



Building mindfulness bottom-up: Meditation in natural settings supports open monitoring and attention restoration

Freddie Lymeus^{a,*}, Per Lindberg^a, Terry Hartig^{a,b}

^a Department of Psychology, Uppsala University, Box 1225, SE-751 42 Uppsala, Sweden

^b Institute for Housing and Urban Research, Uppsala University, Box 514, SE-751 20 Uppsala, Sweden

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ABSTRACT

Mindfulness courses conventionally use effortful, focused meditation to train attention. In contrast, natural settings can effortlessly support state mindfulness and restore depleted attention resources, which could facilitate meditation. We performed two studies that compared conventional training with restoration skills training (ReST) that taught low-effort open monitoring meditation in a garden over five weeks. Assessments before and after meditation on multiple occasions showed that ReST meditation increasingly enhanced attention performance. Conventional meditation enhanced attention initially but increasingly incurred effort, reflected in performance decrements toward the course end. With both courses, attentional improvements generalized in the first weeks of training. Against established accounts, the generalized improvements thus occurred before any effort was incurred by the conventional exercises. We propose that restoration rather than attention training can account for early attentional improvements with meditation. ReST holds promise as an undemanding introduction to mindfulness and as a method to enhance restoration in nature contacts.

1. Introduction

Many people in modern societies routinely challenge their cognitive and emotional capabilities in efforts to meet the demands of their work and personal lives. These efforts draw down adaptive resources, like the ability to direct attention despite intrusive thoughts or external distractions. If the resources remain depleted, focus and performance will deteriorate, fatigue and chronic stress ensue, and health and well-being suffer (Cohen, 1980; Kaplan, 1995; von Lindern, Lymeus, & Hartig, 2017). Different approaches have been proposed to prevent these negative effects. Some aim to enable periodic relief from demands and promote restoration of depleted resources, like restorative environments approaches (e.g., Hartig, Mitchell, De Vries, & Frumkin, 2014; Kaplan, 1995). Others target a presumed need for individual training to strengthen the capabilities needed to meet demands, like mindfulness training (e.g., Brown, Ryan, & Creswell, 2007; Tang, Holzel, & Posner, 2015; cf. Kaplan, 2001; Tang & Posner, 2009). In this paper we offer an integration of these approaches that takes advantage of their respective strengths to overcome their respective weaknesses. In the following, we first consider the restorative environments and mindfulness training approaches alone, and then we indicate points of connection between the two. We draw on these connections in our integrated approach which we call restoration skills training (ReST).

* Corresponding author.

E-mail addresses: Freddie.Lymeus@psyk.uu.se (F. Lymeus), Per.Lindberg@psyk.uu.se (P. Lindberg), Terry.Hartig@ibf.uu.se (T. Hartig).

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1.1. Restorative environments

Restoration refers to the replenishment of an adaptive resource that has been taxed in efforts to meet demands, so that the associated functional capabilities are reinstated (Hartig, 2017; Hartig et al., 2014; Kaplan, 1995). Given a need for restoration, some environments support its fulfillment better than others. Restorative environments are places that not only permit but facilitate restoration by supporting (1) a sense of psychological distance from stressors, distractions and demanding routines, and (2) pleasantly interesting experiences that engage attention effortlessly and evoke positive emotions (Hartig et al., 2011; Kaplan, 1995; Ulrich, 1983). In their attention restoration theory (ART), Kaplan and Kaplan (1989; Kaplan, 1995) termed the key restorative processes *being away* and *soft fascination*. Working together, these processes help to relieve the overworked adaptive systems, shield the experiential field from unwanted intrusions, stimulate soft and unconstrained attentiveness in the present, and aid psychophysiological stress recovery, all without imposing any additional self-regulation needs. Importantly, restorative experience is not just a matter of environmental qualities but of qualities of the transaction between individual and environment (Hartig, Korpela, Evans, & Gärling, 1997). The way someone engages with the environment is presumably amenable to training in relevant skills (Kaplan, 2001).

Most research on restorative environments has considered experiences with widely available natural settings, as with strolling in an urban park, visiting the countryside, or gardening (Hartig & Kahn, 2016; von Lindern et al., 2017). Research generally affirms that, for stressed and fatigued individuals, engaging with nature restores capabilities for directing attention and regulating emotions better than spending time in other commonly accessible environments (for reviews, see Bowler, Buyung-Ali, Knight, & Pullin, 2010; Hartig et al., 2014; Ohly et al., 2016; cf. Hartig & Jahncke, 2017). Many people can occasionally leave obligations aside, enter a restorative environment, and enjoy its benefits without any special skills or effort; however, the social, economic, geographic, architectural, and technological fabric of modern life tends to constrain opportunities for and the quality of restorative experiences (Hartig & Kahn, 2016; Staats, Jahncke, Herzog, & Hartig, 2016; von Lindern, 2017). Consequently, some studies have begun to consider ways to enhance engagement in limited contacts with nature (e.g., Duvall, 2011; Korpela, Savonen, Anttila, Pasanen, & Ratcliffe, 2017). Training in mindfulness skills could be one way to accomplish that.

1.2. Effortful mindfulness training

Mindfulness means a curious, yet detached, quality of attention to present experience (e.g., Bishop et al., 2004); that is, to connect with openness and acceptance with experiences while also maintaining some psychological distance in the experiential process. The psychological distance allows for breadth and flexibility of awareness and behavioral options. Similar to restorative experience, mindfulness can be considered as a state that can vary momentarily as people go through different activities and environments (Brown et al., 2007; Davidson & Kaszniak, 2015; Kaplan, 2001; Lutz, Jha, Dunne, & Saron, 2015; Tang & Posner, 2009). However, mindfulness is more commonly considered as a trait; a set of cognitive-behavioral skills or a neurocognitive capability that can be enhanced over weeks, months, or years with regular meditation exercise. As such, mindfulness training (like other training approaches) requires a significant initial investment of time, effort, and cognitive resources to establish practice habits and learn skills (Kaplan, 2001; Lutz et al., 2015; Lymeus, Lundgren, & Hartig, 2017; Malinowski, 2013; Tang & Posner, 2009). Once learned, however, mindfulness skills can help people to balance their resources and function more efficiently in many different situations. Mindfulness training can thus have a wide range of benefits (Eberth & Sedlmeier, 2012). Our focus here, however, is on attentional processes and outcomes, as several authors have proposed that attentional enhancements are fundamental to many of the other self-regulation and health enhancements that have been reported with meditation training (see e.g., Chiesa, Calati, & Serretti, 2011; Malinowski, 2013; Tang et al., 2015).

Many contemporary mindfulness courses for beginners emphasize so-called focused attention practice in which meditators try to sustain attention to given target stimuli, such as sensations with the breath, and repeatedly redirect attention when they lose their focus (Lutz, Slagter, Dunne, & Davidson, 2008; Lutz et al., 2015; Malinowski, 2013; Tang et al., 2015). During the exercises, experiences of fatigue and distraction are common (Frewen, Hargraves, DePierro, D'Andrea, & Flodrowski, 2016; Hasenkamp, Wilson-Mendenhall, Duncan, & Barsalou, 2012; Lutz et al., 2015). In fact, the experiences of fatigue and distraction are considered as opportunities for training in managing the intensity and direction of focus. With exercise on all or most days over several course weeks, focused attention practice is thought to train cognitive-behavioral attention control skills (e.g., Bishop et al., 2004; Kaplan, 2001) and stimulate gradual development of brain networks involved in cognitive control (Fox et al., 2016; Holzel et al., 2011; Lutz et al., 2008). Posner, Tang and colleagues (e.g., Posner, Rothbart, Rueda, & Tang, 2010; Tang & Posner, 2009) have termed this type of training “attention network training”.

Other approaches to cognitive training have recently been criticized for conceptual shortcomings and over-extended promises (Rabipour & Raz, 2012; Simons et al., 2016), but the meditation literature has continued to accumulate evidence of enhanced performance on selective and executive attention tasks after weeks or months with regular exercise (Chiesa et al., 2011; Eberth & Sedlmeier, 2012; Gallant, 2016; Sedlmeier et al., 2012; though also see Lao, Kissane, & Meadows, 2016). Interestingly, some studies have reported such improvements after only one (Friesse, Messner, & Schaffner, 2012), or as few as four (Zeidan, Johnson, Diamond, David, & Goolkasian, 2010), or five (Tang et al., 2007) meditation sessions.

Although many researchers construe the longer-term enhancements as resulting from attention network training, few have considered that the training can incur a cost. A recent study by Lymeus et al. (2017) found that many individuals who have weak attention to begin with struggle with the exercise requirements of the much researched Mindfulness-Based Stress Reduction (MBSR; Kabat-Zinn, 1990) course. Indeed, it makes sense that people who already exhaust themselves in trying to maintain focus and composure in their daily lives could be unwilling or unable to comply with requirements to spend any free time doing much the same

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