watching nature can cause mental rehabilitation [27,28]. These signs of mental rehabilitations can be measured with variety of vital signs such as blood pressure, heart rate, behavioral reactions (in the day of visit), awareness toward environment (based on self report) and other parameters. The research not only indicates the positive effects of nature on mental health but also the negative mental effects of usual urban areas [29]. Some researches are based on specific statistical population such as kids [30,31], and people under mental pressures [32,33]. Due to the above mentioned researches` conclusions, it can be inferred that human still born with an unconscious tendency toward natural environments that is inherited from their ancestors. This tendency also can be found in people, living most of their lives in cities [21]. There is also another parameter in addition to visual effects of nature on mental health, called soundscape. Researches on soundscapes indicate that natural sounds are defined as pleasure sound and usual urban sounds are defined as noise [34,35]. Therefor, it may be concluded that nature sound has positive effects on mental health as well as its visual aspects and participating in nature [36]. Roger Ulrich used videotapes of urban and nature environments, which included sound to measure participants' amount of stress. However, Ulrich did not significantly analyze the effect of sound on participants, but the urban videos he used, had a considerable mental pressure on participants [37]. Finally, Joseph Alvarsson`s research on effects of urban and nature`s sound, concluded that mental rehabilitation after experimenting mental stress is much more faster with natural sound than urban sound, or high intensity sound [36].

7. Design Principles of Rehabilitation Gardens

The design principles of rehabilitation gardens are highly dependent on user groups. In designing rehabilitation gardens, the people play a focal point and also there should be a balance between different kinds of activities and experiences in rehabilitation gardens so the users experience all the three mechanisms in order to stress and mental fatigue reduction.

These are the principles that should be considered while designing a rehabilitation garden:

7.1 Feeling of security

Healing gardens should provide a feeling of security and safety. By being fenced off and safe, they could offer psychological peace and space for relaxation.

7.2 Understanding user groups and their needs

Understanding how people see their surroundings and how they react to it, is one of the most crucial factors of therapeutic design, in another word what individuals observe and how they interpret it. "Sound, sight and smell in the environment are external stimuli that are directly identified by the conscious mind".

7.3 Offering different types of activities

In healing gardens, paying attention to the need of different types of communication is crucial. One type can relate to demanding environment. For instance, ponds or water can be the least demanding part or cultivation in garden can be considered as the most demanding.

7.4 Different rooms

It is important that the garden has different rooms with different characters. Research shows that gardens or parks should have some specific characters in order to be visited by the users. Healing garden must be able to communicate with the visitors on many levels through sight, smell, hearing etc [5].

7.5 Basic characteristics for rest and activity

It is believed that there are some basic features in our environment which give quality to it and this quality

affects the environment which makes it more attractive or unattractive.

These are eight characteristics, which have been claimed by Patrik Grahn in 1991, that are connected to the idea of how environment can have a restorative effect on visitors.

1. Serene: The place is characterized by peace and silence. There is no rubbish, weeds or disturbing people. Sounds derived from wind, water, birds or insects.
2. Wild: The place is fascinated by wild nature. Plants seems to be self-sown, rocks are lichened and mossed.
3. Rich in species: In this environment, you can experience a variety of different species, both plants and animals.
4. Space: There is a feeling of entering to another world, which is associated with a whole, like a beech forest.
5. The common: It is an open green field that invites you to stay and provides vistas and views.
6. The pleasure garden: The place is a refuge, which is enclosed, safe and secluded. There are opportunities to be with yourself and experience or play as well.
7. Festive: It is a meeting place for social activities and festivity.
8. Culture: A historical place which offers fascination with course of time.

8. Experiments and Results of using Rehabilitation Gardens

The conventional use of garden as a healthcare instrument began with horticultural therapy as a part of occupation therapy during 1950s [38]. Many activities in horticultural therapy such as gardening, raking leaves, sowing seeds and weeds are assumed to have a curative effect [37,39]. It draws on Keilhofner`s theory on importance of essence of activity with an emphasis on meaningful and enjoyable task [40].Relf finally describes the mental rehabilitation mechanism of working in a context of garden in four distinct dimensions [41]:

1. The beauty of nature with seasonal changes and a multitude of life-forms which fascinates, relaxes and puts worries in life into perspective.
2. The dependence on nature and cultivation of it, supporting the ecosystems of the planet.
3. The nurturing of plants and attendance to their growth, which creates a feeling of affinity with nature.
4. Achieving contiguity with other people through the sharing of experiences such as cultivation and harvesting [42,43]. First being in nature cause the sense of being away from routine life, which demands direct attention. In addition, natural environments contain many favorable pleasing stimuli which encourage and spirits, the garden should have various places to encompass these different needs [44]. The reason this factor is not in active or passive classification, is that the participants rather them based on environment process of exploration and sense making, and these attract and hold a person`s attention effortlessly. This quality is called soft fascination. Furthermore, the natural environments cause a sense of extend, due to coherence in experience of environment and scope for continued exploration. Finally, experiences in natural environments involve a high degree of compatibility (what the person wants to do in environment matches well with the environment affords and what the environment requires [21]. Landscape Design may offer opportunities to combat stress by providing rest, recovery, or contemplation [2]. Taking into account all the above mentioned facts it can be inferred that rehabilitation gardens use three mechanisms for stress and mental fatigue reduction, namely Active, Semi-Active, Passive mechanism. These factors are in conformity with factors given by Ana Adevi which are (1) sensory impressions (2) self-chosen places in garden, and (3) interactions between concrete and symbolic activities [44].

8-1- Sensory Impressions (Passive effects)

Sensory Impressions are passive mechanism reducing stress and mental fatigue. According to one the employees of Alnrap rehabilitation garden in Ana Adevi`s research, there is a depth to nature and trees that she did not understand before starting to work in there. It was not clear to her but she could feel it [44]. This feeling is based on unconscious impression. We discussed before about mental effects of nature, which is not based on doing any activity but the effect of environment on soul.

8-2- Self-chosen places (Semi-Active effects)

Some places in the environment find a specific meaning for participants, such as “their place”, “favorite place” or “the only place” for a certain type of activity [45,46]. The second aspect is the relation between participant and the place, the effort toward understanding the environment. This part has some participation with the sensory impressions, that is finding self-chosen places depending on individual needs and sprits. Not only in therapy procedure, but after the therapy self-chosen places have mental effects on participants [44]. These places attract people at the moment of confronting, not only based on their routine spirits but based on their instantaneous spirits [47]. Places that people choose as the appropriate places have many diversities; one prefers to sit on a chair, under the shadow of a tree, while the other prefers to walk around the garden. Even in some cases the participants changed their favorite place and activity because of a fascinating object such as an animal, like a cat. Therefore, according to a variety of human needs atmosphere, individual sprits and facilities of the environment, So the quiddity of an activity has the same value as the unconscious understandings of the environment.

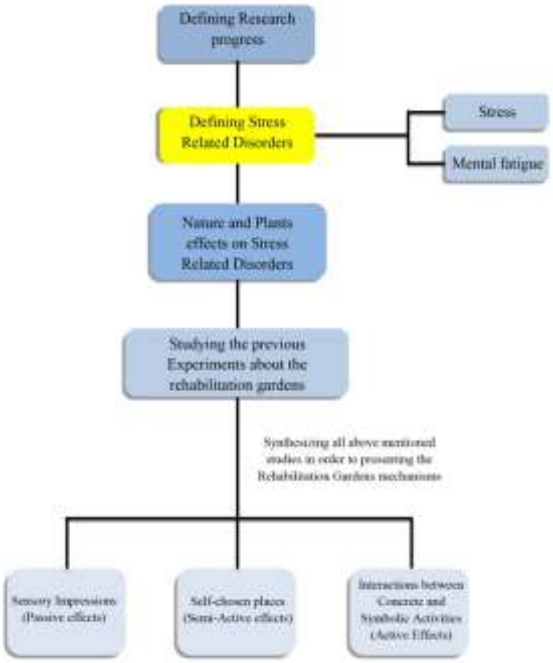
8-3- Interactions between Concrete and Symbolic Activities (Active Effects)

Concrete and symbolic activities are separated from each other through the path toward the target and variety of achievements through the activity. Concrete activities are the activities in which the man know the exact path and search for a certain aim. Symbolic activities are the activities having an ambiguity in both aim and the path. According to Baum in 1997, a person should balance between symbolic and concrete activities to have a positive feeling [48]. Although it is not possible to control the balance precisely, but the point is the interaction between these activities which may cause the sense of freedom and is the key role about it [44]. People experience an activity as pleasurable when there is a balance between challenge and skill [49] and the balance between concrete and symbolic activities make it possible to choose the amount of skill and challenge based on their own abilities.

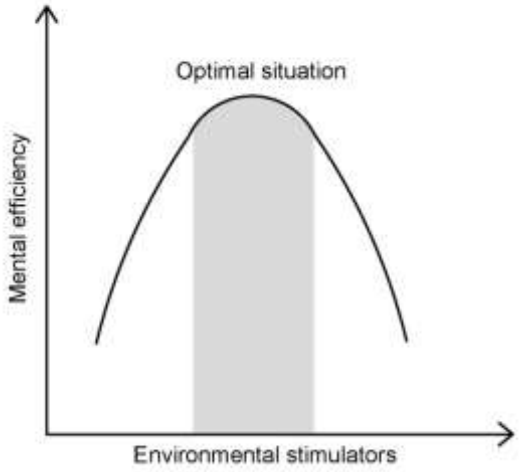
9. Alnarp Rehabilitation Garden

Alnarp Rehabilitation Garden has been laid out at the Swedish University of Agricultural Sciences in 2002.The garden was purposed to be a healing garden. The concept of the garden is supported by different theories related to the Healing Garden School, the Horticultural Therapy School and Cognitive School. The healing garden at Alnarp was meant to serve several purposes.

It will offer horticultural therapy programs for people who are diagnosed as burnout diseases. An interdisciplinary research program and studies on how the garden functions for these people will be provided. Scientists are allowed to test design hypothesis as well as different types of horticultural therapeutic programs. At the end it can be study object for students. The treatment team consists of two horticultural therapists, one landscape architect, one occupational therapist and one physiotherapist and one anthroposophic medical pedagogue. Two days a week one physiotherapist and one psychotherapist are also available there. Every patient has a doctor responsible for them. The participants must suffer from a type of disease which has been diagnosed as fatigue-depression-related, STFR (stress-triggered fatigue reaction), burnout syndrome and/or pain in the back or in the head [5,50].
In Alnarp, there are three objectives have led to the design different rooms. These objectives are based on research and demands of the participants. First objective is more demanding and the focus is on cultivation and horticultural therapy. The second one is less demanding and concentrates on nature and restorative functions. The last is the rooms introduced by Instorative/Cognitive School. There are some parts that work as transitory between demanding and non-demanding rooms [5,50].



Fiq 1: Research progress



Fiq2: the relation between mental efficiency and environmental stimulators

Fiq3: The part of brain that its damage has similar feelings as direct attention

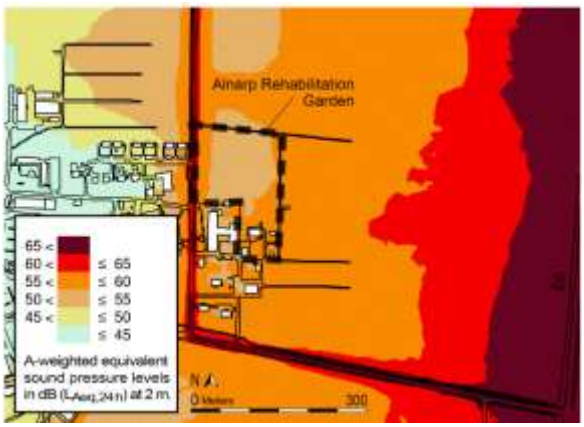


Fig4: Noise map, illustrating A-weighted equivalent sound pressure levels in dB (LAeq, 24 h), in and around the garden. Calculations are for 2 m above ground level and include all state- and municipal roads. The map was extracted from a noise survey commissioned by the Lomma municipality.

Fiq5: Appropriate places for different activities

Fiq6: Alnrap Rehabilitation garden

Conclusions

In brief, several conclusions may be drawn from the results of the current systematic review. First, mental fatigue and stress expansion is inevitable because of many factors such as growth of urbanization, lack of green space, expansion of activities that need so much direct attention and… , therefore, not only we should consider changing our lifestyles, but also finding new rehabilitators for these psychiatric disorders. Second, nature has much more rehabilitating characteristics over urban spaces and lack of nature in urban spaces is one of the reasons of expansion of stress and mental fatigue. Third, rehabilitation gardens are one of the remedies that may help us to reduce our stress and mental fatigue through three different mechanisms; active, semi-active and passive. These different mechanisms are usually based on the type of the action and the accommodation of patience in the garden. However, this method is seems to be useful for mental rehabilitation but improving the urban spaces not to cause so much environmental pressure is a priority compared to using rehabilitation gardens.

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