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The psychology of recent nature visits: (How) are motives and attentional focus related to post-visit restorative experiences, creativity, and emotional well-being?

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Abstract

The health-enhancing benefits of contact with nature have become widely recognized but empirical studies that consider the motives and attentional focus of nature visits are lacking. These psychological qualities may partly determine why one visits natural environments and why some visits are more restorative than others. This study examined recent nature visits by Finnish survey respondents ($n=565$) via exploratory structural equation modelling. In the estimated models, motives and attentional focus explained 54-57% of post-visit restorativeness, 22% of creativity, and 33-37% of emotional well-being. Of the assessed motives, stress reduction was most strongly connected to increased restorativeness and emotional well-being. The motive to be alone showed a positive indirect – but negative direct – connection to emotional well-being. Additionally, focus on oneself, the activity, and the environment were positively associated with the outcomes. The results indicate that motives and attentional focus are strongly connected to the outcomes of nature visits.

Keywords: natural environments, motivation, recreation/leisure, survey research, restorativeness

Introduction

Exposure to nature has been related to restorative experiences and improved well-being in many studies over the past two decades (e.g., Abraham, Sommerhalder, & Abel, 2010; Hartig, Mitchell, de Vries, & Frumkin, 2014; Keniger, Gaston, Irvine, & Fuller, 2013). In these studies, well-being outcomes have varied depending on the research field and design, covering short-term and long-term well-being measures, both psychological and physiological (Hartig et al., 2014). Nature is, in summary, thought to promote stress reduction and overall well-being via three theoretically justified and empirically supported behavioral mechanisms (Abraham et al., 2010; Keniger et al., 2013; see Kuo, 2015 for additional mechanisms): it encourages physical activity (the physical mechanism), it provides a setting for social encounters or for escaping social pressures (the social mechanism), and it contains special qualities that alleviate stress (the stress reduction mechanism). Although usually explored separately, the mechanisms coincide in many ways, and are thus thought to reinforce the benefits associated with one another (Hartig et al., 2014).

The outcomes that nature visits have most consistently been related to include induced restoration and increased positive affect (Hartig et al., 2014; McMahan & Estes, 2015). Repeated positive experiences, in turn, are one plausible explanation for the positive population-level correlations between exposure to green environments and longer-term subjective well-being, such as satisfaction with life (Hartig et al., 2014; Vemuri, Grove, Wilson, & Burch, 2011). There is tentative evidence that exposure to natural environments additionally enhances vitality, a state of positive activation (Ryan et al., 2010; Thompson Coon et al., 2011). Vitality is theoretically described as a complementary but distinct concept from restoration (Ryan et al., 2010). Vitality refers to "feeling alive" and having positive energy available for oneself, mainly psychologically but also physically (Ryan & Fredrick, 1997). Being distinct from deactivated positive states such as contentment, happiness and satisfaction, it has strong connections to more general positive states such as life satisfaction (Ryan & Fredrick, 1997). In this study, vitality is assessed as an affective outcome of

nature visits together with more established measures of restorativeness, positive and negative affect, and life satisfaction.

In addition to restorative and affective benefits, theory and empirical studies suggest that natural environments can improve cognitive and attentional performance (Berman, Jonides, & Kaplan, 2008; Berto, 2005; Kaplan & Kaplan, 1989). Consistent with this perspective, more recent studies have proposed that creativity, as a higher-level executive cognitive function, could likewise be enhanced by exposure to nature (Atchley, Strayer, & Atchley, 2012; Plambech & Konijnendijk van den Bosch, 2015). Nature exposure can also lead to increased creativity via positive affect. An extensive meta-analysis concluded that creativity was systematically associated with activated positive states but not with deactivated positive states (Baas, De Dreu, & Nijstad, 2008). In terms of causality, it seems that positive affect precedes increases in creativity (Baas et al., 2008). As nature experiences have been consistently shown to result in increased positive affect (McMahan & Estes, 2015), it is possible that a more positive state following nature exposure also induces increased creative responses. Accordingly, preliminary empirical evidence implies that exposure to nature can improve several dimensions of a creative process, such as identifying and solving problems and gaining new ideas (Atchley et al., 2012; Ferraro, 2015; Plambech & Konijnendijk van den Bosch, 2015). The evidence on creativity and nature exposure, however, is limited to specific populations (Ferraro, 2015; Plambech & Konijnendijk van den Bosch, 2015). This study contributes to the literature by assessing self-reported creativity as an outcome of nature visits together with restorative and affective measures, as described above.

Previous research has not emphasized everyday nature experiences as a part of individual self- and emotional regulation. It has been suggested that the health-enhancing effects of visiting natural environments are a result of conscious self-regulation where people have learned that natural settings are more likely than others to provide restorative outcomes, such as relaxation and attention restoration (Hartig et al., 2014; Korpela & Ylén, 2007). However, we do not know to what extent

the benefits of a nature experience are actually a result of a conscious effort to reduce stress, and to what extent these benefits are an unconsidered side-effect of an activity with another primary purpose, such as socializing or maintaining fitness. Motives play an important role in determining why one chooses to visit natural environments and why some visits are more restorative than others (Knopf, 1987). Four main types of motives for nature visits in particular have been identified: tranquility, social affirmation, competence, and natural stimuli (Knopf, 1987). These motives are present in the three abovementioned behavioral mechanisms that explain why exposure to nature and well-being are connected, and they are further elaborated in the following sections.

The majority of the environmental well-being literature has focused on the consequences and after-effects of nature visits, and has neglected aspects during environmental experiences that may facilitate restoration, such as attentional focus on the environment (Hartig et al., 2014). The concept of attentional focus in environmental experiences dates back to 1976 when Ittelson, Frank, and O'Hanlon (1976) identified different ways to experience an environment. The underlying idea is that individuals are not passive recipients of their surrounding environment but that they actively modify their environmental experience by choosing what to focus on, and that way they can achieve their goals (Ittelson et al., 1976).

The main contribution of this study is a quantitative analysis of how different types of motives and attentional foci are connected to perceived outcomes of nature visits. To our knowledge, these components have not been previously studied together. The topic is novel and, consequently, we have taken an exploratory approach to examine it by integrating measures and theories from environmental psychology, cognitive psychology, and leisure studies. These theoretical frameworks are described in the rest of this introduction. First, we present the mechanisms that have been shown to explain the positive relationship between exposure to nature and subjective well-being in more detail. Second, we evaluate the existing evidence regarding motives and attentional focus in nature experiences. Third, we briefly introduce two theories from cognitive psychology that explain the

interaction between motives and attentional focus. How these theories are applied in this study is explained in the final section of the introduction where we present the research questions of this study and the conceptual model for examining these questions.

Mechanisms that explain the well-being effects of nature experiences

The physical mechanism. Visiting natural environments is expected to improve well-being by encouraging health-related behavior such as physical activity (PA). Natural settings have also been found to provide added value to the known benefits of exercise (Barton & Pretty, 2010; Bowler, Buyung-Ali, Knight, & Pullin, 2010; Thompson Coon et al., 2011). The motive to be physically active relates to competence building that has been identified as one of the main motives for nature visits (Knopf, 1987).

Experimental studies have consistently shown that exercise in natural settings improves mood and self-esteem within five minutes of exposure (Barton & Pretty, 2010). A meta-analysis by Bowler et al. (2010) concluded that exercise in nature, compared with built environments indoors or outdoors, improves attentional capacity and reduces negative affect. Similarly, a systematic review by Thompson Coon et al. (2011) found that the benefits following exercise in outdoor environments, compared with similar activities in indoor settings, include decreased negative emotions and increased energy and feelings of revitalization.

The social mechanism. According to the social mechanism, nature is thought to provide a suitable platform for social interaction that promotes well-being (Hartig et al., 2014). Thus, natural environments can be visited for their positive attributes that enable pleasant social contacts. Knopf (1987) has identified this type of pull motive for nature visits as a “quest for social affirmation”. In addition, the social mechanism encompasses a push dimension where nature is valued because it is seen as a place for escaping social pressures (Hartig et al., 2014). This push dimension emphasizes

the qualities that natural environments do not possess such as social stressors, offering an opportunity to experience tranquility (Knopf, 1987).

Previous empirical research supports both of these dimensions of the social mechanisms.

Experimental studies have indicated that being accompanied improves the benefits of walking in urban environments, whereas in natural environments, the benefits are greater for those who walk alone (Johansson, Hartig, & Staats, 2011; Staats & Hartig, 2004). Similarly, in a survey study where the respondents were asked about their recent visit to nature, those who had been accompanied rated their feelings of restorativeness slightly more negatively (White, Pahl, Ashbully, Herbert, & Depledge, 2013). Moreover, the quality of the green environment may have an impact on social interactions. A survey-based study in Chicago concluded that open green parks in neighborhoods provide social support that, in turn, mitigates stress, whereas dense vegetation directly reduces stress but discourages social relations (Fan, Das, & Chen, 2011).

The stress reduction mechanism. Stress reduction and reduced attentional fatigue as a result of exposure to natural environments has been extensively covered by two well-known restoration theories. Ulrich's (1983; Ulrich et al., 1991) Stress Reduction Theory (SRT) suggests that nature reduces both psychological and physiological stress. According to SRT, the initial affective response to an environment, in the form of liking and preference, has a strong influence on the outcomes of nature visits (Ulrich, 1983; Ulrich et al., 1991). As humans are more prone to prefer natural to urban environments, exposure to nature leads to reduced physiological arousal and a more positive emotional state (Ulrich, 1983; Ulrich et al., 1991). Experimental studies have consistently reported increased positive affect after short-term nature exposure (McMahan & Estes, 2015). In addition, SRT recognizes the role of attention during nature visits. Ulrich (1983) has noted that the initial affective state influences the direction of one's attention during a nature visit which, in turn, is connected to the outcome of that visit.

Kaplan and Kaplan's (1989) Attention Restoration Theory (ART) has a more cognitive approach. ART proposes that many environmental qualities that are often present in natural environments induce involuntary attention restoration from mental fatigue (Kaplan & Kaplan, 1989). Kaplan and Kaplan (1989) differentiate between two types of fascination: "hard", effortful fascination that may lead to mental fatigue, and "soft", involuntary fascination that engages without mental effort and thus, promotes restoration. An environment that can induce restorative experiences is thought to involve four main qualities: a sense of *escape* that enables distance from everyday concerns, *extent* that creates a sense of being in a whole other world, *fascination* that draws one's attention effortlessly and triggers attention recovery, and *compatibility* between the environment and one's current needs (Kaplan & Kaplan, 1989). According to ART, a restorative experience may involve clearing the mind, attentional recovery, and life reflection (Kaplan & Kaplan, 1989). More recent work building on ART has identified creative problem solving as an important but scarcely studied higher-level cognitive function that exposure to natural environments can facilitate (Atchley et al., 2012; Ferraro, 2015).

Even though the restorative experiences described in SRT and ART are distinct, they also overlap (Kaplan, 1995). Thus, the positive outcomes on emotional and cognitive levels, suggested in these theories, are often seen as complementary psychological processes (Bratman, Hamilton, & Daily, 2012).

Motives and attentional focus in nature experiences

In ART (Kaplan & Kaplan, 1989), motives are included in the concept of compatibility – exposure to an environment can be restorative if it supports the fulfilment of one's current needs. SRT sees that motives are guided by one's affective state and that they drive behavior (Ulrich, 1983). Indeed, empirical qualitative studies have concluded that motives guide individuals to choose different activities in different types of locations (Irvine, Warber, Devine-Wright, & Gaston, 2013;

Kassavou, French, & Chamberlain, 2015). The chosen recreational activities can, in turn, affect an individual's health and well-being (Irvine et al., 2013).

Knopf (1987) synthesized motive-related empirical and theoretical studies from a wide range of disciplines addressing people-environment relationships and identified four main categories of motives for nature visits. The first, *tranquility*, Knopf (1987) describes as coping behavior that is focused on escaping from unwanted aspects of everyday life. These so called push factors can include noise, stimulus overload, and social pressures. *Social affirmation*, the second main motive type, functions as a pull factor, recognizing that natural environments often provide a platform for building or re-enforcing companionship. The third type of motive relates to *competence* such as learning new skills or maintaining fitness. The fourth motive category is *natural stimuli*, implying that natural environments (or their elements) provide a unique experience that is desirable *per se* and, therefore, these nature-related motives are exclusive to nature experiences. It is common for one to have several motives for a single visit to nature, and the motives can derive from different categories and even be in conflict with one another (Knopf, 1987).

Although motives in nature experiences have been well examined in recreation studies (Irvine et al., 2013; Knopf, 1987; Manning, 2010), there is a lack of knowledge about the extent to which the motive is able to affect the outcome of the experience. This is one of the main foci of the present study. A stress management study of United States Coast Guard Academy cadets, assessing all types of restorative activities, addressed this issue and found that most restorative events were associated with motives such as escaping daily routines or role overloads, achievement, teaching or sharing skills, and enjoying nature (Siniscalchi, Kimmel, Couturier, & Murray, 2011). Motives not only guide the choice of activity and environment but also the way the environment is experienced (Ittelson et al., 1976). Although the concept of attention and its recovery is central in ART (Kaplan & Kaplan, 1989), little research has investigated *attentional focus* during nature exposure (Hartig et al., 2014). Ittelson et al. (1976) proposed five modes in which people experience nature:

experiencing 1) the physical features of a place; 2) place as part of self and one's identity; 3) social relationships in a place; 4) emotions that the place induces; and 5) place as a setting for a particular action. These modes have been operationalized in experimental leisure studies where people have been asked about their attentional focus during a nature experience. In these empirical analyses, experiencing place as a part of oneself and in terms of the emotions it induces have correlated highly and thus, four separate foci for environmental experience have been confirmed (Borrie & Roggenbuck, 2001).

In ART, Kaplan and Kaplan (1989) suggest that attention recovery is triggered by involuntary fascination. Although this type of soft fascination is one important determinant of restoration, more recent evidence indicates that restorative benefits may also follow when people consciously direct their attention to the physical features of the environment such as to a specific restorative element or object (following specific instructions, see Duvall, 2011; 2013; Lin, Tsai, Sullivan, Chang, & Chang, 2014). Therefore, consciously directed attention may potentially facilitate health promotion in everyday nature experiences where convenience and several competing interests drive the choice of setting and activity (Irvine et al., 2013; Kassavou et al., 2015). The present study elaborates further on the topic of attention orientation by asking people to recall what they focused on during the most recent nature visits.

The relationship between motives and attention

Matching motives and attentional focus. Cognitive psychologists have argued that our motives, which can be affected by our current mental state and previous experiences, influence the direction of our attention. This assumption derives from the so-called New Look of perception, a view that emerged in the 1940's (Erdelyi, 1974; Lindzey, Gilbert, & Fiske, 1998). Although debated, the foundation of the view, stating that perception is dependent on one's internal processes (Erdelyi, 1974), is still prevalent in psychological research (Balcetis & Dunning, 2006; 2007; Lupyan, 2015;

Voss & Schwierer, 2015). These internal processes include attitudes, values, expectancies, and needs, and they have been argued to bias all human information processing (Erdelyi, 1974). In the context of environmental psychology, Ittelson et al. (1976) highlighted that the modes in which an environment is experienced are largely determined by one's personal motives for this experience. Drawing from these views, we expect that motives prior to a nature visit direct attentional focus during that visit. For example, those who strongly wish to experience nature will focus on the natural features during their stay. We examine whether motives and attentional focus match in our analysis in a model we call "the restricted model".

Continuous automatic processing. Bargh and Chartrand's (1999) view states that, as in the New Look of perception theory described above, goals guide information processing and behavior. Bargh and Chartrand (1999), however, add that the mechanisms that translate goals into behavior can be automatic and both external (environmental, situational) and internal (conscious motives). Thus, our goals and subsequent behavior might be automatically driven by situational features (Bargh & Chartrand, 1999). People can visit natural environments for nature enjoyment but if they engage in physical activity at the same time, the activity can draw their attention away from natural features. Moreover, fascination, one of the main features of ART, presumes that a restorative environment draws one's attention automatically; that is, involuntarily. This soft fascination can occur regardless of one's preceding state of mind and goals. Therefore, attentional focus can be automatically driven by the environment so that motives do not direct focus all the time but attentional focus can vary. In this study, we test this assumption in a model where all motives for nature visits are assumed to have a connection with all types of attentional focus; we call this model "the unrestricted model".

The research problem in the present study

We assess the role of motives and attentional focus in explaining the outcomes of nature experiences (Figure 1). We test two structural equation models (SEM) where the relationship

between motives and attentional focus is either restricted (Erdelyi, 1974; Ittelson et al., 1976) or unrestricted (Bargh & Chartrand, 1999). Our first research question (RQ1) asks if motives and attentional focus can explain the outcomes of nature visits and if so, which outcomes are best explained. We answer this question by evaluating how the models fit empirical data and the explained variance in the outcome measures. Our second research question asks which of the following factors in particular best explain post-visit outcomes of nature visits:

- a) motives to be physically active, to be alone, to socialize, to experience nature, and to reduce stress (independent of attentional focus; RQ2a)
- b) attentional focus on the activity, on oneself, on other people, and on the environment (independent of the motives; RQ2b)
- c) combinations of the abovementioned motives and attentional foci (RQ2c).

The measures and the tested structural equation model, including mediators and both exploratory and confirmatory latent factors, are presented in detail in the next section.

Method

Data and participants

The survey was a follow-up to the Outdoor Recreation Demand Inventory (LVVI2; explained in more detail in Korpela, Borodulin, Neuvonen, Paronen, & Tyrväinen, 2014), a nationally representative Finnish survey. The follow-up survey questionnaire was sent to all of those 869 LVVI2 respondents who had expressed an interest in participating in a consecutive survey about the well-being and health effects of nature. This follow-up survey was collected in the autumn of 2009. With 565 respondents, the response rate was 65%. The respondents in this follow-up survey were more highly educated than those in the main survey, and the proportion of females was higher. However, regarding the frequency of nature visits (Table 1), there were no differences between the surveys. Almost all (95%) respondents stated that they visit natural environments weekly, and 25%

reported visiting nature every day. The respondents resided in rural (15%), suburban (13%), and urban (72%) areas of Finland (Table 1), where the everyman's right guarantees open access to forests and natural environments regardless of land ownership.

The survey asked detailed questions about the typical place or route in nature that the respondents tend to visit and their experiences from their most recent visit there. The respondents had the option to describe a place or an area ($n=179$), a route ($n=268$), or the garden of their home or second home ($n=118$). Depending on this choice, they were also asked different types of questions about the qualities of these natural environments but these questions are outside the scope of this study. The place or route described was familiar to the respondents as the majority (70%) had visited it for the first time four or more years ago. However, the majority (83%) also reported visiting other outdoor locations for recreational purposes. The respondents had visited the place or route most commonly on the same day (28%) or the day before (21%) they had filled in the questionnaire. The most common type of activity in the place or route was walking (33%) or walking with a dog (20%), followed by gardening (12%) and running/jogging (9%).

Measures

In the following sections, we describe all variables used in the analyses. Their descriptive statistics and bivariate correlations can be found in the supplementary material in online Appendix A.1).

Motives: independent latent factors. The respondents were instructed to recall the situation prior to their most recent visit to their typical place or route in nature. They were asked to evaluate how important a variety of factors were in their decision to go outdoors on a 4-point rating scale ranging from 1 'Very important' to 4 'Not important at all'. For easier interpretability, the scale was reverse coded in the analysis. The items were derived from recreation experience preference items measuring recreation motivation (Manning, 2010), of which we selected the motives that matched the physical, social, and stress reduction mechanisms of nature experiences. These motives also

represent Knopf's (1987) categorization of motives for nature experiences, described in the introduction.

The option 'Maintaining physical fitness' was the indicator for the motive *to be physically active*, reflecting competence-building (Knopf, 1987) and the physical mechanism of the benefits of contact with nature. The social mechanism included two types of motives, reflecting either escape from interaction (tranquility; Knopf, 1987) or the need for it (social affirmation; Knopf, 1987). The indicator for the motive *to be alone* was 'I get to be alone', and the two indicators for the motive *to socialize* were 'I can be with friends' and 'I can be with family' ($r=.59$). The motives relating to the restorative mechanism derived from the expected restorative end result, stress reduction, and from the expected means of obtaining it, namely through experiencing nature. The motives *to reduce stress* (reflecting tranquility; Knopf, 1987) were stated as 'I can relax', 'I can withdraw from daily routines', and 'I can reduce stress' (Cronbach's $\alpha=.79$). The motives *to experience nature* (reflecting natural stimuli; Knopf, 1987) were phrased 'I can enjoy nature' and 'I can learn from nature' ($r=.70$).

Attentional foci: mediators. The respondents were instructed to recall their experiences during their most recent visit to their typical place or route in nature. They were asked to evaluate to what extent they had focused on 'the activity, that is, outdoor recreation' (*focus on the activity*), 'your own thoughts and emotions' (*focus on oneself*), 'other people around you' (*focus on others*), and 'the environment, that is, the natural or urban surroundings' (*focus on the environment*). The scale was a 7-point rating scale ranging from 1 'Completely' to 7 'Not at all'. For easier interpretability, the scale was reverse coded in the analysis. The items represent the main types of attentional focus in environmental experiences (Borrie & Roggenbuck, 2001; McIntyre & Roggenbuck, 1998). We settled for surveying only one item per type of attentional focus in line with the approach by McIntyre and Roggenbuck (1998). Other studies have assessed two or more items per attentional

focus but their factor structure has not been fully confirmed (Borrie & Roggenbuck, 2001; McKay, Brownlee, & Hallo, 2012).

Post-visit mental states: latent outcome factors. The respondents were instructed to recall the situation after their most recent visit to their typical place or route in nature. They were asked to evaluate to what extent a number of changes in their mental state had occurred, and to what extent they had felt a number of emotions (see Table 2). The scale used was a 7-point rating scale ranging from ‘Describes my experience...’ 1 ‘Completely’ to 7 ‘Not at all’. For easier interpretability, the scale was reverse coded in the analysis.

The post-visit mental states were measured as restorative experiences (six items from the Restorative Outcome Scale [ROS]; Korpela, Ylén, Tyrväinen, & Silvennoinen, 2008; see also Hartig, Lindblom, & Ovefelt, 1998; Staats, Kieviet, & Hartig, 2003), creativity (four items), negative emotions (eight basic emotions; see Zelenski & Larsen, 2000), positive emotions (three basic emotions; see Zelenski & Larsen, 2000), vitality (two positive items and one negative item from the Subjective Vitality Scale [SVS]; see Ryan & Frederick, 1997), and life satisfaction (one item). Because the respondents reported few negative emotions, these items were highly skewed and peaked and there was little variance to examine. The negatively phrased items were therefore excluded from the analyses.

Analytic approach

First, for data analysis, all ‘Don’t know/Cannot say’ options were coded as missing. All original rating scales were reverse coded so that higher values indicated greater motivation, greater attentional focus, and a stronger positive post-visit mental state. All analyses were performed using Mplus version 7.4. Many outcome items correlated significantly with each other (see supplementary material in online Appendix A.1). Consequently, significant cross-loadings between factors were expected, in which case an exploratory, rather than confirmatory, outcome factor structure was

chosen based on recommendations by Marsh, Lüdtke, Nagengast, Morin, and Von Davier (2013). First, in the exploratory analysis, the outcome structure was inspected by traditional exploratory factor analysis (EFA) with the default oblique Geomin rotation ($\epsilon=.01$), which generally produces optimal solutions for new variable structures (Asparouhov & Muthén, 2009). Variables with large residual variances ($>.50$) were dropped from the analysis one by one, after which the factors that were conceptually sound, with eigenvalues greater than 1, were considered for further analysis (Tabachnick & Fidell, 2007). In the end, the outcome variables formed three latent factors that were conceptually distinct from one another, although some small but significant cross-loadings were present (Table 2). The items that loaded highly on the first two factors, restorativeness and creativity, were as expected, whereas the third factor was a combination of positive emotions, vitality, and life satisfaction. As the third factor contained positive affective states (both activated and deactivated) and a more general state of being satisfied with one's life, we named the third factor 'emotional well-being'.

Second, we tested two complete models with independent latent factors and mediators by exploratory structural equation modelling (ESEM): 1) "restricted model" with matching motives and attentional focus and 2) "unrestricted model" with all connections between motives and attentional focus estimated. To answer RQ1 about whether motives and attentional foci can explain the outcomes of nature visits, we evaluated the models based on the χ^2 test, fit indices (the Comparative Fit Index [*CFI*] and the Root Mean Square Error of Approximation [*RMSEA*]), and the percentages of variance explained (R^2) in the outcomes (Kline, 2016). In the ESEM models, the outcome factors were specified as explorative. The independent factors, motives, were confirmatory and their variances were fixed at 1 (Bollen, 1989). The motives that were measured by only one indicator (motives to be physically active and to be alone) were treated as latent single indicator factors, and their loadings were fixed at .9 to reach mathematical identification in both models (Bollen, 1989). Although applied researchers generally prefer to include several items per factor,

using single items is warranted from a methodological point of view and might be even superior over multiple items if the measures are reliable (Hayduk & Littvay, 2012). All ordinal factor indicators were specified as categorical, which meant performing a normal transformation for their values (Muthén & Muthén, 1998–2012). We interpreted standardized estimates because the variables' scales were arbitrary (Yuan & Chan, 2011), and the otherwise recommended bootstrapped standard errors and confidence intervals (Bollen & Stine, 1990) were not available with the ESEM approach (Muthén & Muthén, 1998–2012). The significance of the estimates was determined by the delta method (see below) which is considered accurate in large samples (Bollen & Stine, 1990).

With mediation models such as the one in this study, three types of relationships can be assessed. First, *direct connections* are the traditional regression relationships between an independent factor (or a mediator) and an outcome. We examine direct effects to answer RQ2a and RQ2b (i.e., which motives and attentional foci are directly connected to the outcomes). Second, *indirect connections* evaluate the combined effect of two regression paths: one from the independent factor to a mediator, and another from the mediator to an outcome. Third, *total effect* refers to the combination of direct and indirect effects. Indirect connections and total effects are explored in response to RQ2c (i.e., which combinations of motives and attentional foci are connected to the outcomes). The significances of all these relationships are determined by the delta method, a function of the path estimates and their standard errors (Sobel, 1986). In the simplest case, which is that of direct connections, a path's significance is determined by the ratio of the estimate to its standard error. In the case of large samples, this ratio is assumed to be normally distributed (Bollen & Stine, 1990). It is worth mentioning that, since we analyze cross-sectional data, the word 'effect' does not imply causalities here; instead, 'effect' is the generally accepted term in the assessment of mediation models.

Although evaluating the direct, indirect, and total effects multiplies the number of evaluated connections, there are several valid reasons for this thorough comparison. First, these effects are all considered estimates of effect size in mediation models (Fairchild, MacKinnon, Taborga, & Taylor, 2009; Preacher & Kelley, 2011). Second, we are not only interested in the significant individual connections but also in the combinations of motives and mediators that together contribute to the outcomes. Third, total effects provide estimations of the motives that are the strongest correlates of our outcomes and, therefore, their identification is important.

Results

RQ1: Variances explained and the overall model fit

Our first research question examined how well the models in general are able to explain reported post-visit mental states. The restricted model with matching motives and attentional focus explained 57% of the variation in restorativeness, 22% of the variation in creativity, and 37% of the variation in emotional well-being. The respective figures in the unrestricted model were slightly smaller: 54%, 22%, and 33%. Both models fit the data equally well, with $RMSEA=.05$ and $CFI=.98$ for both models, apart from the X^2 test that rejected both the restricted ($X^2=664$, $df=279$, $p<.001$) and the unrestricted model ($X^2=629$, $df=266$, $p<.001$). However, the Satorra-Bentler corrected X^2 test favored the unrestricted model ($X^2_{diff}=42$, $df=13$, $p=.0001$). As the X^2 test can be sensitive to sample size (Kline, 2016), we inspected the models' residuals to detect possible sources of misfit (see supplementary material in online Appendix A.1). If the absolute value of the difference between the observed and estimated correlation exceeds .10, the residual can be considered large (Kline, 2016). In this analysis, 10 out of 378 residuals (2.6%) exceeded this cut-off in the restricted model and 8 (2.1%) in the unrestricted model. The largest residuals were .17 and .13, respectively, which we considered tolerable. We conclude that both models fit the data well, although the residuals were

slightly smaller in the unrestricted model and the variances explained were slightly greater in the restricted model.

In the restricted model, the connections from each motive to the matching attentional focus were significant and conceptually sound (see Figure 2 for an overview, and supplementary material in online Appendix C.1. for the estimates and their standard errors). The unrestricted model showed two additional mismatching connections between a motive and attentional focus. Motive to socialize was connected to increased focus on the activity, and the motive to reduce stress was connected to increased focus on oneself (Figure 3).

In both models, all latent independent factors (motives) covaried. Similarly, the residual covariances between all attentional foci were estimated. For readability, the above covariances are not shown in the figures, but their estimates are provided in the supplementary material in online Appendix D.1.

RQ2a: Motives and the outcomes of nature visits (direct connections; Figure 2, Figure 3)

There were only a few significant direct connections between the motives and the outcomes after controlling for attentional foci, but these few connections were strong in effect size. Firstly, motive to be alone was negatively connected to emotional well-being (Figure 2, Figure 3) in both models, and to restorativeness in the restricted model. Secondly, the motive to reduce stress had a strong positive direct connection to emotional well-being and restorativeness in both models. Other motives were not directly related to any of the outcomes.

RQ2b: Attentional foci and the outcomes of nature visits (direct connections; Figure 2, Figure 3)

All attentional foci, except for focusing on other people, showed some positive connections to the outcomes. Focus on oneself was most strongly and positively connected to the outcomes of nature

visits, as it was connected to all outcomes in both models (Figure 2, Figure 3). In addition, both models showed positive connections between focus on the activity and greater restorativeness and emotional well-being, and between focus on the environment and emotional well-being. Additionally, in the restricted model, focus on the environment was associated with increased restorativeness (Figure 2).

RQ2c: Combinations of motives and attentional foci and the outcomes of nature visit (indirect connections and total effects; Table 3, Table 4)

All motives had significant indirect positive connections to at least one outcome and these indirect connections were relatively low in effect size (.03 - .16; Table 3). Only some motives showed significant total effects (sum of the direct and all indirect connections) to an outcome and these total effects were larger (.19 - .88; Table 4).

The motive to reduce stress showed the strongest total effect on the outcomes. It had a positive total effect on restorativeness and emotional well-being in both models (Table 4). In the unrestricted model, the motive to reduce stress had additional positive indirect effects on restorativeness and creativity via focus on oneself (Table 3).

The motive to be alone also showed a total effect on an outcome. This motive was negatively connected to emotional well-being (Table 4), which follows from the strong, negative direct connection between motive to be alone and emotional well-being (RQ2a). In contrast, motive to be alone showed positive indirect connections to almost all of the outcomes: via increased focus on oneself, it was connected to enhanced restorativeness and creativity in both models, and to increased emotional well-being in the restricted model (Table 3).

The motive to experience nature was the third motive that had a total effect on an outcome. Those who wished to experience nature reported more creativity (but only in the restricted model; Table 4), even though none of the direct or indirect effects on creativity were significant on their own

(Figure 2, Table 3). In addition, the motive to experience nature was indirectly and positively connected to emotional well-being via focus on the environment in both models (Table 3).

The motives to be physically active and to socialize had no total effects on the outcomes (Table 4). Yet, they both showed positive indirect connections that were small in effect size (Table 3). The motive to be physically active was indirectly connected to greater restorativeness and emotional well-being via increased focus on the activity in both models. The motive to socialize was indirectly connected to enhanced restorativeness in both models: in the restricted model this indirect connection was mediated by focus on oneself, and in the unrestricted model by focus on the activity (Table 3). Additionally, motive to socialize was positively connected to creativity and emotional well-being via focus on oneself in the restricted model.

Discussion

Overall, the outcomes of nature visits were well explained by motives and attentional focus during the visit. Of all the outcome factors assessed, the models explained the greatest amount of variance for restorativeness, which indicates that the assessed motives and attentional foci are especially relevant in terms of experienced psychological restoration. Together with the result that positive states were common after the nature visit and negative emotions rarely experienced, these findings complement previous empirical studies that have shown positive associations between exposure to nature and increased positive affect (Barton & Pretty, 2010; McMahan & Estes, 2015) and suggest that motives and attention play an important role in this relationship.

Both types of relationships between motives and attentional focus received empirical support. On the one hand, the restricted model where the motives matched the attentional focus (for example, the motive to be physically active matched with focus on the activity) showed good fit with the data. Motives were also positively connected to the respective attentional focus in the unrestricted model where their connections to all other attentional foci were additionally evaluated. On the other

hand, the unrestricted model was favored by the χ^2 difference test, suggesting that at least some motives were connected to attentional foci that they were not originally matched with. Only two of these ‘mismatching’ connections were statistically significant. Overall, it seems that recalled motives for nature visits are connected to recalled attentional focus during the visit but the focus can shift during the experience.

Evidence regarding motives and attentional focus in relation to outcomes of nature visits

The motives that explained the post-visit outcomes most strongly –to reduce stress and to be alone– both represented Knopf’s (1987) push mechanisms. Interestingly, their connections with the outcomes were contrasting. Those who wanted to reduce stress reported the strongest positive outcomes whereas those who wished to escape social relationships experienced more negative emotional well-being, although the effect was smaller. Several interconnected reasons can explain the strong direct relationship between the motive to reduce stress and enhanced restorativeness and emotional well-being. From the perspective of the questionnaire, the stress reduction motive best matched the assessed outcomes (compared with the other motives), as positive changes in one’s state of mind are relevant aspects of reduced mental stress. Furthermore, stressed individuals are more likely to visit natural environments for relaxation and stress reduction purposes than those who are non-stressed (Stigsdotter & Grahn, 2011). Individuals with higher initial levels of stress have a greater potential for restoration and recovery, which, as our results suggest, can be actualized to a large extent in natural environments. Using a place or an environment for self-regulation has been proposed in favorite place studies (Korpela & Ylén, 2007). It is possible that this type of conscious self-regulation applies to the respondents of this study, who described a visit to a familiar place or route in nature. The unrestricted model showed that only a small part of the relationship between the motive to reduce stress and restorativeness was explained by increased focus on one’s own thoughts and emotions.

With regard to the motive to be alone, this push mechanism from social relationships appears twofold: directly, it was connected to lower positive emotional well-being, whereas indirectly, via increased focus on one's own thoughts, it was consistently associated with a more positive post-visit mental state. In the case of emotional well-being, the negative direct connection even outweighed the positive indirect connection, and, overall, those who had wished to be alone experienced lower emotional well-being.

There are a number of plausible but, at this point, speculative explanations for this strongly negative relationship. In terms of causalities, it is possible that either wishing to be alone decreases one's emotional well-being, or that those who already felt depressed sought nature for social withdrawal, and the experience did not improve their emotional well-being. Alternatively, the negative correlation between the motive to be alone and emotional well-being could be due to other underlying factors such as personality differences, or situational factors such as the presence of other people that prevented some respondents from being alone. On the other hand, the result that the motive to be alone was indirectly positively connected to all outcomes via focusing on one's own thoughts and emotions suggests that the focus on oneself was more likely a form of constructive cognitive reappraisal or reflection (Gross & John, 2003) than rumination (Bratman, Hamilton, Hahn, Daily, & Gross, 2015). Previous research supports this view, as visits to natural environments have been found to both reduce rumination (Bratman et al., 2015) and induce deep, restorative reflection on one's life (Herzog, Black, Fountaine, & Knotts, 1997; Kaplan & Kaplan, 1989; Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009).

The motives that we theoretically associated with the restoration theories (to experience nature and to reduce stress) were both relevant in terms of the outcomes. Thus, the results support the view by Hartig et al. (2014) that explains nature's stress-reducing potential through both the absence of stressors and its positive restorative qualities. Similar results were found in the study by Siniscalchi et al. (2011) where motives to enjoy nature and to escape daily routines were both related to

restorative experiences. Our results suggest that these motives function differently: the stress-reducing, push motives function independent of attentional focus (see discussion above) whereas the nature-experiencing motive functions indirectly via increased focus on the natural environment. It seems that for those whose motive is to experience nature, focus on the environment is needed for a more positive experience. Whether this focus is due to soft, involuntary fascination (Kaplan & Kaplan, 1989) or a more conscious, directed focus on the natural elements (Duvall, 2011; 2013; Lin et al., 2014) cannot be confirmed at this point. We return to this discussion at the end of this section.

The motives for social affirmation and physical activity were weakly and indirectly associated with the outcomes. In relation to social affirmation, a more positive outcome seems to be connected to the opportunity to focus on oneself or on the activity but, interestingly, not on other people. Thus, social relationships experienced during nature visits may promote gaining a new perspective on oneself or one's life, which facilitates better emotional well-being, creativity, and restorativeness. The restorative and emotional outcome of having a stronger motive for physical activity was, on the contrary, mediated through focusing on the activity. Although the effect was small, this result agrees with the well-known positive connection between physical activity and mental well-being (for example, Penedo & Dahn, 2005) even though it is contradictory to the results by Siniscalchi et al. (2011). It would have been interesting to test how physical strain functions in this relationship but unfortunately, we did not measure this.

Regarding attentional focus during nature visits, focusing more on the activity, oneself, or the surrounding environment (but not on other people) were related to positive outcomes. Similarly, in Duvall's (2011) study, engagement during a nature visit produced well-being effects even though the focus of engagement was not specified. It seems that a positive nature experience can result from focusing on a variety of matters, excluding other people. Even though focusing on other people might not be detrimental, the presence of others can deplete attentional resources from other, more restorative, objects of focus such as the surrounding environment (Staats & Hartig, 2004;

however, see Duvall, 2013 for contrasting results). Those who are alone are able to direct their full attention to anything they wish, which may be more likely to lead to an enhanced mood.

Alternatively, the scope of attentional focus could be interpreted from the reverse causal order in the light of the ‘broadening hypothesis,’ which suggests that a positive state broadens the scope of attention (Fredrickson & Branigan, 2005). In the context of this study, the broadening hypothesis would mean that the connections between positive post-visit mental states and focusing more on the activity, oneself, and the environment were detected because those who were feeling good to begin with simply focused on a broader range of matters.

Finally, it is not known whether our item for environmental focus measured soft, involuntary fascination or consciously directed focus on the environment. It seems plausible, however, that this item better indicates directed, rather than automatic focus for two reasons. Firstly, the only motive that focusing on the environment was connected to was the motive to experience nature. This result implies that when the other motives were more salient, either the respondents’ attentional focus did not shift into the environment as a result of fascination, or that fascination cannot be captured by this type of self-reported question. Fascination may be a more subtle, underlying feature of nature visits whereas recalled attention orientation is a conscious, voluntary attentional focus. Secondly, focus on the environment was more strongly connected to emotional well-being than to restorativeness, even though restorativeness is an outcome derived from ART. If recalled attentional focus on the environment was an indicator of soft fascination, stronger connection to restorativeness would be expected. Instead, supporting findings by Lin et al. (2014), our results suggest that restoration can be experienced even without recalled focus on the environment.

Limitations

We have identified several limitations of this study. First, the sample was not a random sample of the Finnish population. Survey participation did not presume interest in nature, but the background

information (Table 1) implies that most were enthusiastic visitors to nature. These figures did not, however, differ significantly from the average national rates of weekly nature visits (Sievänen & Neuvonen, 2011). Furthermore, access to nature in Finland is high as most people live within a walking distance of a natural environment (Sievänen & Neuvonen, 2011). Therefore, the results of this study may only apply to those who have a good access to natural environments and visit natural environments on a regular basis.

Second, the data were collected at one point in time, and thus the results cannot be interpreted in terms of causalities. Even though the mediational model we tested reflected the causal order of the nature experience – motives *prior to* exposure were regressed on attention *during* the experience, which were both regressed on the *post-visit mental states* – the causal order of the relationships may just as well have been the reverse because the experiences were based on memories.

Third, human memory is known to produce bias (Cooper, 1998). We assessed potential systematic memory bias in the initial screening of the data by correlating all the analyzed measures with the length of time between the reported visits and the replies. Only two significant correlations were found, and they were both small. Thus, we considered it safe to assume that the memory-based responses were relatively unbiased by time. Had the data been collected during on-site nature experiences, the responses may have been more objective (Wirtz, Kruger, Napa Scollon, & Diener, 2003) but, at the same time, the experiences may have lacked authenticity due to the awareness of being recorded (Stewart & Hull, 1996). The advantage of this type of cross-sectional survey design is that we can conclude that the reported nature experiences were not affected by such bias.

Fourth, one could argue that as the reported experiences were from a familiar place or route, it is difficult to know whether the responses have actually been based on the most recent visit or the recollection of an “average visit” to the location. To minimize this risk, respondents were repeatedly instructed to reply based on their previous visit to the typical place or route. Additionally, to assess

potential bias caused by more trait- than state-based responses, we examined correlations between all analyzed measures and the familiarity of the route or place, measured by the time passed since the first visit there. No correlations between familiarity and the measures were found, which means that the respondents replied similarly regardless of how familiar they were with the place or route.

Conclusions and directions for future research

Overall, motives and attentional focus both seem to be important aspects of nature visits, as they explain a major share of the outcomes of visiting natural environments. While greater nature relatedness may increase the amount of time spent in green environments (Lin, Fuller, Bush, Gaston, & Shanahan, 2014), one of the main results of this study is that the well-being benefits of nature experiences appear to be related to a much broader range of motives and attentional foci. The motive to reduce stress seems especially strongly related to restorative experiences and positive post-visit mental states, suggesting that the benefits of a nature experience could actually be the result of a conscious effort to reduce stress. Motives for physical fitness, being alone, and experiencing nature appear to match attentional foci while in nature, which, in turn, is connected to greater restoration and emotional well-being after the visit. Creativity, as a high-level cognitive function, seems mainly connected to focusing on one's own thoughts and emotions. The motives we assessed in this study were limited so it is possible that other motives are also important in terms of these outcomes.

This research has raised many questions that require further investigation. The study focused on mainly enthusiastic visitors to nature who described a place they had a tendency to visit. More research efforts on the generalizability of the results are required, especially regarding those with limited access and/or low interest to visit nature. We know that motives influence the type of environment that one chooses to visit (Irvine et al., 2013; Kassavou et al., 2015) but whether (and how) environmental qualities influence how attention is directed during nature visits is another

interesting topic that merits further research. Additionally, causalities regarding well-being mechanisms in nature experiences remain a matter for future studies. Positive mood has been identified as a consistent benefit of nature exposure (McMahan & Estes, 2015), and it could underlie both enhanced creativity (Baas et al., 2008) and a broadened range of attentional focus (Fredrickson & Branigan, 2005). Regarding causalities and the role of attentional focus, tentative evidence shows that purposeful attention direction while exposed to nature facilitates attentional functioning (Duvall, 2011; Lin et al., 2014). If the positive post-visit mental states are even partly the result of optimally directed attention, the well-being effects of nature experiences could be enhanced by conscious efforts to direct attention for people who visit natural environments regularly.

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Table 1. Sample characteristics

Variable	<i>n</i>	Category	Share (%)
Gender	561	Male	39.8
		Female	60.2
Age (years) ^a	564	15-34	23.1
		35-54	46.2
		55-64	21.1
		≥65	9.6
		Outdoor recreation frequency ^a	563
		4-6 times a week	24.2
		2-3 times a week	33.9
		≤ Once a week	16.5
First visit to the recreation area (or route)	557	< 1 year ago	9.2
		1-3 years ago	21.0
		≥4-10 years ago	69.9
(Approximate) share of all outdoor recreation in this place/route ^a	560	Only a small	3.4
		A quarter - half	46.1
		Three quarters	33.0
		All or almost all	17.5
Previous visit to the place/route ^a	559	Today	27.7
		Yesterday	20.9
		2-6 days ago	29.5
		≥1 week ago	21.8

^a Some categories have been combined

Table 2. The exploratory factor structure of the assessed post-visit outcomes in the ESEM model, with standardized estimates and standard errors.

Post-visit outcomes of the most recent nature visit	F1 Restorativeness	F2 Creativity	F3 Emot. well-being	Residual variance
I calmed down.	.81 (.03)	-.02 (.03)	.03 (.03)	.32
My concentration and alertness increased.	.94 (.03)	.06 (.02)	-.14 (.04)	.24
I got new spirit for my everyday routines.	.75 (.03)	-.02 (.03)	.13 (.04)	.29
I restored and relaxed.	.84 (.03)	-.07 (.03)	.11 (.03)	.21
I forgot everyday worries.	.62 (.04)	<.01 (.03)	.17 (.04)	.43
My thoughts were clarified.	.77 (.03)	.12 (.03)	.01 (.03)	.32
I came up with many new ideas.	-.02 (.04)	.72 (.03)	.11 (.05)	.43
I got excited about a new idea.	-.16 (.05)	.97 (.02)	.02 (.01)	.15
I figured a solution a problem that had been bothering me.	.08 (.03)	.89 (.03)	-.21 (.05)	.27
I felt particularly creative after being outdoors.	.06 (.04)	.62 (.03)	.25 (.05)	.38
Happiness	-.03 (.03)	.01 (.02)	.92 (.03)	.17
Calmness	.20 (.04)	.03 (.03)	.68 (.03)	.30
Joy	.08 (.04)	.01 (.02)	.80 (.03)	.26
I felt alive and vital.	.18 (.04)	.05 (.03)	.66 (.03)	.34
I was fairly satisfied with my life.	-.05 (.04)	-.02 (.03)	.76 (.03)	.48
Scale <i>M</i> and <i>SD</i>	5.27 (.93)	3.57 (1.38)	5.30 (.90)	
Correlations between the factors	F1	.23	.54	
	F2		.28	

Note. Oblique Geomin rotation with $\epsilon=0.01$. In bold: loadings >0.40 .

Table 3. Standardized significant indirect connections from the independent factors to the outcome factors in the restricted and unrestricted models.

Model	Motive	Attentional focus	Outcome	Std. indirect effect	SE
Restricted	To be physically active	Activity	Restorativeness	.05**	.02
			Emotional well-being	.04*	.02
	To be alone	Oneself	Restorativeness	.12***	.02
			Creativity	.16***	.03
			Emotional well-being	.09***	.03
	To socialize	Oneself	Restorativeness	.03**	.01
			Creativity	.05**	.02
			Emotional well-being	.03*	.01
	To experience nature	Environment	Emotional well-being	.11***	.03
Unrestricted	To be physically active	Activity	Restorativeness	.04*	.01
			Emotional well-being	.03*	.01
	To be alone	Oneself	Restorativeness	.05*	.02
			Creativity	.09**	.03
	To socialize	Activity	Restorativeness	.03*	.02
	To reduce stress	Oneself	Restorativeness	.03*	.01
			Creativity	.06*	.03
	To experience nature	Environment	Emotional well-being	.10**	.04

* $p < .05$ ** $p < .01$ *** $p < .001$

Table 4. Standardized total effects and their standard errors from the motives to the outcomes.

		Restorativeness	Creativity	Emotional well-being
Restricted	To be physically active	-.02 (.06)	-.01 (.07)	.12 (.07)
	To be alone	-.15 (.10)	.05 (.11)	-.40** (.12)
	To socialize	-.12 (.09)	.07 (.09)	-.17 (.10)
	To reduce stress	.88*** (.13)	.15 (.14)	.57*** (.13)
	To experience nature	-.08 (.09)	.19* (.10)	.16 (.09)
Unrestricted	To be physically active	-.3 (.06)	.01 (.07)	.10 (.07)
	To be alone	-.08 (.09)	.05 (.10)	-.31** (.11)
	To socialize	-.08 (.09)	.06 (.09)	-.14 (.10)
	To reduce stress	.83*** (.11)	.15 (.13)	.50*** (.11)
	To experience nature	-.07 (.10)	.19 (.11)	.20 (.11)

* $p < .05$ ** $p < .01$ *** $p < .001$

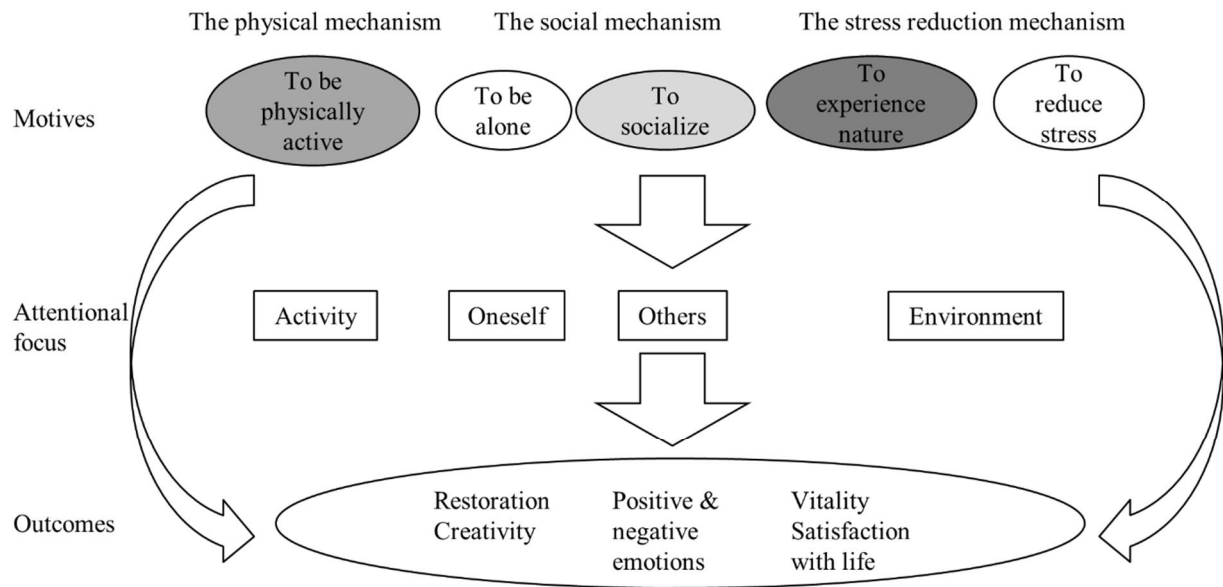


Figure 1 The conceptual model to be tested. The connections from all motives and attentional foci to all outcomes are estimated. The connections between motives and attentional focus are estimated both within (restricted model) and between the overarching mechanisms (unrestricted model). In the motives, the background color reflects the type of motive (Knopf, 1987): white - escape motives; light gray - social affirmation; gray - competence; dark gray - natural stimuli.

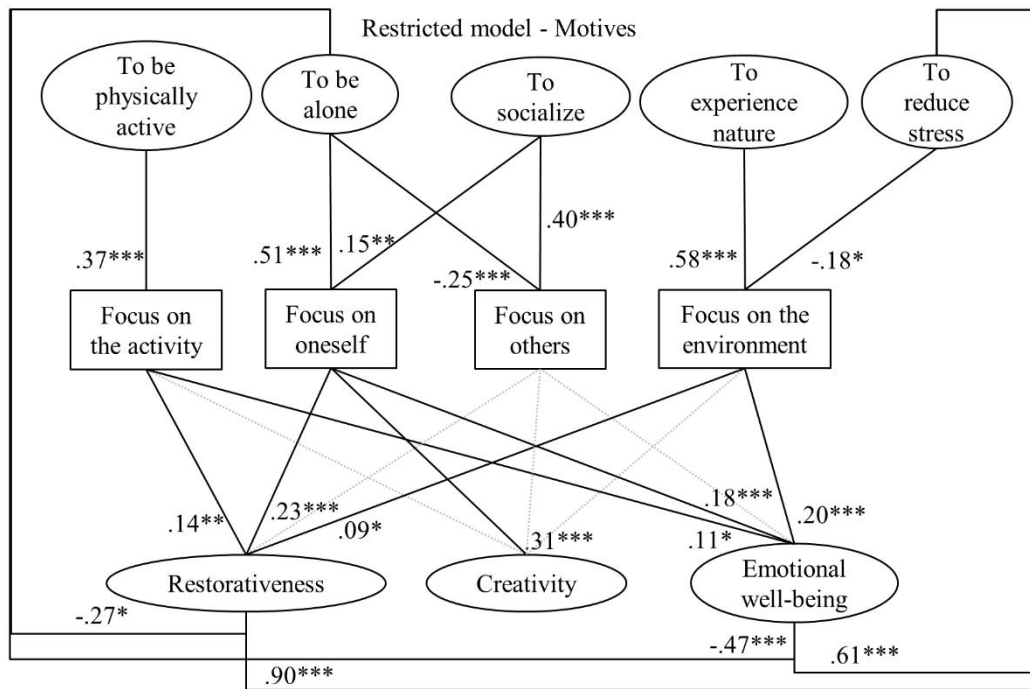


Figure 2 The significant direct paths ($p < .05$; solid lines) of the restricted model ($n = 565$; see supplementary material in online Appendices C.1, C.2, and C.3 for all path estimates and their SE 's). The latent variables are shown in ellipses and non-significant paths in dashed gray lines. For readability, the indicators of the latent variables (online Appendix B.1), covariances, and residual correlations (online Appendix D.1.) are not shown but they are provided as supplementary material.

* $p < .05$ ** $p < .01$ *** $p < .001$

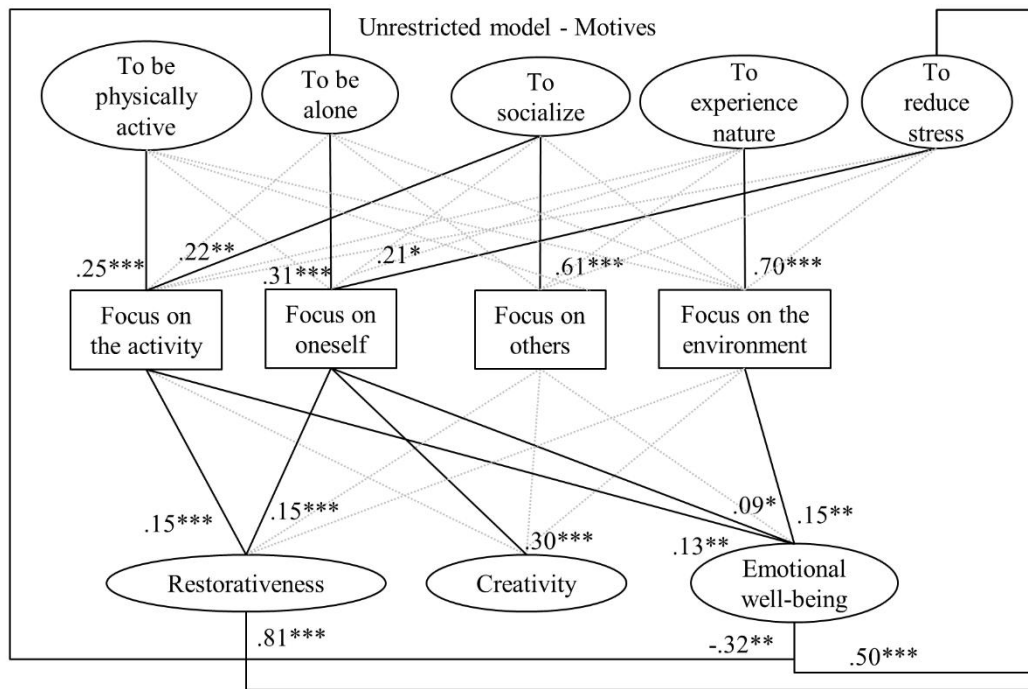


Figure 3 The significant direct paths ($p < .05$; solid lines) of the unrestricted model ($n = 565$; see supplementary material in online Appendices C.1, C.2, and C.3 for all path estimates and their SE 's). The latent variables are shown in ellipses and non-significant paths in dashed gray lines. For readability, the indicators of the latent variables (online Appendix B.1), covariances, and residual correlations (online Appendix D.1.) are not shown but they are provided as supplementary material.

* $p < .05$ ** $p < .01$ *** $p < .001$

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