



Research Paper

Forest design for mental health promotion—Using perceived sensory dimensions to elicit restorative responses



Ulrika Karlsson Stigsdotter^a, Sus Sola Corazon^{a,*}, Ulrik Sidenius^a, Anne Dahl Refshauge^b, Patrik Grahn^c

^a Department of Geoscience and Natural Resource Management, University of Copenhagen, Denmark

^b Municipality of Copenhagen, Denmark

^c Department of Work Science, Business Economics and Environmental Psychology, Swedish University of Agricultural Sciences, Sweden

HIGHLIGHTS

- The spatial dimensions of the environment influence the experience of restoration.
- The environment should have a balance between enclosed areas and open views.
- A natural and wild appearance of the forest with diverse vegetation is preferred.
- Memories and associations play an important role in restoration.
- The findings validate the PSDs most preferred for restoration.

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ABSTRACT

At present, research within health promoting environments is dominated by a focus on the difference between the urban and the natural environment. However, little knowledge exists regarding which qualities within the natural environment promote restoration.

The aim of the paper is to identify which qualities and perceived sensory dimensions (PSD) of a forest environment are psychologically restorative.

The research consists of 26 participants' ratings and experiences of psychological restoration in a forest environment called the Health Forest Octovia[®], which consists of eight different rooms designed according to previous research on PSDs, where each room represents one of the PSDs. The participants rated the restorativeness of the rooms on a scale and they were interviewed about their experiences. The interviews were analyzed by an interpretative phenomenological analysis (IPA).

The results from the rating exercise show that the rooms where the PSDs serene, rich in species, refuge and nature are dominant are rated highest with regards to restoration, which supports the previous research on the subject. Further, the findings from the IPA indicate that the spatial aspects are important for the experience of restoration. An environment which includes diverse vegetation and balances enclosed dense growth with more open views is regarded as being optimal for restoration. The dense growth should have the appearance of a den and offer experiences of privacy.

The results validate the potential for using the PSDs as guidelines for designing health-promoting natural environments.

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1. Introduction

1.1. Health promoting natural environments

There is a growing political interest in promoting natural environments for public health as part of creating sustainable cities (European Commission, 2014; World Health Organisation, 2006). Research which supports the positive effect of interacting with

* Corresponding author at: University of Copenhagen, Department of Geosciences and Natural Resource Management, Rolighedsvej 23, 1958 Frederiksberg C, Denmark.

E-mail address: sus.corazon@gmail.com (S.S. Corazon).

natural environments in relation to mental and physical health promotion is also accumulating (Bratman, Hamilson & Daily, 2015; Bowler, Buyung-Ali, Knight, & Pullin, 2010; Nilsson et al., 2011). When it comes to environmental preferences with regards to stress restoration, natural environments are also, not surprisingly, preferred over built environments in a number of studies (Hartig & Staats, 2006; Staats, Kieviet, & Hartig, 2003; van den Berg, Koole, & van der Wulp, 2003).

However, not all natural environments are equally restorative (Herzog, Maguire, & Nebel, 2003) or appropriate for different users (Cooper Marcus & Sachs, 2014). But only few studies have investigated the restorative effect of different green environments or features within the environment (e.g. Grahn & Stigsdotter, 2010; Tyrväinen et al., 2014; Wang, Rodiek, Wu, Chen, & Li, 2016). At present, studies on health promoting environments are dominated by research focusing on the difference between the urban and the natural environment (Hartig & Staats, 2003; Staats, Jahncke, Herzog, & Hartig, 2016), or distance and access to natural environments (e.g. Annerstedt van den Bosch et al., 2016). Therefore, less is known about which qualities of the natural environment promote mental health.

1.2. Health-promoting forest environments

Focusing not only on natural environments, but specifically on forests is a relatively new, but growing area within the research field of health promoting natural environments (Meyer & Bürger-Arndt, 2014; Nielsen & Nilsson, 2007). An important European initiative in this area was the COST Action E39 from 2004 to 2008 (Nilsson et al., 2011), in which 25 countries participated. At present, the research field is dominated by Asian studies, which use the term “forest bathing” to refer to taking in the forest atmosphere (e.g. Park, Tsunetsugu, Kasetanni, Kagawa, & Kiyazaki, 2010). The Asian studies include a large number of forest environments, but do not distinguish between the different qualities of forests (e.g. Li et al., 2011; Park et al., 2010; Song et al., 2013). A few studies have investigated the different qualities of forest environments with regards to the influence of different managed forest types (Martens, Gutscher, & Bauer, 2011), forest stand density (An, Kim, Jeon, & Setsu, 2004) and vegetation type (Annerstedt et al., 2010).

Still there is a need to improve our understanding of the specific qualities underlying the restorative potential of forest environments and natural environments in general in order to identify and develop these environments further to eventually become a resource for health promotion.

1.3. Perceived sensory dimensions

The research studying different restorative qualities within the natural environment has its offspring in the Attention Restoration Theory (ART), which was developed by the psychologists Rachel and Steven Kaplan in the 1980s (Kaplan & Kaplan, 1989). According to ART, the capacity of an environment to facilitate the feeling of being away, extent, fascination and compatibility is crucial if restoration is to occur (ibid). Some attempts have been made since the development of the ART theory to further classify and describe experiences in natural environments (Grahn, Stigsdotter, & Berggren-Barring, 2005; Maikov, Bill, & Sepp, 2008; Van Herzele & Wiedemann, 2003). Building on this existing research, the latest attempt to categorize sensory experiences in environments was by the landscape architects, Grahn & Stigsdotter (2010). Based on a representative sample of the Swedish population, Grahn & Stigsdotter have identified 8 different perceived sensory dimensions (PSDs) (see Fig. 1). Each sensory dimension consists of a number of variables with a different factor loading (for more information on the factors constituting the different PSDs, see Grahn & Stigsdotter,

2010). The PSDs can be used to describe differences within the same type of natural environment (Tenngart Ivarsson & Hagerhall, 2008) or different kinds of natural environments from pocket city parks to larger regional green areas (de Jong, Albin, Skärbäck, Grahn, & Björk, 2012). Grahn & Stigsdotter’s research further shows that people who are in need of psychological restoration prefer natural environments that are dominated by the PSDs *serene*, which is interpreted as “a haven, almost a holy place [...]” (Grahn & Stigsdotter, 2010, p.269), *refuge*, which is interpreted as a place “where people can feel safe” (Grahn & Stigsdotter, 2010, p.268), *rich in species*; interpreted as “diverse in sensory experiences” (Grahn & Stigsdotter, 2010, p.268), and *nature*; interpreted as a “wild, free-growing, untouched room” (Grahn & Stigsdotter, 2010, p.267). The other PSDs, which are *space*, *culture*, *prospect* and *social*, are related to qualities of being active, experiencing cultural objects and other people, and they are generally rated low in relation to psychological restoration. Especially the PSD, *social*, is negatively related to psychological restoration by stressed individuals as it involves a space where there is social activity.

1.4. The health forest Octovia[®]

Based on Grahn & Stigsdotter’s research on PSDs, a full-scale Health Forest has been established in an existing Arboretum in Denmark. The arboretum encompasses the largest collection of different trees and shrubs in Denmark with over 2000 different species placed in relation to their geographical origin and generic affiliation (Jensen, 1994). The Arboretum is located within the municipality of Hoersholm in the northern part of Zealand. An area of 2 ha within the arboretum has been chosen as an appropriate site for the establishment of the Health Forest based on the presence of the PSDs. Based on landscape analyses which used the PSDs as guidelines, eight different spatial settings, which are referred to as *rooms*, have been located and marked, and together they constitute the Health Forest Octovia[®] (see Fig. 2). Each of the rooms has been chosen based on the strong presence of one of the PSDs, and has further been re-designed to accentuate this particular sensory dimension. A 750 m trail connects the eight rooms in a circular walk. The design process has been thoroughly described and documented (Stigsdotter, Refshauge, Sidenius, & Grahn, 2014). This is the first forest environment where the eight PSDs have been analyzed and emphasized through landscape design in separate areas.

1.5. The present study

A large cross over study using mixed methods was conducted in the health forest Octovia[®] and an urban setting during 2014–15, the aim of which was to gain deeper understanding of the restorative potential of both the forest and the urban environment in relation to both psychological and physiological restoration. The present qualitative study is part of the larger research project and focuses on participants’ experiences in relation to psychological restoration in the forest environment. Psychological restoration can improve mental health by providing relief from stress (Van den Berg et al., 2003), defined as a state of physiological mobilization of energy and psychological tenseness and discomfort (Danish National Institute of Public Health, 2007).

The questions which guide the present research are as follows:

- How do the participants rank and experience the eight different rooms in the Health Forest Octovia[®] with regards to promoting psychological restoration?
- Which nature qualities and spatial aspects in the Health Forest promote psychological restoration?

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