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Relationship between perceived sensory dimensions and stress restoration in care settings

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ABSTRACT

Through research, particular kinds of natural environments are recognized aiming at the restoration and improvement of mental health. However, there is little known about the association between the characteristics of natural restorative environments introduced as perceived sensory dimensions (PSDs) and stress recovery achieved by restorative experience of the environment. To bridge this gap, a visual assessment was developed and distributed as part of a survey to students of Golestan University in Gorgan, Iran, as a result of which a total number of 124 completed responses were collected and analyzed. Measures included components of PSDs (i.e. Nature, Culture, Prospect, Social, Space, Rich in species, Refuge, and Serene), and Short Revised Restoration Scale (SRRS, which covers four dimensions as stress responses: emotion, physiology, cognition, and behavior). Asked to complete a questionnaire, participants were required to evaluate the restorative potential of eight PSDs, all depicted on images as a photo-questionnaire, in terms of stress restoration. The results confirm that PSDs are comprised of eight components. Moreover, Serene, Nature, and Refuge were identified as the three most important PSDs resulting in stress restoration. Also, findings indicated the negative the impact of Rich in species and Social on restoration. Therefore, the combination of Serene, Nature, and Refuge together with the absence of Rich in species and Social create an environment offering stress restoration. These findings add to the knowledge on the properties of restorative environments through an objective description of the potentially health-promoting quality, helping to utilize them as inspiration in the design of natural restorative environments in the context of care settings.

1. Introduction

Recently, stress has received significant attention and Disorders Specifically Associated with Stress have appeared in the chapter on Mental and Behavioral Disorders of Eleventh Revision of International Classification of Diseases (ICD-11). Despite the fact that stress is not considered as a disease, it has been identified as a risk factor for developing illnesses including coronary heart disease, type II diabetes, and depression (Aldwin, 2007). Also, it is considered as a major cause of premature death (Nielsen et al., 2008). Sustained stress, even at low levels, can add to the risk of disease and influence the immune response (Glaser et al., 2000).

Although restorative reactions happen in bodily systems and some clinical preventions are effective, restoration could be achieved by surrounding settings (Han, 2003). Natural environments are considered an important therapeutic factor in various kinds of rehabilitation (Annerstedt and Wahrborg, 2011). Based on restoration theories of Attention Restoration Theory (ART; Kaplan and Kaplan, 1989) and Stress Reduction Theory (SRT; Ulrich, 1983), studies have attempted to introduce properties of restorative environments. Recently, researchers identified eight Perceived Sensory Dimensions (PSDs) of nature that have been categorized according to their perceived and experienced qualities (Grahn and Stigsdotter, 2010).

To evaluate the restorativeness of PSDs or other properties of the natural environment, most studies have measured stress through individuals' Level of Stress (LS; Grahn and Stigsdotter, 2003) or Perceived Stress Scale (PSS; Cohen et al., 1983). These scales categorize individuals into groups of stressed and non-stressed individuals through determining the amount of stress they experience, which offers the opportunity to compare the preferences of the two groups. Other studies focusing on directed attention fatigue have applied Perceived Restorative Scale (PRS, Hartig et al., 1997) which, as proposed by ART, consists of four restorative components. However, little is known about the association between the characteristics of natural restorative environments which are introduced as PSDs, and stress recovery achieved by restorative experience of the environment.

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Therefore, this study attempts to determine the essential elements of successful restorative environments, exclusively those located in care settings, based on integrating both the Kaplan (1989) and Ulrich (1983) theories of restorative environments and through exploring the relationship between PSDs and Short Revised Restoration Scale (SRRS). SRRS is designed to evaluate the restorative potential of designs of existing and proposed settings and, covering the four dimensions of stress responses (emotion, physiology, cognition, and behavior), adopts a slightly broader notion of restoration through integrating the theories proposed by both Kaplan and Kaplan (1989) and Ulrich (1983).

1.1. Theories supporting the restorativeness of natural environments

The positive effects of contact with nature on human health, which is recognized as "restoration", are discussed by two theories: ART (Kaplan et al., 1989), SRT (Ulrich, 1983). These theories complement one another (Berto, 2014). ART is about cognitive restoration from directed attention fatigue while SRT is about affective restoration from stress.

ART, which emphasizes on the cognitive aspect of nature experience, is drawn upon past research (James, 1892), dividing attention into two components: involuntary attention, where attention is captured by inherent or important stimuli, and voluntary or directed attention, where attention is directed by demanding cognitive processes. Fascination is considered a key process in restoration according to ART and is defined as effortless interest-driven attention (Berto, 2011). The need for directed attention in natural environments is minimized and the exhaustion of directed attention can be restored by rest as soft fascination in the context of natural environments. Therefore, ART identifies directed attention as the cognitive mechanism that is restored by interactions with nature (Kaplan, 1996, 2001). Later, many studies investigated perceived restorativeness of different settings and supported the role of natural settings in a restorative environment (e.g Ivarsson and Hagerhall, 2008; Carrus et al., 2015; Wilkie and Clouston, 2015).

SRT underscores the affective impact of nature experience (Ulrich, 1983). Ulrich claims that restoration is derived from the reduction of stress instead of replenishment of directed attentional fatigue. His theory encompasses a wide range of diverse emotional and physiological as well as cognitive responses to explain and predict the restorative potential of the environment on human beings (Parsons, 1991). Therefore, Ulrich's theory focuses on physical settings which facilitate recovery from any kind of stress. It is hypothesized that scenes that immediately evoke feelings of mild to moderate interest, pleasure, and calm are effective in stress restoration (Hartig et al., 1996). Ulrich believed that stress is a process recognized as a psychological, physiological, and behavioral response to a situation that is against the individual's health. Accordingly, nature scenes, through activating the parasympathetic nervous system, reduce stress and autonomic arousal originated from the innate connection of man-kind to the natural surroundings.

1.2. Perceived sensory dimensions (PSDs)

Over the past 30 years a number of methods for mapping recreational and social values of urban and peri-urban green spaces have been developed for achieving better place-based outcomes in urban green spaces and open spaces (Lindholst et al., 2015). Recreation Opportunity Spectrum (ROS), which was developed in the United States during the 1970s (Driver et al., 1987), has attempted to distinguish one type of recreation opportunity from another in terms of activities, specific experiences, and setting attributes. Actually, the ROS framework divides the possible recreational experiences into a spectrum of experiences that corresponds with different settings which are labelled as within a range from primitive proceedings towards more anthropocentric-dominated settings (Driver et al., 1987). These settings have been characterized in terms of physical, social, and managerial attributes. Later, as (Lindholst et al., 2015) claims, Park Character Analysis (PCA), a mapping method for classifying and evaluating individual green spaces, was developed. PCA is based on various pre-defined characteristics some of the aspects of which greatly resemble the Recreation Opportunity Spectrum (ROS) in earlier steps. Grahn et al. (2005) suggested that human's perception or experience of recreational qualities in urban green spaces can be captured by a range of 'experienced dimensions' or what Grahn and Stigsdotter (2010) later referred to as Perceived Sensory Dimensions (PSDs). Moreover, PSDs are drawn from Supportive Environment Theory (SET; Grahn, 1991; Grahn et al., 2010) which explains the relationship between the individual's mental strength and the requirement for supportive environments.

As Lindholst et al. (2015) claims, PSDs are revealed from a number of interview studies conducted between 1985 and 2012 on human well-being and restoration. Basically, there are three generations of PSDs inaugurated by Grahn and Sorte (1985), Berggren-Bärring and Grahn (1995), and Grahn and Stigsdotter (2010). According to Grahn and Stigsdotter (2010) eight certain characteristics which were believed to have salutogenic impacts were introduced as PSDs through exploratory factor analysis (Grahn and Stigsdotter, 2010). Consequently, PSDs include eight characteristics of restorative environment providing a wide range of different experiences that support people mentally and physically in their everyday life. These eight components include: Serene (a peaceful, silent, safe and secure place), Nature (wild nature not created by humans), Rich in species (a room offering a variety of animals and plants), Space (a nature room offering a feeling of entering another world), Prospect (a view that invites you to stay), Refuge (a safe and secluded place where you can relax), Social (a social arena or meeting place) and Culture (a place with evidence of people's values, beliefs, efforts, and toils).

Some of the eight dimensions are associated with theories concerning the evolutionary origin (Adevi and Grahn, 2012). For example, Prospect and Refuge refer to the need for survival of humankind to live in vast areas with the possibility to detect and hide from threats (Appleton, 1975), Rich in species refers to the biophilia hypothesis (Wilson, 1984), Nature refers to a restorative setting offering a non-demanding fascinating environment with low to no presence of human activities (Herzog et al., 1997), and Space refers to an innate tendency to find a large coherent nature environment where one feels one is stepping into another world (Kaplan and Kaplan, 1989). These eight dimensions manifest themselves through many different sensations. It is believed that these eight dimensions provide a basic foundation through providing desirable natural qualities, positive distraction, and privacy along with encouraging physical exercise and enhancing social support.

1.3. Related studies on PSDs

With regard to PSDs and preferences, there is a piece of evidence putting forth Serene and Space as the most preferred PSDs among inhabitants in nine Swedish cities (Grahn and Stigsdotter, 2010). Moreover, another research on preferences regarding PSDs in China and Russia showed that despite cultural and historical differences, great similarities were found in people's desires for environmental outdoor properties, with Serene, Nature and Refuge being the most preferred affordances (Skärbäck et al., 2015). Also, employing PRS, a study indicated that users with an average level of stress prefer the PSDs of Social and Serene while for the stressed individuals Nature as well as Social and Serene constitute preferred PSDs (Peschardt, 2014).

In several studies, certain PSDs have been found to be associated with a positive effect on health. For example, one study revealed that availability of five of the PSDs (Serene, Nature, Rich in species, Space, and Culture) act as a motive to encourage people to do physical exercise (Björk et al., 2008) and result in health promotion. Moreover, Annerstedt et al. (2012) claims that having access to Serene and Space