

LET'S BRING THE OUTDOOR INDOORS

To what extent do plants and daylight in an office environment influence the creative performance positively as mediated by mood?

Zainab El Ahmadi



LET'S BRING THE OUTDOOR ENVIRONMENT INDOORS!

To what extent do plants and daylight in an office environment influence the creative performance positively as mediated by mood?

Master thesis

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Abstract

Objective Creative performance is of high importance and beneficial for individuals to produce new and useful ideas to improve overall performance. This study investigated the effect of a combination of nature-related environmental office elements, plants and daylight, and their influence on creative performance, mood & restoration. The underlying mechanism of mood and restoration is based on the Attention Restoration Theory (Kaplan, 1995). In addition, the combination of environmental elements expands knowledge in the field of environmental psychology of office design.

Method An experimental study was conducted with students (N=100) in an office environment, given that the environment has an influence on the individual. This study was designed as a 2 (daylight vs. non-daylight) x 2 (plants vs. non-plants) between-subjects experiment. The response was measured in terms of creative performance and frequency (number of ideas). The effect of mood was measured twice, once before and once after the experiment. In addition, the environmental preference and the restorative effect were measured (taken from the Attention Restoration Theory).

Results Daylight had a significant effect on creative performance. No effect of plants on creative performance was found. Regarding the number of ideas, the interaction between plants and daylight showed that daylight only has an effect when there are no plants in the environment. Negative and positive mood had no mediating effect on the relationship between the environment and creative performance. Exploratory analysis showed that plants do have an effect on environmental preference.

Conclusion This study indicates that more of a specific element (nature) may not necessarily lead to enhanced results. Investments in daylight should be made, as it adds significant value on creative performance, but care must be taken with elements that cancel out the effects of daylight. Organizations can use these insights strategically to design the environment according to needs. For example, when there are many ideas to be collected (brainstorming sessions), plants should be removed.

Keywords: creative performance, mood, nature, plants, daylight, office environment, restoration.

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1. Introduction

“With creativity, the future becomes an opportunity, not a threat” Moran, 2010

Society at large is driven forward with creative performance (Moran, 2010). Today's environments are changing rapidly and creativity is a crucial ability to add sustainable value (Meinel et al., 2017). Its innovative and improving effect is seen not only in political, scientific and business domains, but also in personal development (Moran, 2010) and well-being (Cropley, 1990; Tamannaefar & Motaghedifard, 2014). Well-being and creativity are often studied in organizational and social psychology (e.g. Acar et al., 2020; Baker et al., 2020; Beute & De Kort, 2013; Davis, 2009; De Dreu et al., 2012; Lan et al., 2020). Creative performance has a positive effect on well-being (Tan et al., 2021), social interaction and communication (conflicts for example) (Moran, 2010). An individual is better able to deal with threats of everyday life, potential opportunities and change in an environment when being creative (Moran, 2010). Creative performance is also crucial in entrepreneurship (De Dreu et al., 2012). As employees are better able to produce new and useful ideas to solve their problems, they generally perform better (Lan et al., 2020). This is not restricted to a specific domain, as an individual can integrate creative performance into any domain (Moran, 2010). Moreover, creative performance by individuals contributes and is the key to innovation, which ultimately makes companies stand out from the competition, established and innovative (Ammabile, 1996; De Dreu et al., 2012).

The design of the office environment plays a role in enhancing the creative performance of employees (Thoring et al., 2021). This will be the focus of this study as the environment affects how employees think, feel and behave (Baker et al., 2020; Meinel et al., 2017). Baker et al, (2020) made a distinction regarding the environmental elements in the office. Environmental elements of the office, include sound, color, light, smell and temperature. Design elements include materials and surfaces, office equipment, furniture, window/view, decorative elements and plants. This study investigates the combination of two nature-related office elements. More specifically, the combination of plants and daylight. The explanation behind combining nature-related elements of the office environment is linked to Kaplan's (1995) Attention Restoration Theory. This theory states that nature has a positive cognitive effect on attention restoration. In an office environment, an individual needs focused attention to perform well, but it loses its strength as time passes. This decline in focused attention is related to mental fatigue and stress. This has a negative effect on accuracy and performance, but also on mood because it can lead to a feeling of irresponsibility and irritability. In sum, a natural landscape effortlessly attracts a person's attention, reduces mental fatigue and restores cognitive capacity.

Plants are acknowledged to influence creative performance in a positive way (Dul & Ceylan, 2011, 2014; Dul et al., 2011; Steiner, 2006). Thus, in addition to their restorative effects, plants also increase curiosity, flexibility of thought and the generation of new ideas (De Dreu et al., 2012). Moreover, multiple studies have found significant effects of environmental office elements such as plants on mood and creative performance (Shibata & Suzuki, 2004; Thoring et al., 2021).

Daylight, has been recognized to affect stress and recovery, mood and alertness (Kamath, 2016). According to Kamath (2016), employees do indeed prefer daylight. In addition to the restorative effect that daylight has, it has a positive impact on mood and hence creative performance. This occurs because of the 'connection to the outdoors' that is perceived as positive (Lind, 2010, as cited in Kamath, 2016).

Alongside environmental office elements, positive affective state is also claimed in several studies to have a positive effect on creative performance (Jovanovic, Meinel, Schrödel, & Voigt, 2016; Staw et al., 1994). It has been shown that an individual's positive mood has a positive influence on creative performance (Amabile et al., 2005; Baas, 2008; Davis, 2009; Isen et al., 1987; Nijstad et al., 2010; Staw et al., 1994). Mood is the underlying process of creative performance. This leads to mood being considered as the mediating variable in this research (Nijstad et al., 2010).

Numerous studies have been published on either one or the other office element such as plants and daylight and their effect on mood, which ultimately affects creative performance (Baker et al., 2020; Beute & De Kort, 2013; Davis, 2009; de Dreu et al., 2012; Lan et al., 2020). Hence, what is not yet clear is the combination of the various office elements in combination with individuals' state of mood on creative performance. As Cheung and Zhang (2021) argued, research is needed to determine how mood and environmental elements can enhance employees' creative performance. Moreover, according to a literature review by Meinel et al., (2017) the number of studies that empirically investigate the effect of a combination of different nature-related office elements is relatively small. This is in line with the findings of Reich (2022), as he emphasizes the importance of investing in understanding and contextualizing the information that exists on different levels (e.g. emotions and creative performance), applications (e.g. different elements of the environment) and cases (e.g. context such as health or organizational for example).

The main purpose is therefore to provide insight into the extent to which plants and daylight in the office environment influence creative performance, mediated by the mood of employees. This study aims to contribute to the science of environmental psychology with a deeper understanding of the environmental effect. The practical purpose is to provide organizations, especially those where innovation is important, with valuable information on

possible office designs to enhance employees' creative performance. The research question addressed in this study is formulated as follows:

To what extent do plants and daylight in an office environment influence the creative performance positively as mediated by mood ?

2. Theoretical framework

2.1 Creative performance

The definition of creativity is divided into three components (Kaufman & Sternberg, 2007). A creative idea must represent something innovative and new. Furthermore, a creative idea must be of high quality. Finally, a creative idea must be relevant, novel and good.

Translating the definition to the organizational context gives us "the creation of a valuable, useful new product, service, idea, procedure or process by individuals working together in a complex social system" (Woodman et al., 1993, as cited in, Kaufman & Sternberg, 2019).

Creativity might refer to a product, a place, a process or a person. Creative performance is defined as "the generation of insights, problem solutions and ideas that are new and potentially useful" (Amabile, 1996; Mumford & Gustafson, 1988, as cited in, De Dreu et al., 2012).

"With the world changing more rapidly than ever before, creativity is at a historical premium" (Kaufman & Sternberg, 2007). In the high-tech sector, for example, the life cycle of products has dropped from ten years to six months. Therefore, creative performance is highly necessary in today's organizations. Employees must be creative to meet the challenge of rapid change (Hunter and Schmidt 1996, as cited in Kaufman & Sternberg, 2019). Creative performance mechanisms in organizations can be classified into individual and organizational (group-based) (Bharadwaj & Menon, 2000). This study has a focus on individual mechanisms and the impact that the environment has on them. Amabile (1988) pointed out the importance of this focus because it is the center of creativity and innovation in organizations. Among the psychological measures of creative performance - the study of individual differences in creative ability and potential - the one offering the most potential for substantiating creative performance is divergent thinking (Plucker & Renzulli, 1999; Runco, 2007, as cited in Silvia et al., 2008). As both originality and novelty of creative response involve the ability to think fluently and flexible (McCrae, 1987). Divergent thinking aims to capture both elements, the quality of creative responses and the number of responses (Silvia et al., 2008).

2.2 The role of mood

The affective state of an individual can be divided into mood and emotion. Mood, compared to emotion, is an affective state that is experienced over a longer period of time, is subject to context and is not involved in a specific relationship (Davis, 2009). Mood is (empirically) subdivided into positive and negative affective states.

As mentioned earlier, creative performance is defined as "the generation of insights, problem solutions and ideas that are new and potentially useful" (Amabile, 1996; Mumford & Gustafson, 1988, as cited in, De Dreu et al., 2012). Creative performance is applicable and crucial in work, life, education and society. Moreover, it is a key element for the progress of human civilization (Tang, 2017).

The affective state, mood, makes an important contribution to creative performance (Lan et al., 2020). A study by Beute & De Kort (2013) showed that positive mood has a positive influence on mental resources, however, the context was related to health. The results are similar to those reported by Fredrickson & Joiner (2002). According to Fredrickson & Joiner (2002), positive emotions expand our thinking capacity and enable more global, creative thinking. This, in turn, allows us to expand both our mental and social resources. These resources will help us to better cope with stressors in the future, thus cushioning possible harmful effects of stress on our health.

The state of well-being induced by the positive mood evokes a relaxed approach to the task, whereas the state of stress is induced by the negative mood, which has a negative effect on creative performance (Davis, 2009). Therefore, the following hypothesis was formulated:

Hypothesis 1: A positive mood, results in a high level of creative performance

Various studies have investigated the effects of environmental elements such as plants and daylight on mood and creative performance (Desmet et al., 2021; Shibata & Suzuki, 2004). The present section discusses research investigating plants and daylight's potential to induce positive mood, and its effect on creative performance.

2.3 The role of plants

2.3.1. The effect of plants on creative performance

A qualitative study by Plambech and Konijnendijk Van Den Bosch (2015) investigated the effect of nature environments on creative performance. According to them, an environmental element such as plants promotes creative performance. Nature does facilitate creative performance by increasing an individual's curiosity. Moreover, it helps with flexibility in the way of thinking and the generation of new ideas (De Dreu et al., 2012), which are building blocks for creative performance (Plambech & Konijnendijk Van Den Bosch, 2015). Several studies have found that plants improve creative performance (Dul & Ceylan, 2011, 2014; Dul et al., 2011; Steiner, 2006; Stone, 1998). Ceylan et al. (2008) found that offices with plants are linked to high levels of creative potential. These results are similar to those of Hoff and Öberg (2015), which was based on interviews with creative professionals. Shibata and Suzuki (2004) indicated that creative performance in an association test was significantly better when there was a plant in the room than when no plant was placed.

This can be explained by the connection with Kaplan's (1995) Attention Restoration Theory. The fascinating effect of the natural landscape may be that it retains one's attention, reduces mental fatigue and improves cognitive awareness. As McCoy and Evans (2002) pointed out, the restorative effects of nature may be similar to the sense of freedom and openness that Rogers (1954) identified as enhancing creative performance. This is related to the previously mentioned effect of curiosity (Plambech & Konijnendijk Van Den Bosch, 2015). These effects can be facilitated by remaining present in the indoor physical environment while providing a natural view through a window to create exposure to the natural environment (McCoy & Evans, 2002). The findings of McCoy and Evans (2002) are in line with the findings of Yu and Hsieh (2020). Their statement was that the experience of being exposed to nature does enhance creative performance through recovery from mental fatigue. A similar statement suggesting that the recovery effect will increase attentional and cognitive performance, which are important for creative performance, is used by other researchers (Berman et al. 2008, Plambech & Konijnendijk van den Bosch, 2015).

2.3.1. The effect of plants on mood

The mood state of an individual is positively impacted by plants (Shibata & Suzuki, 2004). As mentioned earlier, this is beneficial for creative performance (Beute & De Kort, 2013; Lan et al., 2020). Moreover, negative mood tends to limit an individual's attention capacity. Since creative performance requires attention, nature also has a significant effect on this. Nature tends to recharge an individual's attention, which is related to Kaplan's (1995) Attention

Restoration theory. This has a positive effect on the stimulation of the brain without wasting energy on spontaneous attention. This high level of spontaneous attention is common in urban environments such as the office. An individual's brain can be 'hit' by millions of types of information per second, all of which appeal to or affect an individual's attention capacity. Of those millions of pieces of information, only 15-20 are cognitively processed. The remaining parts of the information must be sorted, which consumes a large number of energy (Plambech & Konijnendijk Van Den Bosch, 2015).

Hypothesis 2: The use of plants in office environment has a positive effect on mood which results in a higher level of creative performance

2.4 The role of daylight

2.4.1. The effect of daylight on creative performance

Daylight has a positive effect on visual performance, spatial recognition, stress and recovery, circadian regulation, mood alertness, cognition and other health benefits such as vitamin D (Kamath, 2016). Back in the day, daylight was the only source of light (Kamath, 2016). Over the years, mankind has created artificial light that suits modern life (Vilar, 2010). The amount of time workers spend in urban spaces around the world is very high. This results in a lack of exposure to daylight compared to artificial light. The lack of daylight has a negative impact on the health of workers. For example, in 1946, when a factory was built without daylight, workers experienced various health problems such as headaches and fatigue (Edward & Torcellini, 2002, as cited in, Kamath, 2016). These insights are in line with the findings of Evans and McCoy (1998) who stated that people generally live 90% of their lives indoors. As urbanization, fast-paced lifestyles and technological advances continue, the amount of time people spend in natural environments continues to decline (Yu & Hsieh, 2020). In terms of health, research on light has shown that it affects the brain, from physiological effects to cognitive and affective functions such as attention and problem solving (Mukae & Sato 1992; Stevens et al. 2007, as cited in Desmet et al, 2021).

According to Lind (2010), low quality lighting in indoor environments is the greatest discomfort experienced by employees. Moreover, workers prefer daylight (Cuttle, 2002; Heerhagen and Heerhagen, 1986; Ludlow, 1976; Markus, 1967, as cited in Boyce et al., 2003). As 35% of the workers felt that the lack of daylight and thus windows, was the biggest complaint (Kamath, 2016). These findings are consistent with those of a more recent study by Kamath (2016). Based on results of a survey questionnaire on preferences in office lighting design, 96% indicated that daylight is crucial in office lighting. According to the literature, daylight is

associated with the restorative effects of nature. To return (briefly) to the restorative phenomenon: a natural landscape reduces mental fatigue and restores cognitive ability. The effect of daylight on recovery has also been demonstrated in health studies. Such as the study by Edward and Torcellini (2002), who found that patients recover better with outdoor views (plants and daylight) compared to environments that lack windows (Kamath, 2016). Exposure to daylight and its enhancing effect on creative performance has been studied (Dul & Ceylan, 2011; Dul et al., 2011; Hoff & Öberg, 2015, as cited in Meinel et al., 2015). In addition, daylight has a positive effect on improving an employee's positive mood (Kamath, 2016).

2.4.2. The effect of daylight on mood

Research links the effect of daylight on mood (Isen & Baron, 1998) and thus on creative performance. According to Edward and Torcellini (2002), this has to do with the perception of the environment, which is greater with daylight. This effect is experienced positively by employees. Moreover, it acts as a link between the outdoor and indoor environment, which has a positive effect on mood. This is linked to the previously mentioned restorative effect of nature-related office elements. The positive mood boosted by daylight then has an additional positive effect on motivation, commitment to work, job satisfaction etc. (Kamath, 2016).

The explanation of a change in mood is due to a possible difference between the reality experienced and the expectations that the subjects have of the employee. The greater the dissonance, the more negative the mood becomes. These findings show how important it is to understand the subjects' expectations of daylight. Indeed, it is important to understand that daylight, like artificial light, has a negative effect on mood when it causes thermal and visual discomfort and any privacy-related problem (Boyce et al., 2003).

Hypothesis 3: The use of daylight in office environment has a positive effect on mood which results in a higher level of creative performance.

2.5 The interacting effect of daylight and plants

This study investigates whether the combination of two nature-related office elements, plants and daylight, interact. The reasoning behind this combination of nature-related elements of the office environment is linked to Kaplan's (1995) Attention Restoration Theory. A possible justification for why the two can reinforce each other is that on a scale from urban to rural (natural), while the office lies somewhere in between the two points. When only one natural element is added, the office environment becomes more rural. The assumption is that the more natural elements there are, the more rural the environment becomes and thus the effect is enhanced. Moreover, since both elements have a positive effect on the mediating variable

(mood), the hypothesis of the interactive effect of the combination is then a logical prediction. From this, the following question is derived:

Does the combination of plants and daylight in office environment has a more intense effect on mood which results in a higher level of creative performance?

2.6 Research model

The following research model is used as a guide for this social science research. The independent variables (plants and daylight), the mediating variable (mood) and the dependent variable (creative performance) are visualized.

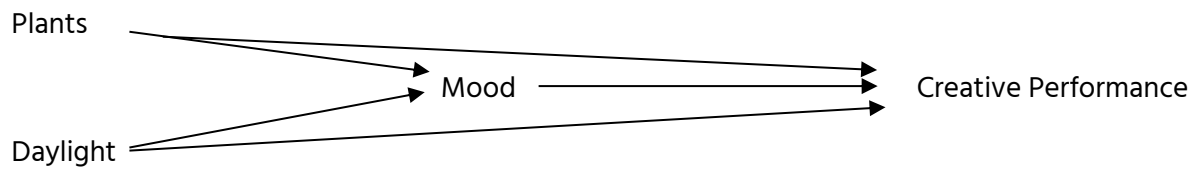


Figure 1 Research model

3. Methodology

3.1 Experimental research design

This research was designed as a 2x2 between-subjects design to measure mood and creative performance. A field experiment with nature-related office elements was manipulated, plants and daylight. The response in terms of creative performance and the mediating effect of mood was measured. The independent variables in this study are therefore plants and daylight. The dependent variable is creative performance. In addition, the restorative effect was measured. In this experiment, a real office was set up to provide a more realistic scene for the experiment. Measurements were taken from Monday to Friday for four weeks. To avoid differences due to the day (Friday and Monday) or even the time or day, the conditions were alternated (Allen et al., 2016). A schedule was utilized to plan this out. The hours during which the participants could participate were, in accordance with the average working hours, from 9 a.m. to 5 p.m. The day was split into half-hour blocks, which facilitated the invite process. The participants were entitled to choose a time and a day to participate, as long as it fitted in the half-hour time available for them to roll in. Participants were therefore not randomly exposed to one of the conditions, as they made their own decision on when to participate. The following table shows the distribution of the four conditions.

Condition 1	Condition 2	Condition 3	Condition 4
Daylight	Daylight	No daylight	No daylight
X	X	X	X
Plants	No plants	Plants	No Plants

Table 1 Segmentation of the experimental conditions

This experiment required renting a room with the appearance of an office in the Cubicus building of the University of Twente for four weeks. The presence or absence of daylight was manipulated by having the dark blinds open or closed. The plants were manipulated by adding dark green potted plants into the office environment. Multiple plants were positioned strategically, in a visual angle of the participant (Hermans et al., 2019) and within three meters from the participant (Mattson & Kim, 2002). As the office was quite large, a little plant was placed on the table. Finally, a larger dark green potted plant at the other corner of the office was positioned. This was done to have an equal distribution of the plants in the office environment. The office did have in total 5 windows, 3 large and two smaller with a view to trees outside the building. The walls were having a neutral look, however some parts of the walls were colored red. An impression of the office is presented in Figure 2.



Figure 2 Impression of the office through photographs.

3.2 Procedure

Prior to conducting the study, ethical approval was obtained from the Ethics Committee of Behavioral Management and Social Sciences (BMS). The participants were not aware of the actual experiment, they only knew that the researcher was interested in the psychology of creativity (Silvia et al., 2008).

At the start of the experiment, participants were greeted and thanked for their willingness to participate. Before entering the office where the experiment was conducted, respondents were asked to complete the mood questionnaire outside the office at a coffee table. This was done in order to measure the exact state of mind upon arrival in the experiment room.

Before starting the first task, some time was deliberately set aside to prepare the necessary papers. This was done to give them a chance to subconsciously observe the experiment room. Next, creative performance and mood were assessed in turn. First, creative performance was measured with the divergent thinking and originality task (Guilford, 1950, as cited in Silvia et al.,; Madjar & Oldham, 2002). Participants were instructed to try to be creative, as this has a positive effect on the validity of the test (Harrington, 1975, as cited in Silvia et al., 2008).

Subsequently, exactly the same mood questionnaire was completed again by the participants. This was done twice intentionally, once before and once at the end of the experiment, to measure the possible effect of the environmental elements of the office and their effect on mood. In addition, the preference of the office environment was assessed. Finally, the restorative effect was measured by means of a self-reported questionnaire. After the experiment, participants were given the opportunity to ask questions and were thanked for their participation.

The introduction and the general questionnaire can be found in Appendix A. The exact measurement of mood, creative performance and restorative effect is described in the next section.

3.3 Measurement and data analysis

The measurement of creative performance, mood, restoration and environmental preference are based on instruments that have been tested as valid in previous research. For each construct of a measurement, Cronbach's alpha scores were calculated.

3.3.1 The measurement of creative performance

The divergent thinking and originality task (Guilford, 1950, as cited in Silvia et al., 2008) is an instrument that measures creative performance for years (Madjar & Oldham, 2002; Lichtenfeld et al., 2012; Zhang & Bartol, 2010). The test consists of asking the participant to generate unusual and new uses for five different objects (e.g. brick, newspaper, etc.). The motivation behind the choice of this specific unusual-use tasks is that they have the highest reliability score compared to other divergent thinking tasks (Silvia et al., 2008). Participants were then instructed not to repeat a function, and the uses had to be useful and meaningful. All participants were given 20 minutes to work on this task.

Frequency, which refers to the sum of unusual uses for all five objects (newspaper, brick, etc.), was evaluated. Then the overall creative performance was evaluated, which refers to the extent to which the generated applications were both novel and useful. A scale from 1 (not at all creative) to 7 (very creative) was used for each of the five objects. The internal consistency reliability of the creative performance in this study was satisfactory (Cronbach's $\alpha = .92$)

3.3.2 The measurement of mood

The distinction between positive and negative mood is critical to perform this experiment. The PANAS (Watson et al., 1988, as cited in Crawford & Henry, 2004) is a questionnaire which includes main factors related to the positive affect which relates to the positive mood. The negative affect is regarding the negative mood state (Kennedy-Moore et al., 1992; Watson et al., 1988, as cited in Crawford & Henry, 2004).

Respondents rated each mood experienced at that time outside and inside the experimental room. Intensity of the specific mood was rated using a five-point scale. The segmentation of the 20 mood options is according to the state of the mood: positive versus negative. The different mood states associated with each category are presented in Table 2 (Kennedy-Moore et al., 1992). The Dutch translated version of the PANAS can be found in Appendix B (Peeters et al., 1996, as cited in Engelen et al., 2006). The PANAS internal consistency reliability was satisfactory in the present study (Cronbach's $\alpha = 0.77$; for pre positive affect, Cronbach's $\alpha = .86$; for pre negative affect, Cronbach's $\alpha = .76$; for post positive affect, Cronbach's $\alpha = .82$; for post negative affect).

Positive	Negative
Interested	Distressed
Excited	Upset
Strong	Guilty
Enthusiastic	Scared
Proud	Hostile
Alert	Irritable
Inspired	Ashamed
Determined	Nervous
Attentive	Jittery
Active	Afraid

Table 2 The different categories of PANAS (Watson et al., 1988, as cited in Engelen et al., 2006)

Additionally the perception of the environment and restoration was measured. The rationale is to verify whether the natural elements have had an impact. In the base, the environment must be at least restorative given the theory involved, Attention Restoration Theory. First the

measurement of the environment will be discussed, then the measurement of the restorative effect.

3.3.4 The measurement of the environment

As in the study by Shibata and Suzuki (2004), a questionnaire was used to assess participants' perceptions of the environment. However, the exact five elements of this study were based on the study by Pals et al, (2014). Respondents were asked how they evaluated the space with respect to five different items. The bipolar questions were assessed using a seven-point scale, indicating the intensity felt.

1. Unpleasant/Pleasant
2. Negative/Positive
3. Unattractive/Attractive
4. Unpleasant/Highly Pleasant
5. Unstimulating/Stimulating

The internal consistency reliability of the measurement of environment was satisfactory in the present study (Cronbach's $\alpha = .84$).

3.3.5 The measurement the restorative effect

Since the presence or absence of plants and daylight are both nature-related office elements, a restorative effect is expected. Therefore, the measurement of the presence of the restorative effect was added to the questionnaire to test whether the restorative effect occurred or not. The restorative effect was measured by a self-reported measure from Staats et al., (2003), as cited in Pals et al., (2014). The Dutch translation can be found in Appendix E.

The following questions were used:

1. "In the office environment I was able to concentrate well",
2. "In the office environment I was able to focus on myself",
3. "In the office environment I was able to release all tension",
4. "In the office environment I was able to relax", and
5. "In the office environment my energy level got renewed".

The internal consistency reliability of the measurement of the restorative effect was satisfactory in the present study (Cronbach's $\alpha = .77$)

3.5 Participants

This experimental study was conducted among Dutch students at the University of Twente. The characteristics of the respondents did represent diversity in age and gender. However, a distinction was made in the type of study. The focus was on creative and technological studies, such as communication sciences or industrial engineering, because creative performance and innovation are important components in these fields.

3.5.1 The sample characteristics

In order to prevent a certain characteristic from being over-represented in a condition, the distribution of the characteristics in the sample must be even. A Chi-square test was performed for the characteristics age, gender, what kind of environment they live in and what kind of environment they are usually in. All characteristics were found to be not significantly different between the four conditions. The significance limit was set at .05. The independent sample t-test indicated that there was no significant difference in the sample population between the different conditions. The results showed that the sample was evenly distributed across the conditions, which allowed further analysis ($P > .05$). The means and standard deviations of the various characteristics are presented in Table 3.

	Plant		Non-plant	
<i>Daylight</i>				
	N	25		25
Age a)		21.24 M/2.54 SD		22.36 M/ 2.86 SD
Gender b)		Male 25,00%		Male 22,50%
		Female 25,00%		Female 26,70%
The general living environment c)		4.72 M/1.65 SD		4.42 M/ 1.39 SD
The most lived environment d)		4.76 M/1.05 SD		4.48 M/ 1.39 SD
<i>Non-daylight</i>				
	N	25		25
Age a)		21.16 M/ 2.23 SD		21.88 M/ 2.279 SD
Gender b)		Male 17,50%		Male 35,00%
		Female 30,00%		Female 18,30%
The general living environment c)		4.72 M/ 1.31 SD		4.44 M/ 1.69 SD
The most lived environment d)		4.48 M/ 1.09 SD		5.00 M/ 1.258 SD

a) Mean + SD of self reported age
b) Percentage division Male/ Female
c) Mean: 1)=Extremely rural/ 2)=Moderately rural/3)=Fairly rural/4)=Neutral/5)=Fairly urban/6)=Moderately urban/7)=extremely urban
d) Mean: 1)=Extremely rural/ 2)=Moderately rural/3)=Fairly rural/4)=Neutral/5)=Fairly urban/6)=Moderately urban/7)=extremely urban

Table 3 The sample characteristics per condition

4. The results

4.1 The impact of the office environment on the creative performance

4.1.1 The main effect of daylight

A significant main effect of daylight was found on overall creative performance $F(1,99)=7.24$, $p\text{-value}=0.008$. However, no significant main effect of daylight was found on frequency $F(1,99)=2.86$, $p\text{-value}=0.09$. As can be seen in Table 4, regarding the overall creative performance score, the respondents were significantly more creative ($M=4.56$, $SD=0.674$) in the daylight condition than in the no daylight condition ($M=3.90$, $SD=0.69$). Regarding the number of ideas produced, frequency, participants showed no significant difference between the daylight ($M=23.18$, $SD=9.12$) and the no daylight condition ($M=20.00$, $SD=9.91$).

4.1.2 The main effect of plants

No significant main effect of plants was found on overall creative performance $F(1,99)=2.47$, $p\text{-value}=0.12$ and frequency $F(1,99)=0.08$, $p\text{-value}=0.76$. As can be seen in Table 4, in terms of overall creative performance score, respondents were not significantly more creative in the plant condition ($M=4.25$, $SD=0.79$) than in the no-plant condition ($M=4.03$, $SD=0.64$). Regarding frequency, respondents did not show a significant difference between the plant condition ($M=21.32$, $SD=8.58$) and the no-plant condition ($M=21.86$, $SD=10.63$).

		Plants		No Plants	
		Mean	SD	Mean	SD
<i>Daylight</i>					
	Overall Creative score a)	4.56	0.64	4.19	0.67
	Frequency	20.92	8.31	25.44	9.51
<i>No daylight</i>					
	Overall Creative score a)	3.93	0.80	3.88	0.57
	Frequency	21.72	9.01	18.28	10.65

a) Mean: 7-point likert scale

Table 4 The impact of the office environment on the creative performance

4.1.3 The interacting effect: daylight x plants

No significant interaction effect was found on the overall creative performance score $F(1,99)=1.31$, $p\text{-value}=.26$). However, a significant interaction effect was found concerning the number of ideas produced. This interaction is presented in Figure 3. A further analysis of this interaction pattern shows that in the condition without plants, daylight is significant $F(1,96)=7.24$, $p\text{-value}=.008$. In the condition with plants, this effect is non-significant ($F < 1$, ns). In sum, only in the no-plant condition daylight has an effect.

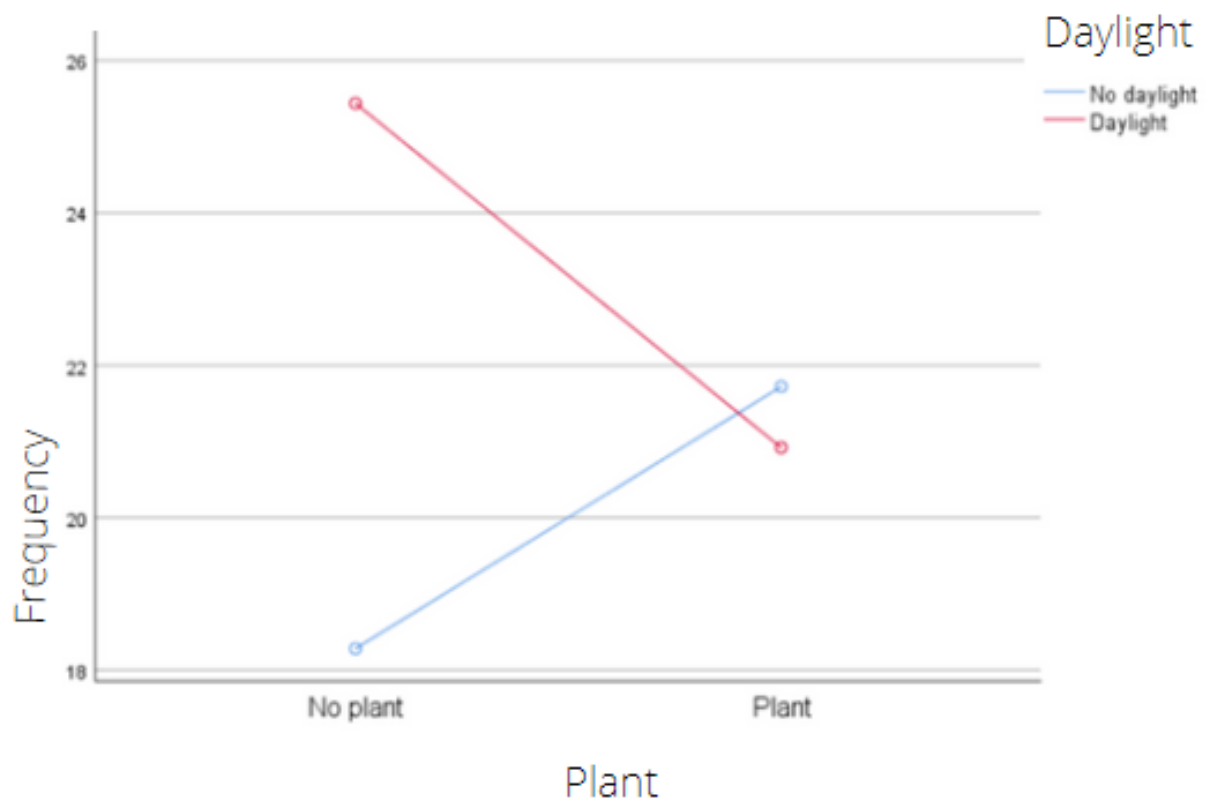


Figure 3 The interaction of plants and daylight on frequency

4.2 The impact of the office environment on the change in mood

A 2x2 mixed model ANOVA was used to examine the influence of the office environment on the difference in employees' mood. The rating scale was administered pre- and post-experiment. The influence of the office environment on the students was also examined. The Shapiro-Wilk, Fmax and Levene's test statistics were used to test the assumptions of normality and homogeneity of variance. The assumptions for a mixed model ANOVA were not violated.

4.2.1 The negative mood

A significant difference between the two measures of negative affect was obtained $F(1,96)=4.11$, $p\text{-value}=.045$ with interval confidence levels after the experiment ($M=16.10$; $SD=0.52$) significantly lower than before exposure to the experiment ($M=16.60$; $SD=0.56$). In this case, the negative affect score decreased after the experiment. No significant main effect for daylight was found ($F(1,96)=1.14$, $p\text{-value}=.288$) when plants and the interaction effect were taken into account. No significant main effect for plants was found: ($F(1,96)=2.82$, $p\text{-value}=.097$) when daylight and the interaction effect were taken into account. The interaction effect between plants and daylight showed no significant main effect $F(1,96)=1.06$, $p\text{-value}=.306$.

4.2.2 The positive mood

No significant difference between the two measures of positive affect was obtained $F(1,96)=0.213$, $p\text{-value}=.646$. No significant main effect for daylight was found ($F(1,96)=0.937$, $p\text{-value}=.335$) when plants and the interaction effect were taken into account. No significant main effect for plants was found ($F(1,96)=1.490$, $p\text{-value}=.225$) when daylight and the interaction effect were taken into account. The interaction effect between plants and daylight showed no main effect ($F(1,96)=3.915$, $p\text{-value}=.051$).

4.3 The mediation analysis

The mediating role of mood on the relationship between both daylight and plants on creative performance, specifically the overall creative performance score and the frequency of ideas, was investigated in this study using Hayes' process simulation (Preacher & Hayes, 2004). The results, as presented in Figure 4 and Table 5 & 6, showed that both positive and negative mood had no mediating effect on the relationship between daylight or plants and creative performance.

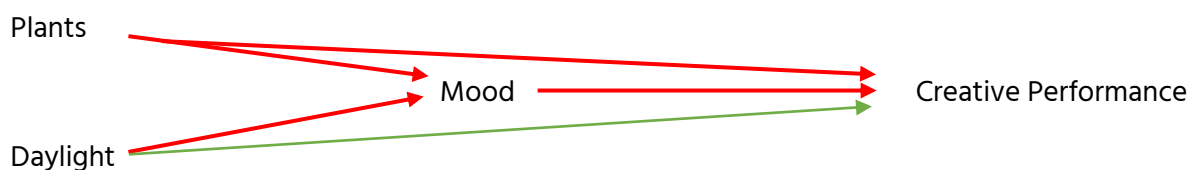


Figure 4 Simplified overview of the absence of a mediating effect of mood

Relationship	Total Effect	Direct Effect	Indirect effect	Confidence interval	
				Lower Bound	Upper Bound
Daylight -> Positive mood -> Overall creative performance	0.47 (p-value<0.01)	0.47 (p-value<0.01)	0.0003	0.0148	-0.036
Daylight -> Positive mood -> Frequency	3.18 (p-value=0.10)	3.26 (p-value=0.09)		-0.8864	0.4178
Plants -> Positive mood -> Overall creative performance	0.2125 (p-value=0.1405)	0.2165 (p-value=0.1366)	-0.004	-0.047	0.0328
Plants-> Positive mood -> Frequency	-0.54 (p-value=0.7804)	-0.7102 (p-value=0.7149)	0.1702	-0.4122	0.959

Table 5 In depth overview of mediating effect of positive mood

Relationship	Total Effect	Direct Effect	Indirect effect	Confidence interval	
				Lower Bound	Upper Bound
Daylight -> Negative mood -> Overall creative performance	0.4724 (p-value=0,0008)	0.4651 (p-value<0.001)	0.0073	-0.0375	0.0635
Daylight -> Negative mood -> Frequency	3.18 (p-value=0.098)	2.788 (p-value=0.141)	0.392	-0.5541	1.3923
Plants -> Negative mood -> Overall creative performance	0.2125 (p-value=0.140)	0.1984 (p-value=0.175)	0.0141	-0.0377	0.1008
Plants-> Negative mood -> Frequency	0.54 (p-value=0.780)	-1.2548 (p-value=0.513)	0.7148	-0.2163	2.0968

Table 6 In depth overview of mediating effect of negative mood

4.4 Exploratory analysis of restoration and environmental preference

The potential relationship between the additional dependent and manipulated variables are tested with the Multivariate Analysis of Variance (MANOVA). According to the results of the MANOVA, no effect was observed regarding the main and interaction effect of daylight and plants on the dependent variable restoration. The same applies to the dependent variable environmental preference. However, a main effect was observed for plant condition and its effect on environmental preference.

4.3.1 The main effect of daylight

No main effect of daylight was detected on the environmental preference ($F(1,99)=0.01$, p -value=.920) and the restoration effect ($F(1,99)=0.16$, p -value=.685). Regarding the environmental preference, the respondents did not significantly prefer daylight ($M=4.30$, $SD=.941$) to the condition without daylight ($M=4.32$, $SD=1.07$). Regarding the restoration effect, respondents showed no difference between the daylight ($M=4.66$, $SD=0.87$) and the no-daylight condition ($M=4.58$, $SD=0.89$).

4.3.2 The main effect of plants

A significant main effect of plants was found on environmental preference ($F(1,99)=5.21$, p -value=.025). However, no effect was found on restoration ($F(1,99)=0.29$, p -value=.594). Regarding the environmental preference, the respondents significantly preferred the condition with plants ($M=4.54$, $SD=1.02$) compared to the condition without plants ($M=4.09$, $SD=0.94$). Regarding the restoration effect, respondents showed no significant difference between the condition with the plant ($M=4.67$, $SD=0.92$) and the condition without plant ($M=4.6$, $SD=0.84$).

4.3.3 The interacting effect: Daylight x Plants

There is no statistically significant interaction effect between daylight and planting according to the MANOVA analysis when it comes to the environmental preference ($F(1,99)=0.01$, p -value=.920) and the restoration effect ($F(1,99)=0.74$, p -value=.39). This means that using a combination of daylight and plants does not lead to a higher level of environmental preference ($M=4.52$, $SD=0.95$) than the no-daylight and plants condition ($M=4.08$, $SD=0.99$). This is similar to the restoration effect, using a combination of daylight and plants does result in a higher level of

restoration (M=4.63, SD=1.03) than the no-daylight and plants condition (M=4.46, SD=0.96).

		Plants		No Plants	
		Mean	SD	Mean	SD
<i>Daylight</i>					
	Preference a)	4.52	0.95	4.09	0.89
	Restoration b)	4.63	1.03	4.68	0.69
<i>No daylight</i>					
	Preference a)	4.56	1.11	4.09	0.99
	Restoration b)	4.71	0.69	4.46	0.96

a) 7-point likert scale
 b) 7-point likert scale

Table 7 The exploratory analysis of restoration and environmental preference

5 Discussion

The main purpose of this study is to provide insight into the extent to which plants and daylight, which mimic a more natural office environment, influence creative performance mediated by mood. In this study, plants had no significant effect on creative performance. However, daylight does appear to be an important office element that promotes creative performance. The interacting effect of daylight and plants was found to have a significant effect on the total number of ideas. Daylight has only in the non-plant condition an effect. The plants and daylight did not have a significant effect on the restoration. However, the presence of plants did result in a higher level of environmental preference. The mediating role of mood was not sustained in this study.

The impact of the office environment on creative performance

Daylight had a significant effect on the overall creative performance score. This is in line with previous research (Dul et al., 2011; Kamath, 2016; Meinel et al., 2015). When it comes to light, different settings affect creativity. Moreover, findings in this area are contradictory (Meinel et al., 2017). One possible reason that daylight had no significant effect on frequency is that dimmed lighting and darkness also promote creativity (Steidle & Werth, 2013). As in the no daylight version, the dark blinds were down, creating a half-dimmed effect when the sun was shining.

The interacting effect of daylight and plants was found to have a significant effect only on the total number of ideas. Daylight only had an effect in the non-plant condition. This can be explained by the possible obstructive effect of plants on the spaciousness of the environment. Indeed, daylight has a positive effect on making an environment more spacious (Edward & Torcellini, 2002, as cited in Kamath, 2016), which is conducive to creative performance (Baird et al., 2012; Thoring et al., 2021). In an empty environment, where stimulation is reduced, it helps the production of ideas. Individuals tend to fill empty environments to make it seem complete, which encourages the expression of ideas even more. This is in line with the Zeigarnik effect in Gestalt psychology (Zeigarnik, 1938).

Surprisingly, the plants showed no significant effect on the dependent variable creative performance. The possible explanation for this effect is the design of the experiment. The office used in the experiment had windows, which made it possible to design the four different conditions. As in the plant condition, the plants were placed right in front of the windows. In the non-plant condition, the natural view of the outside of the office, which also consisted of greenery (trees), may have had a similar effect. This is in line with previous studies showing that the sense of freedom and openness of windows can be identified as enhancing creative performance (Rogers, 1954). Another possible reason is the color of the plants. The plants used in

this study had a dark green color instead of the color combination yellow-green or light green (Elsadek et al., 2016). Moreover, an interesting environmental element that may have hindered the promotion of creativity are the red-colored walls in the office environment. This color is associated with school assessments, traffic lights etc. which is negatively related to creative performance (Eliot et al., 2007). The pots of the plants had a white/beige color, which possibly made the red wall color stand out more.

The impact of the office environment on mood

This study showed that daylight and plants had no significant effect on mood. A possible reason for this could be that the duration of the experiment was not long enough to actually influence mood. As mentioned in the literature review, mood is an affective state that is experienced for a longer period of time (Davis, 2009). Compared to the study by Yu & Hsieh (2020), a longer time period (of three days) was used to test the effect of change in mood, whereas in this study it was about half an hour. Moreover, mood is subject to context (Davis, 2009). Compared to other studies, there are differences in how creative performance is assessed. Different studies have measured creative performance differently, such as at the individual level, team level or organizational level (Althuizen, 2012). Moreover, an individual's mood can be influenced by several cues such as the timing of the experiment, such as late in the day or very early in the morning (Boyce et al., 2003). As this study was conducted from 09:00 to 17:00, the cue of timing might have had a significant effect.

Another plausible explanation for this rather contradictory result could be the degree of motivation of the participants. Intrinsic motivation is important to see effect, as stated in several studies. In this study, (intrinsic) motivation was not measured (Madjar et al., 2002). Moreover, the red-colored walls are related to avoidance motivation (Eliot et al., 2007) which is negatively related to creative performance.

The role of mood

This study found that mood does not have a mediating effect on creative performance. It was expected that positive mood contributes significantly to creative performance as argued in several studies (Beute & De Kort, 2013; De Dreu et al., 2012; Fredrickson & Joiner, 2002). Moreover, there were no differences between positive and negative mood with regard to creative performance, which is in line with a few studies (De Dreu et al., 2008; Vulpe & Dafinoiu, 2011). A possible explanation for this rather contradictory result can be found in a meta-analysis of studies on mood and creativity. It was found that, compared to a neutral state, a positive mood determines a higher level of creative performance, but no significant differences were found between positive and negative affect (De Dreu et al., 2008).

Moreover, according to De Dreu et al., (2008), when a task is perceived as enjoyable and fun, positive mood showed a greater effect. When a task is perceived as achievement-oriented and serious, negative mood had a greater effect. This is consistent with the findings of Akinola & Medes (2007) who state that positive mood can give the participant the indication that the goal of performing creatively can be easily achieved, thus requiring less effort. While negative affect may motivate participants to make extra effort to be creative.

This study used the measurement PANAS (Watson et al., 1988, as cited in Crawford & Henry, 2004) which facilitates the distinction between positive and negative affect. However, whether a mood is positive or negative is not enough, the degree of effect of the affective state must also be taken into account. This is because it plays an important role in the relationship between mood and creativity. Moods may be activating and positive (e.g. happy), while others can be positive and deactivating (e.g. relaxed). This is also the case with negative moods, where activating negative moods (e.g. anger) and deactivating negative moods (e.g. depression) are different. Only the activating positive moods are related to higher levels of creative performance instead of the deactivating positive mood (e.g. serene and relaxed) (De Dreu et al., 2008).

Finally, an additional underlying mechanism of the mood-creativity relationship is the regulation focus (promotion vs. prevention). According to De Dreu et al., (2008) the combination of activated mood and the promotion focus was positively related to creative performance. The well-known reasoning that the focus on a relaxed (positive) affective state does not promote creativity (De Dreu et al., 2008). This contradicts the arguments discussed earlier in the literature review of this study that well-being elicited by positive mood results in a relaxed approach to a task (which is beneficial for creative performance). This compares to the negative mood that induces a state of stress. Moreover, the attention restoration theory, which played an important role in the argumentation regarding the restorative effect of plants and daylight in this study, focused on a relaxed (deactivating) positive mood. In this research, some students could earn study points (promotion) while others did participate with another focus (prevention for instance) in mind. This can have affected the results of this study.

The impact of plants and daylight on restoration

The lack of effect of plants and daylight on recovery may be due to the effect on the mental state of the participants. Perhaps the participants did not experience mental fatigue or stress, or the plant condition was not sufficiently stimulating.

The influence of the researcher's presence in the room may also have affected the results. In addition, the participants were measured while performing a creativity test. They had to

concentrate and use their mental capacity instead of having the time to relax and look around to regain energy.

The mere addition of plants or daylight was not enough to transform the office environment. Even the combination of both elements was not sufficient. However, this may have to do with the other possible reason that the restorative effect according to Pals et al, (2014), only physical elements such as plants can bring recovery. However, daylight is a nature-related element, but is not physical.

Furthermore, as Kaplan (1995) mentioned in his study, all restorative characteristics must be present before recovery from mental fatigue and stress is achieved. Since recovery was a secondary feature measured to test the effect of nature, the restorative characteristics were not measured in this study.

The impact of plants and daylight on environmental preference

Interestingly, plants had a significant influence on environmental preference. According to previous research, novelty and growth are associated with plants. Moreover, people in general are subconsciously more attracted to natural elements (Pals et al., 2014).

5.1 Limitations, implications and future research recommendations

5.1.1 Limitations of the study

In sum, the potential limitations of this study already mentioned in the discussion are mainly related to the design of the experiment room, such as the window and its view of greenery and the duration of the experiment. Another possible limitation of the results could be the red walls in the office that have an inhibiting effect on creative performance and on motivation, which is an important element in the underlying mechanism of mood. Finally, the demonstrated significant effect of positive mood on divergent thinking tasks was found in studies where positive mood was induced (Amabile, 1992a; Greene & Noice, 1988). In this study, the moods were not induced. According to research, natural and induced mood are not parallel (Kwiatkowski & Parkinson, 1994, as cited in Kaufmann and Vosburg, 1997).

Another limitation may be the fact that mood is influenced by different cues, such as the time of the experiment. This experiment was conducted from 09:00 in the morning to 17:30 in the evening, Monday to Friday. This may have had an effect on the mood and performance of the participants (Boyce et al., 2003).

A further limitation could be the fact that this study was conducted in a Dutch context, while the studies used in the literature

review were conducted in a different context (mainly American and studies conducted in a health context, for example). This may have had an effect on the results. A suggestion for future research is to ensure that the literature used is somewhat similar to the same context as the target population, as culture has a significant effect on creativity (Vulpe & Dafinoiu, 2011).

5.1.2 Theoretical implications and future research.

The present study contributes to the study of environmental psychology by reinforcing the contradictory findings on the strengthening effects of plants and daylight in the office environment. More natural elements does not mean more effects. Daylight has beneficial effects in the form of higher creative performance. The same applies to the quantity of ideas, but only when there are no plants. Plants have beneficial effects when it comes to the environmental preference of the room. The theory of attention restoration was considered to prove its suitability in this field of research. Especially when it is taken into account that mood must be in an active rather than a relaxed state for it to have an effect on creative performance. However, this is not the case in this study. Interestingly, the theory of recovery in relation to the deeper mechanism of mood and creative performance is different and calls for future research to strengthen the evidence for these effects found.

It is recommended to conduct future research on mood, nature-related office elements and creative performance. Given the underlying mood mechanisms found, it is recommended that the study be repeated with induced moods rather than non-induced moods. Not only can mood be induced, but in order to test the restorative effect it is recommended that all participants get induced to experience some sort of mental fatigue by, for example, having them play a difficult game beforehand. Amabile (1988) says the following about this: "No amount of skill in the domain or in the methods of creative thinking can compensate for a lack of appropriate motivation to perform an activity" (Amabile, 1988). Since motivation plays an important role in the relationship between positive affect and creative performance, it is therefore recommended that future research measure motivation towards the creativity task. More specifically, the three dimensions of motivation. First, the lack of motivation, the intrinsic motivation and finally the extrinsic motivation (Kaufmann and Vosburg, 1997). In addition, the environment should be checked before conducting a field study on details. The colors of the chairs, the walls, etc. have an effect based on the context.

5.1.3 Practical implications

The practical aim of this study was to provide organizations, especially where innovation is important, with valuable information on possible office design solutions to enhance the creative performance of employees. Valuable insights for organizations, office designers and environmental designers are found in the present study.

In terms of creative performance, daylight has an effect. In turn, organizations can use this information to design or invest in strategically arranging the offices in the building in places where daylight is available. However, it is important to keep in mind when designing that there is a potential problem with working with computers in the form of glare, light on computer screens or telephones. See-through blinds are a possible element to solve this problem. In addition, strategic placement of computers and desks can also solve the problem. Moreover, daylight only has an effect if there are no plants in the office environment, when it comes to a large number of ideas. This is especially important when brainstorming sessions are held. Plants, on the other hand, contribute to environmental preferences. This can be used in areas where there is an improvement needed. As employees spend a large amount of time in an office, it is beneficial to increase office satisfaction by investing in improving environmental preference.

An environmental designer can use this knowledge strategically, for example, to design a space without plants and with daylight where a large number of ideas can be gathered (e.g. brainstorming room). Then a place in the office can be designed with daylight for overall creative performance. Plants can be added to reinforce the environmental preference, which may vary between organizations.

5.2 Conclusion

This study investigated the extent to which plants and daylight in an office environment positively influence creative performance, mediated by mood. It showed that daylight has an added value when it comes to creative performance. Moreover, daylight only has an effect when there are no plants in the office environment, when it comes to the quantity of ideas. The two nature-related elements do not reinforce each other's presence.

This study adds to the promising evidence that the environment has an effect on an individual. The benefits arising from the single effect of daylight on creative performance may point to a wider potential of the mechanisms underlying the idea that more elements of the same thing, such as nature in this case, does not necessarily lead to higher effects. The benefits arising from the single effect of daylight on creative performance may indicate a broader potential for studying the mechanisms underlying affective states, creative performance and the effect of the environment. It is worth emphasizing that the environment can make a potential difference, even if it does not immediately appear so. Let's start by (strategically) bringing in the daylight from outside!

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Appendix A

Introductie

Respondentnummer:

Beste respondent,

Hartelijk dank voor uw deelname! In het kader van mijn afstudeeronderzoek voor de Master Communication Science, bent u uitgenodigd om deel te nemen aan dit experiment. Het doel van dit onderzoek is het in kaart brengen van uw gemoedstoestand en het aantal ideeën dat bij u opkomt. Uw bijdrage is een essentiële bouwsteen bij het in kaart brengen van cognitieve processen.

Deelname is geheel anoniem en vrijblijvend. Op elk gewenst moment is er een gelegenheid om te stoppen. De gegevens zullen enkel voor dit onderzoek op ethische wijze gebruikt worden. Tevens is dit onderzoek door de ethische commissie BMS gevalideerd. Er zijn geen enkele risico's verbonden aan uw deelname. Deelname aan dit experiment zal een half uur duren. Ik verzoek u vriendelijk alle vragen volledig te beantwoorden. Voor opmerkingen en vragen ben ik te allen tijde bereikbaar.

Ik wens u veel succes!

Vriendelijke groet,

Zainab El Ahmadi

Algemene vragenlijst

Wat is uw geslacht?

- Man
- Vrouw
- Ik antwoord liever niet

Wat is uw leeftijd? (In jaren)

- _____
- Ik antwoord liever niet

In wat voor omgeving woont u? Geef aan in hoeverre uw woonomgeving ruraal (in de buurt van een bos, park etc.) of urbaan (stedelijk) is door slechts één antwoord te omcirkelen.

Rurale omgeving 1 2 3 4 5 6 7 Urbane omgeving

In wat voor omgeving bevindt u zich merendeels?

Rurale omgeving 1 2 3 4 5 6 7 Urbane omgeving

Appendix B

The PANAS (Watson et al., 1988) translated by Peeters et al. (1996)

De vragenlijst bevat 20 gemoedstoestanden waarbij u op een vijf puntenschaal dient aan te geven in welke mate u zich op dit moment voelt.

Denk niet te lang na over uw antwoord. Het gaat om uw eerste indruk en wat u op dit moment voelt.

Er bestaan geen foute antwoorden.

Elk antwoord is goed, als het uw eigen gevoelens weergeeft.

Sla a.u.b. geen woorden over.

1 = Helemaal niet
mate 2 = Een beetje 3 = Gemiddeld 4 = Nogal 5 = In sterke

1. Geïnteresseerd

1 - 2 - 3 - 4 - 5

2. Uitgelaten

1 - 2 - 3 - 4 - 5

3. Sterk

1 - 2 - 3 - 4 - 5

4. Enthousiast

1 - 2 - 3 - 4 - 5

5. Trots

1 - 2 - 3 - 4 - 5

6. Alert

1 - 2 - 3 - 4 - 5

7. Geïnspireerd

1 - 2 - 3 - 4 - 5

8. Vastberaden

1 - 2 - 3 - 4 - 5

9. Aandachtig

1 - 2 - 3 - 4 - 5

10. Actief

1 - 2 - 3 - 4 - 5

11. Overstuur

1 - 2 - 3 - 4 - 5

12. Van streek

1 - 2 - 3 - 4 - 5

13. Schuldig

1 - 2 - 3 - 4 - 5

14. Angstig

1 - 2 - 3 - 4 - 5

15. Vijandig

1 - 2 - 3 - 4 - 5

16. Prikkelbaar

1 - 2 - 3 - 4 - 5

17. Beschaamd

1 - 2 - 3 - 4 - 5

18. Nerveus

1 - 2 - 3 - 4 - 5

19. Rusteloos

1 - 2 - 3 - 4 - 5

20. Bang

1 - 2 - 3 - 4 - 5

Appendix C

Divergent thinking and originality task test by Torrance (1974)

Bedenk nieuwe en ongewone gebruiksmogelijkheden voor vijf voorwerpen (krant, baksteen, rubberband, kleeplak en auto-afval).

Krant

Baksteen

Rubberband

Kleerhanger

Auto-afval

Appendix D

Environmental preference questionnaire translated by Elzinga (2020)

Hoe ervaart u deze kantoorruimte?

Geef antwoord op basis van een 7-puntsschaal door één antwoord te omcirkelen.

Ik evalueer deze kantoorruimte als:

Onaangenaam	1	2	3	4	5	6	7	Aangenaam
Negatief	1	2	3	4	5	6	7	Positief
Onaantrekkelijk	1	2	3	4	5	6	7	Aantrekkelijk
Onplezierig	1	2	3	4	5	6	7	Plezierig
Niet stimulerend	1	2	3	4	5	6	7	Stimulerend

Appendix E

Restorative effect questionnaire translated by Elzinga (2020)

Geef aan in hoeverre u het eens bent met de volgende uitspraken (t.a.v. de kantoorruimte waar u zich bevindt) door één antwoord te omcirkelen.

1. In de kantoorruimte kon ik me goed concentreren

Helemaal niet mee eens 1 2 3 4 5 6 7 Helemaal mee eens

2. In de kantoorruimte kon ik me goed op mezelf richten

Helemaal niet mee eens 1 2 3 4 5 6 7 Helemaal mee eens

3. In de kantoorruimte kon ik eventuele spanning loslaten

Helemaal niet mee eens 1 2 3 4 5 6 7 Helemaal mee eens

4. In de kantoorruimte kon ik me ontspannen

Helemaal niet mee eens 1 2 3 4 5 6 7 Helemaal mee eens

5. In de kantoorruimte kreeg ik nieuwe energie

Helemaal niet mee eens 1 2 3 4 5 6 7 Helemaal mee eens

6. In de kantoorruimte voelde ik me energiek

Helemaal niet mee eens 1 2 3 4 5 6 7 Helemaal mee eens