HUMAN SPACES:

The Global Impact of Biophilic Design in the Workplace

Should a 'work' place be any different from the other spaces people inhabit? The relationship between individuals and their environment can be a crucial determinant of how they feel, perform and interact with others. So, designing spaces that inspire, energize and support the people who use them is a global imperative. People's connection to nature –biophilia– is an emergent field that can help organizations meet that challenge. This unique study explores the relationship between psychological well-being, work environments and employee expectations on a global scale for the first time.

Report Guide

Preface

It is an exciting time in the history of design, a time in which new science is informing our choices to improve people's experience of the built environment. Professor Sir Cary Cooper and his team at Robertson Cooper have a track record of expanding our collective understanding of how to create the best possible workplaces.

This study undertaken by Robertson Cooper adds further strength to our understanding of how reconnecting people to nature in the built environment improves well-being and productivity. While many of the responses to biophilic design are universal human reactions, this work also highlights some of the subtle cultural differences in these responses. This study is another valuable contribution for supporting the important practise of biophilic design.

Bill Browning, Founding Partner of Terrapin Bright Green, and one of the green building industry's foremost thinkers and strategists

Opening Message From Professor Sir Cary Cooper

This new research report is an important and practical piece, showcasing for the first time the universal connectivity of humans with their natural and built environments. As well as enabling organizations to make links between their physical spaces and the performance of their people, this study throws light on some of the cultural differences at work across the world, and offers an answer to one of the defining factors of modern life – our ability to cope with urbanization and loss of connection with green spaces. The backdrop to this report is both the movement of populations from rural to urban environments, and the psychology of work – what do we expect and need, and are those expectations different from country to country, organization to organization?

The new findings revealed in this report, about how nature and biophilic design impact our well-being, productivity and creativity at work, are significant. But I hope of equal significance is that this report can inspire business owners and commercial designers to take a new approach and prompt everyone to think about their own unique workplace and how best it can support people to thrive.

Professor Sir Cary Cooper, CBE, Professor of Organizational Psychology and Health at Lancaster University, and leading expert on well-being and stress at work

HUMAN SPACES:

Biophilic Design at Work

Biophilic Design at Work

Biophilia, a concept first popularized by Edward O. Wilson in 1984[1], describes the innate relationship between humans and nature, and concerns the need we have to be continually connected to nature. Plenty of research confirms this human preference for the natural, rather than built, environment[2]. For example, in a 2004 study, when asked to describe their ideal city, people more often chose non-urban characteristics, greenery in particular[3], and in other studies it has been shown that a pleasant and natural view can raise the price of a house considerably[4].

Although it has been proposed that this desire for a connection with nature is the result of an anti-urban bias combined with a romantic view of nature, environmental psychology research tells us that being connected to nature, is in fact, an adaptive human function that allows for, and assists with, psychological restoration[5]. This means that within an urbanized environment, bringing in elements that allow direct nature connection (such as parks and lakes) or indirect connections (i.e., interior design using natural elements, nature-resembling colors and patterns, indoor plants and views of greenery) can help us to mentally recover and provide respite from our day-to-day activities, to maintain positive well-being.

Interest in biophilia has grown substantially over the last decade, largely due to the rapid urbaniziation of the modern world, which has resulted in cities that are characterized by a predominance of manmade structures. Global figures show this incredible shift in populations moving into urban areas over the last 60 years. Some countries, including those we have analyzed in this report, have seen an increase of over 40% in the number of individuals in the population residing in urban areas since 1950. In particular, those countries that have seen the greatest economic development in recent years appear to be the nations with the greatest increase in urbanization such as Brazil (51%), Indonesia (42%), the Philippines (39%) and China (32%).

Globally, it is clear that people are moving away from rural areas to towns and cities. In fact, the United Nations predicts that by 2030, 60% of the world's population will live in urban environments. Therefore, it is imperative that we consider how the human-nature connection can still be provided to those residing in towns and cities. The answer to this challenge is biophilic design.

Often, we find that our cities and suburbs have been designed in a way that alienates us from nature and degrades the environment. Biophilic design is a method of designing the places in which we live and work in such a way that satisfies our deep and fundamental need to be connected with nature.

The effects of providing this connection to nature go much further than simple employee satisfaction. An increasing research base has identified the positive benefits of biophilic design in supporting multiple organizational outcomes, including well-being, productivity and creativity.

The focus of this report is on the potential benefits to be gained by satisfying humans' biophilic needs in the workplace, as well as the issues that surround working in environments that do not provide a connection with the natural world. Following an EMEA (Europe, Middle East & Africa) Human Spaces report published in 2014, which analyzed original data across eight countries in the region and looked specifically at the impact of biophilic design in that geographical area, a second wave of data collection has provided the base for a global research project. Collecting data from 16 countries around the world, this research quantifies the benefits of biophilic design in the workplace. While adding to the existing evidence base for biophilic design, we aim to provide a blueprint for nature-inspired design for high-performing organizations.

Biophilic Design at Work

Research Methodology & Sample Profile

- Online survey of office workers across a variety of roles and sectors.
- 7600 employees from 16 countries across the world - United Kingdom (UK), France, Germany, Netherlands, Spain, Sweden, Demark, United Arab Emirates (UAE), United States (US), Canada, Brazil, Australia, Philippines, India, China and Indonesia.
- Largest proportion of respondents fell in the 25-44 age bracket (58%).
- Largest proportion of respondents spent 40-49 hours a week at work (40%).
- 39% felt 80-100% productive at work during the last three months.
- Well-being refers to the combination of participants' responses to three scales: happy; inspired; and enthusiastic. These scales are taken from Robertson Cooper's market-leading stress evaluation tool (ASSET).

Biophilic Design at Work

Global Urbanization

The table below highlights the increases in the amount of people living in urban areas during the last 60 years across the 16 countries investigated in this report. Countries with the greatest increases in urbanization are highlighted in blue[6].

Country	Percentage of Population Living in Urban Areas		Increase
	1950	2010	
Australia	77	89	12
Brazil	36	87	51
Canada	61	81	20
China	13	45	32
Denmark	68	86	18
France	55	78	23
Germany	65	76	11
India	17	30	13
Indonesia	12	54	42
Netherlands	56	83	27
Philippines	27	66	39
Spain	52	77	24
Sweden	66	85	19
United Arab Emirates	55	77	22
United Kingdom	79	90	11
United States	64	82	18

Biophilic Design at Work

The consequences of a decline in physical contact with nature are poorly understood, especially in those countries that are urbanizing the fastest. The purpose of the present study was to extend the scope of our research into biophilic design by analyzing its impact on people across the globe.

Background to Biophilia

Biophilic design is a response to the human need to connect with nature and works to re-establish this contact in the built environment. Ultimately, biophilic design is the theory, science and practise of creating buildings inspired by nature, with the aim to continue the individual's connection with nature in the environments in which we live and work every day[7].

In today's contemporary built environment, people are increasingly isolated from the beneficial experience of natural systems and processes[8]. Yet it is often natural settings that people find particularly appealing and aesthetically pleasing. So, by mimicking these natural environments within the workplace, we can create workspaces that are imbued with positive emotional experiences. It is often the case that we don't take enough time to immerse ourselves in nature or appreciate the living systems that exist everywhere around us, making it vital for us to incorporate nature into our day-to-day environments.

HUMAN SPACES:

The Case for Biophilic Design

The Case for Biophilic Design

As it stands, the field of research into the benefits of biophilic design is accumulating evidence at a rapid pace. In an evaluative review of more than 50 empirical studies[9], it has been concluded that an environment devoid of nature may create discord, meaning that such environments can have a negative effect on health and well-being. It is noted that this discord is largely due to a lack of greenery and, in particular, a visual absence of plants. This can be improved by incorporating elements of nature into these environments, by creating parks, offering views of nature through windows, and the presence of potted plants.

More recently, there has been an increasing amount of research focusing on biophilia in the context of the workplace, looking specifically into the interaction between the design of the workplace and employee outcomes. However, despite evidence that shows people benefit from being connected with nature, it is concerning that a biophilic approach to the design of work environments is not placed higher on the global corporate agenda.

Our findings emphasize the dramatic impact that even simple changes to incorporate nature in the workplace can have on how employees feel when they come to work, and how happy, creative and productive they feel when they are working. This should encourage organizations to consider these effects and take action to incorporate biophilic design practises into the workspace. While the primary focus of this report is employee well-being, productivity and creativity, we also pay attention to measures of happiness, enthusiasm and motivation in examining how bringing nature into the workplace can elicit these positive emotions.

Global Key Findings

- A third (33%) of office workers say that the design of an office would affect their decision to work at a company.
- Only 42% report having live plants in the office and an alarming 47% report having no natural light in their office.
- Almost a fifth (19%) of respondents report that there are no natural elements present in their office.
- Just under half (47%) of all respondents agree that they have felt stressed in their workplace within the last three months. This finding emphasizes the importance of identifying and enforcing practises that can improve well-being at work – such as biophilic design.
- Two thirds (67%) of respondents report feeling happy when walking into bright office environments accented with green, yellow or blue colors.
- 24% of respondents say that their workplace does not provide them with a sense of light and space.
- 39% of workers felt most productive at their own desk in a private office. Others said they felt most productive at their own desk in an open plan office (36%).
- 28% of respondents report that they do not have a quiet space to work in their office.

The Case for Biophilic Design

Adaptable Workspaces

Globally, our research has shown that workers' productivity depends upon the environment they are in. 39% of workers felt most productive at their own desk in a private office. The countries with the greatest preference for a private office were Germany (59%), China (52%), Canada (50%), Sweden (49%), the US (45%), Denmark (44%), France (43%) and the Netherlands (41%). 36% felt most productive at their own desk in an open plan environment.

There has been a tendency for professional workforces to move towards open plan spaces. However, what we can see from this data is that we have individual preferences on office layout and it is important to take this into consideration, along with cultural preferences.

Overall, 28% of respondents in the present study said that they do not have a quiet space where they can go to work. Furthermore, over 10% felt most productive in a space that suited the task, such as a quiet room for a call, or break out area.

While it is only natural that preferences for type of workspace will vary, what this shows is that productivity is impacted significantly by our surroundings.

HUMAN SPACES:

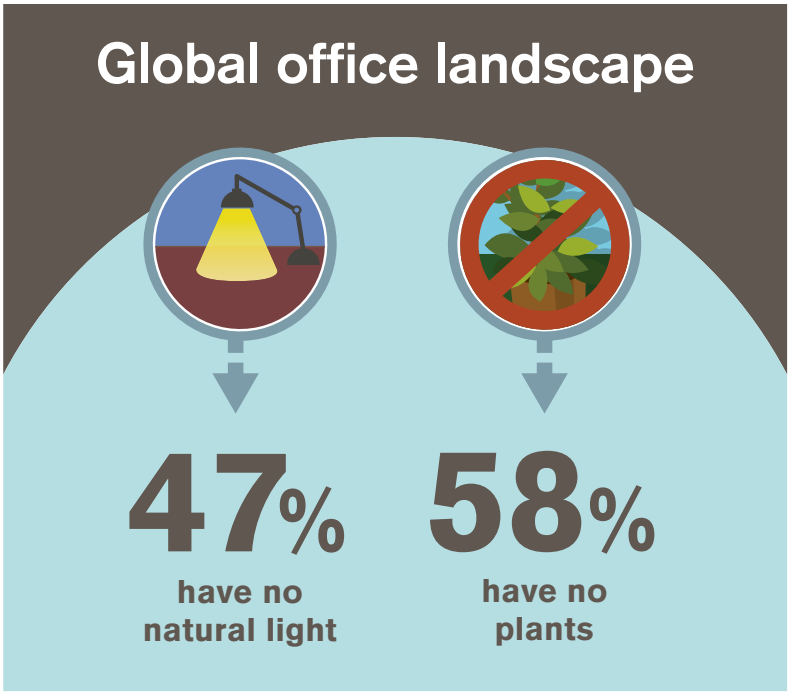
Global Research into Biophilic Design

Global Research into Biophilic Design

The Human Spaces report into The Global Impact of Biophilic Design in the Workplace is the first study to take a global perspective of the current state of workplace design, the effect that existing design practises are having on workers, and how making a change by bringing nature into the workplace can have a significant impact.

One of the most crucial findings to emerge from the analysis is that a third (33%) of all respondents in the global study say that the design of an office would affect their decision to work for a company.

This latest data further confirms the role that biophilia can play as part of an employer's brand; a growing area of focus for businesses competing for talent. According to Backhaus and Tikoo[10], employer branding "represents a firm's efforts to promote, both within and outside the firm, a clear view of what makes it different and desirable as an employer". While those efforts include core elements like remuneration and personal development, our survey results demonstrate clearly that office design is also a part of the mix.



Over ten years ago, a US study[11] found that only 22% of workers quoted the physical environment as a key desirable factor when looking for a new role. Our new research shows that this has grown to 27% in the US, compared to the global figure of 33%. This global figure is significantly impacted by data from India, Indonesia and the Philippines, with 67%, 62% and 60% of workers, respectively, being significantly influenced by workplace design.

When the same question was put to workers in the EMEA study, only 23% of respondents said the design of an office would affect their decision to work for a company. It's possible to attribute this difference to the increase in awareness about the benefits of design factors, although it may be due to cultural differences in employee expectations surrounding their workplace and what it provides. Regardless of the differences, the statistics across all countries are significant and relevant, as they demonstrate workplace design has a definite impact on workers' perception of an organization.

For organizations with ambitions to lead their market and compete for the most valuable employees, biophilic design can create a clear point of difference, alongside other elements of the employer brand.

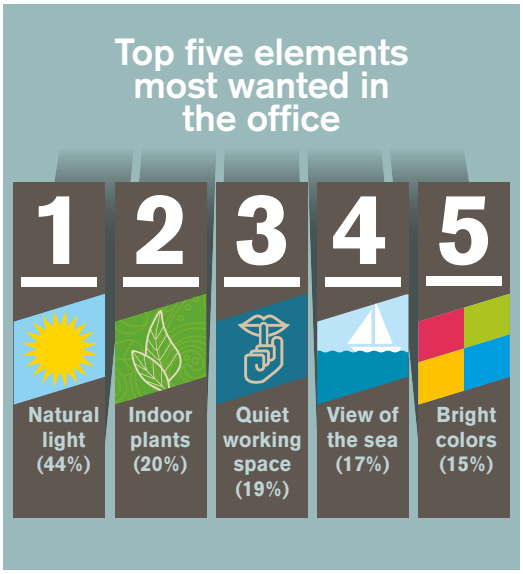
Global Research into Biophilic Design

Many of the largest global businesses have renowned office environments that are not only part of an external brand, but can also help to deliver a positive employee experience. The foremost of these environments have entered popular culture – for example, Google's 'Googleplex' and the Apple campus at '1 Infinite Loop'. The impact of this type of expansive approach is reflected in a number of independent studies showing an increase in both productivity and employee retention as the result of environment transformation at work. Anthony Ravitz, leader of the "Green Team" at Google, talks about their efforts to measure productivity. For them, this isn't just how quickly you can do a task or even how well you can do it, it's about how you feel when you are doing it and if you have the energy to play with your kids when you get home at the end of the day[12].

A number of previous case studies concerning biophilic design, such as the Genzyme example included in this report, have focused on well-being and productivity gains following redesign or new builds. No major studies, however, have been conducted into subsequent changes in employee attraction, and this would represent an area of interest for further investigation.

What our research does show, is that natural light hits the top of the list for the most wanted element within the workplace. However, a huge 47% of workers say that they have no natural light within their work environment. The countries with the greatest percentage of workers reporting that their office does not provide natural light were the UK (66%) and the US (64%). Interestingly, natural light was the number one requested element in the workplace in both countries, much more than any other element of design.

Similarly, elements representative of the natural world, such as indoor plants and natural colors like green, blue and brown, also made the top five, yet 58% of workers report having no greenery, in the form of plants, within their work environment.



The disparity between the preferences for natural elements within the workplace and what is actually present highlights the prevalence of this issue across the globe. It would seem that a great number of organizations are failing to provide their workers with a connection to nature, evidenced by the data that shows workers lack natural light and plants in their office space. The implications of this, in addition to the tangible benefits gained when nature is brought into the workplace, are explored in the following sections of the report. We break down the impact of being connected to nature in the workplace into three key areas: the impact on employee well-being; productivity; and creativity.

The research findings allow us insight into this human connection with nature and the influence of well-designed workspaces. The range of responses also allows us to make comparisons between different cultures, geographical regions and stages of economic development to propose their likely impact on employee preferences and the degree to which individuals are affected by those preferences.

Global Research into Biophilic Design

Comment From Professor Sir Cary Cooper:

Looking at a snapshot of global working environments, up to one in five people have no natural elements within their workspace and alarmingly nearly 50% of workers have no natural light. Yet a third of us say that workplace design would affect our decision to join a company. There's a big disparity here, and one that hints at workplace design only recently rising to prominence as a crucial factor. For the organizations that focus on their spaces, and work hard to deliver meaningful, inspiring workplaces, the dividends are made clear in this study. Performance jumps, as does creativity. Yet, there are no off-the-shelf templates for the utopian work environment. Incorporate biophilia, yes, but listen to your people to make sure their preferences and ideals are reflected too.

Psychological Responses

In addition to surveying workers about the presence of natural elements in the workspace, we also asked people to report on their emotional state at various points throughout the day. This enabled us to examine the immediate psychological impact of biophilic design elements upon the individual when they first enter their workspace. The results (see table below) show clearly that workers entering environments that welcome workers with natural greenery are much happier and inspired. This places emphasis on the importance of creating as natural a work environment as possible in order to evoke these positive feelings among employees. In contrast, we also find that workers who do not have greenery within their work environment feel more anxious and sometimes bored when they enter the workplace.

GLOBAL RESEARCH FINDINGS

The table below presents the percentage of respondents (N=7600) that report feeling happy, inspired, anxious or bored when entering workplaces that either do or do not provide internal green spaces.

How do you feel when you enter the workplace'?		Internal Green Space	
		Yes	No
Positive Feelings	Happy	15%	9%
	Inspired	32%	18%
Negative Feelings	Anxious	2%	5%
	Bored	5%	11%

Comment from Steelcase, leading office furniture manufacturer: *"Well-being is made tangible through the workspace – this isn't simply about work environments with better ergonomics or more comfort. We believe that the workplace can be a place where people actually leave healthier than when they arrive in the morning." Nancy Hickey (Senior Vice President and Chief Administrative Officer).*

HUMAN SPACES:

The Impact of Biophilia

The Impact of Biophilia

1. Well-being

It seems clear that urban life, with its disconnection from the natural world, stimulates a desire for contact with nature that needs to be satisfied.

A key factor in maintaining positive well-being is reducing levels of stress. Research has identified that visible connections to nature can have a positive effect on an individual's reported stress levels. In a review of numerous studies looking at the effects of different landscapes on health, it was found that natural landscapes had a more positive effect compared to urban landscapes[13]. In fact, in some cases, urban landscapes had a negative effect. According to our findings, this is certainly the case in France, where views of natural scenes such as greenery, wildlife and even ocean views were linked to the greatest levels of well-being among office workers and window views of urban scenes, such as roads and buildings were linked to a lower sense of well-being.

Bill Browning: Measured Responses

Responses to biophilic experiences have been measured in a number of ways. Much of the early work focused on visual preferences, indicating strong affiliations for savanna and savanna analogue landscapes. These findings were enhanced by later research showing that viewing images of such landscapes trigger a stronger dopamine response (i.e., pleasure indicator) in the visual cortex of the human brain than scenes of nature-less manmade landscapes. Other measured responses include faster recovery from major surgery and shorter stays in psychological wards. Direct physical responses can be measured in heart rate and blood pressure, and through the levels of the stress hormone cortisol. Other measured responses include better cognitive performance and enhanced creativity[14,15,16,17,18,19,20].

Our data shows that, in Canada, the provision of green space is important in ensuring that workers' well-being is at a positive level. This is supported in recent empirical research that looked at the associations between well-being and nature connectedness among a student population. Significant associations emerged, showing that when people were connected to nature in both their internal and external environment, they reported much greater levels of well-being[21].

Our analysis has shown that perceptions of well-being can increase by up to 15% when people work in surroundings that incorporate natural elements, providing that connection to nature, in contrast to those who have no contact to nature in their workplace. An increase of this size is certainly significant with such a large sample that is representative of the global population. For well-being to increase this dramatically is evidence of the power of biophilic design in the workplace and the positive impact that this can have on employees.

Workers in office environments with natural elements, such as greenery and sunlight

The Impact of Biophilia

Considering these findings in conjunction with workers' reports that 47% have no natural light and 58% have no natural greenery, organizations and designers are urged to consider design practises that ensure these elements are present in the workplace to help maintain and increase levels of well-being.

The Restorative Effects of Nature

At work, when we focus our attention on a demanding task, factors in our environment that disrupt us can lead to mental fatigue. However, workspaces that incorporate nature provide more tranquil settings that allow for more effortless attention that is less mentally draining and may indeed restore - rather than deplete - our mental capacity[22]. In academia, this is referred to as Attention Restoration Theory[23], which posits that viewing and experiencing nature engages a different part of the brain from that used in high attentional focus.

It is therefore concluded that environments dominated by elements of nature are thought to be more beneficial to the individual. This point emphasizes the impact of nature on our cognitive capabilities, suggesting that by providing nature contact within the workspace, organizations can ensure consistent levels of job performance within their workforce.

The Impact of Biophilia

GLOBAL RESEARCH FINDINGS

Natural elements positively linked to well-being at work -

Nature views: Having no window view was significantly related to greater levels of reported stress. In contrast, window views of greenery and water were linked with lower levels of stress.

Accent colors: Employee well-being is positively impacted by offices that incorporate nature-resembling colors such as green, blue and brown. It was also found that the use of gray colors within the workspace had a significant negative impact on employees' levels of stress.

Nature within the workspace: Across the world, those who work in offices that provide natural light, live plants and greenery along with water features, report significantly higher levels of well-being than those who work in environments devoid of nature.

Light and spacious workspaces: Those who report that their work environment provides a sense of light and space report greater levels of well-being in comparison to those who do not feel that their work environment is light and spacious.

United States Case Study: Genzyme Corporation

In 2004, world-leaders in biotechnology, Genzyme Corporation, designed a new corporate headquarters that includes features such as: natural light; a clear glass exterior; a central atrium with chandeliers at the base that reflect sunlight; indoor gardens; water features; and windows.

This building was one of the first to achieve LEED (Leadership in Energy and Environmental Design) Platinum status.

18 months after the structure opened, its staff survey found that:

- 88% said having direct views and access to the natural elements indoors improved their sense of well-being.
- 75% said the building's design increased their feeling of connection to co-workers.

The Impact of Biophilia

The impact of the work environment is already well established in Robertson Cooper's '6 Essentials' model - a robust model, validated by research with over 100,000 employees - that shows the key aspects of working life that affect workplace well-being and employee engagement. It is designed to guide the process of making well-being work for an organization.

Among the 'Essentials' is 'job conditions' - this concerns how our work environment makes us feel. Job conditions are defined as those elements of the physical environment that impact employee experience – that could be anything from being sat next to a noisy printer to having an uncomfortable workstation. While the 6 Essentials model emphasizes the importance of removing the barriers to well-being created by 'job conditions', biophilic design adds a new and positive approach to the area. Rather than simply removing those 'hygiene' factors that block individual well-being, it's clear that biophilic design can positively influence one of the 6 Essential Factors, and consequently be a direct driver of well-being.

The Impact of Biophilia

A Window On the World

Windows are the primary interface between the office worker and the external natural environment. As such, they provide a simple way of giving people the connection to nature that they need in order to avoid the discord associated with environments devoid of nature.

Research in the US[24] has shown us the benefits of window views within the workspace. In an office of 90 people, it was found that workers who had a window that afforded a view of a nature scene recovered from low-level stress at a much quicker rate than those who only had a view of a blank wall. Further to this, the longer participants spent looking out the window at nature, the more rapidly their heart rate tended to decrease. This highlights the simple effect of nature on a human's physiological response to stress and how nature can help people to be less negatively affected by day-to-day pressure at work.

As well as having the power to reduce the negative effects of stress, other research[25] shows that a green window view that provides natural lighting to employees' workspaces had a big impact in reducing sickness absence rates among an organization's employee population. This was compared to those with a view of a gas station, for example, or those at desks in interior spaces with no view at all. The health benefits afforded by natural lighting and a connection with nature are taken as the explanation for the lower levels of sick leave reported among those with windows within their workspace. Natural light has emerged as a particularly important element of biophilic design throughout this report. It has not only been reported as the top preference on a list of many natural elements that individuals would like in their workplace, but also found to be linked to productivity in a number of countries in Europe (Germany, Sweden, UK and the Netherlands) and India, where it is by far the strongest predictor of high levels of employee productivity. Such findings emphasize the need for organizations to provide access to natural light through either office redesign where more open spaces are created, or through the creation of social areas within the workplace that provide people with access to natural light and a place for respite.

Investigating exactly why people derive such great pleasure from viewing a dramatic and changing vista, research has shown that these scenes of nature may stimulate a reward structure in the brain that seeks information through the senses. Further to this, it has been shown that those scenes with the greatest amount of variety and randomness should produce the greatest amount of activity in the brain and, as such, be of the greatest pleasure for the viewer. Conclusive research in this area is ongoing. Research suggests that, in order to positively stimulate workers, employers should consider the visual environment surrounding each employee and evaluate the potential benefits for employee well-being and performance when this environment is perceptually stimulating[16]. Access to window views is a simple way of providing this stimulation. However, as research shows us that it is the variation in patterns, textures and colors of nature that brings us pleasure, we can take this knowledge and think about how we might re-create this within the indoor environment when access to a window is not feasible.

The Impact of Biophilia

Bill Browning: Real vs. Simulated Nature

A number of studies in hospital environments have found that showing pictures of pleasing landscapes to patients just before or just after surgery resulted in lower stress levels and better recovery rates. Similarly, wall-mounted video screens displaying images, or real-time video of natural scenes, resulted in reduced stress rates in windowless environments. These beneficial results therefore lead to the question of whether there is a difference in response to real versus simulated nature. In a study at the University of Washington, participants were subjected to a stressful experience and given one of three different recovery period conditions. These were sitting at a desk facing a wall of gray curtains, or facing a wall with gray curtains with one segment open to reveal a window with a view to a water feature and some trees, or facing the wall with gray curtains with one segment open to reveal a high-definition flat-screen television of the same dimensions as the window and displaying real-time video of the view out the aforementioned window. The recovery response with just the gray curtains was slow. The recovery response to the video monitor was better both psychologically and physiologically. Finally, the psychological response (i.e., perceived recovery) to the real window was similar to that of the simulated window, and the physiological response to the real window was significantly better than the simulated window. Essentially, we have come to learn that, while simulated nature has value, real nature is better[19,26,27].

The consequences for workers who don't have access to a window view are more predominant in Germany and India, where office workers with no windows reported lower levels of happiness at work. Research findings showed that productivity was much higher when German workers had a view of nature, while in India a view of wildlife was linked to greater levels of creativity.

Overall, the growing evidence base supports biophilic design as a factor that can positively influence the well-being of workers within an organization, and the findings presented here provide further evidence for this.

Bill Browning: Daylight vs. View to Nature

Studies reinforce that access to both daylight and a view out of a window to nature are important in supporting our well-being and productivity. However, we should be aware that these are different strategies with different responses. While quality daylight is important, studies by Heschong and Loftness[28,29] *of a utility company call center, highlight how views to nature can enhance the benefits of a good daylighting strategy. The call center is located in a LEED Gold certified building, with extensive windows looking out on trees. The space is well lit, however the positioning of workstations perpendicular to the windows required occupants to turn their bodies away from their computer screens to access the view outdoors. By shifting the position of the workstations to an acute angle to the windows meant that the movement of leaves, birds, butterflies and weather patterns would now be within the peripheral vision of the occupants. These occasional distractions cause occupants to look away from the short visual focus of their computer screens and observe the nature outside. This short pause results in a relaxation response that then supports better attention on the work task. Moving the workstations cost about $1,000 per occupant, but resulted in a 6% increase in call processing capacity, or about a $3,000 return per occupant.*

The Impact of Biophilia

2. Productivity

Feeling good often equates to being able to do more. In addition to the abundance of research that confirms the relationship between well-being and productivity[30] there is also clear evidence directly linking biophilia with an organization's output.

One of the more recent, and most relevant, research studies looking at these effects was carried out in the UK (a study called 'The relative benefits of green versus lean office space: Three field experiments'[31]), where university researchers in Cardiff compared the levels of productivity of two groups of office workers who were exposed to different levels of nature contact. They found that those who worked in offices with natural greenery saw a 15% rise in productivity over a three month period, in comparison to those working with no greenery or natural elements within their immediate environment.

Workers in office environments with natural elements, such as greenery and sunlight

GLOBAL RESEARCH FINDINGS

For the first time, this research is showing universal links between productivity and office design. Despite the various cultural differences surrounding work and workspaces across the 16 countries that contributed respondents to the survey, the following elements were positively linked to productivity in all cases. They present a template for biophilic design in the workplace, which can be further tailored to match an organization's unique context.

Natural elements positively linked to productivity at work -

Nature views: Viewing external nature scenes from the office space had a positive impact on workers' productivity.

Accent colors: Colors such as blue, green and yellow were associated with higher levels of productivity.

Nature within the workspace: Ensuring the presence of natural elements within the workplace, such as plants, green space, plenty of light and elements of water predicted greater levels of productivity.

The Impact of Biophilia

This research has found similar relationships between the presence of natural elements and productivity, made more interesting by cultural differences. For example, in the UK, the Netherlands and the Philippines, it was found that the presence of indoor plants was positively associated with productivity. In contrast, workers' productivity in India and Indonesia was linked to the presence of green office colors. In Germany there was less focus on office color, instead it was the use of stone elements that was most strongly linked to employees' performance. In Australia, it was the use of wood within the office design and furnishings that contributed to greater levels of productivity, yet in Canada the presence of greenery indoors was most crucial for ensuring high levels of employee productivity. Further detail on specific cultural preferences from the Human Spaces research can be found in Appendix Two.

The variance in the impact and prevalence of office design elements from region to region is expected and the likely influence of cultural factors to explain these differences can be noted. However, more research is required to comment definitively on the drivers of specific employee preferences in workplace aesthetic and design. What the results do emphasize clearly is the diversity and depth of workplace design considerations. For a multinational firm expanding into a new country or region, it's likely that a form of cultural compatibility testing will be undertaken on the existing operating model, product or service, corporate culture and so on. This research demonstrates a clear case for office environment and biophilic design to be included among this list – in addition to domestic firms taking a more in-depth approach to examining the impact of their work environments.

In the US, our findings show that workers without views of nature have impaired levels of productivity. Another survey in the US[32] found 40% of people agreeing that natural greenery within their indoor environment made them feel calmer and more relaxed. Furthermore, those residing in environments that incorporate external green space indicate that having this space is important for their well-being. Taking this investigation into the office environment, employees also report that plants make them feel calmer and more relaxed, frequently stating that an office with plants makes it a more desirable place to work[33]. Similarly, in the UK, live plants in the office have a positive effect on productivity - specifically, people who have access to this greenery within their workspace report higher levels of productivity than those with an absence of these elements.

Although the US and the UK can be considered as countries that are much more advanced in their understanding of biophilic design and the benefits it can have for employees and the organization's productivity as a whole, the findings here suggest that they still lack in implementing this type of design within their office environments. This is clear from the fact that both the US and the UK reported the lowest levels of natural light, the element that is rated as the top most wanted element within the workplace.

When we look at the Australian workforce, according to a National Health survey by Medibank[34], the population can be considered a high-risk group with more than half of people reporting stress at work. Stress-related claims cost Australian businesses over $200 million annually and exactly 53% of Australian workers surveyed say that they feel overwhelmed with pressure a significant proportion of the time that they are at work. Considering the positive benefits posed by biophilic design efforts, the findings reported here may be greatly beneficial to those organizations that relate to these alarming figures and want to take action to improve both the well-being and productivity of their workforce. Specific areas of focus, based on

The Impact of Biophilia

the findings, would be to provide windows with views to outside nature, as these have emerged as strong determinants of both happiness and productivity among workers. The use of green and blue within the office color scheme may also be beneficial in contributing to higher levels of creativity.

China is another country of interest when it comes to the field of biophilic design due to the fact that it is urbanizing faster than anywhere else in the world. Existing research conducted on school children in China tells us that, even from a young age, people living in urban environments are not being provided with the nature contact they require in order to meet their innate biophilic needs[35]. Our research indicates that for the Chinese, above all else, natural light is the most important factor in maintaining healthy levels of well-being and productivity. The figures show that natural light was particularly more important in China than in other countries around the world. Interestingly, in comparison to other countries where the use of bright accents within the office color scheme, such as blue, green and yellow are found to be related to employee outcomes, in China the color brown appears to be significant in relation to both employee well-being and productivity. Although the reasoning behind these findings is not clear, what they show is that there are evident cultural differences and preferences in terms of specific elements of biophilic design that influence people in a positive way.

The global scope of this report is a unique feature in that the research has been conducted on a large scale to investigate the impact of biophilic design. This means that the research has identified cultural differences in the impact and preference of biophilic design elements that have not been investigated before.

In summary, biophilic design has an overall positive impact across the world, but there are significant cultural differences that must be taken into consideration when designing workplaces in a way that incorporates biophilic design practises.

The Impact of Biophilia

Bill Browning: Color

The deep appeal of color is an attribute of people's adaptive response to the natural world which, through evolution, has assisted in the location of food and water, and with way-finding. While many colors can have cultural meanings that vary significantly from place to place, there is also evidence that some colors engender deeper universal physiological and psychological responses, such as enhanced creativity, better cognitive focus, or a calming effect.

A space with a color palette that feels connected with nature may also be perceived as being a healthy place to dwell, in which one can feel stimulated or calmed. Evolutionary psychology and related research suggests that humans have a preference for colors familiar to savanna settings, particularly colors found in healthy vegetation. Colors commonly found in healthy natural landscapes are indicative of the presence of clean water, nutrient-rich vegetation, or fruits and flowers. Not all hues of a color elicit the same response, and those that are typically found in stressed or dying vegetation may be perceived as less beneficial to human health and well-being.

There is evidence that different colors are tied to specific outcomes. For instance, viewing dark to medium greens can lower the heart rate and blood pressure to alleviate stress, whereas orangey, weakly yellowed, or brownish greens, which are typically found in stressed or dying vegetation, are the least desired. In addition, the color red can support mental engagement and attention necessary for cognitively intense tasks, and the color blue and some medium greens can support mental capacity for tasks requiring creativity. For further details see the Savanna Hypothesis on page 32.

As previously stated, we found that across a range of different occupations, in workplaces that incorporate natural elements such as greenery and sunlight, employees reported productivity levels 6% greater than those without these elements.

Understanding the range and complexity of factors that can impact employee productivity is key for organizations wishing to prioritize performance initiatives and Human Resources (HR) strategy. It's important then to put biophilia and workplace design into context when looking at how they can drive individual and organizational outcomes. So, how does this 6% gain compare with other concepts in organizational psychology, well-being and performance?

Work performance is heavily driven by factors that are personal to each employee, including sense of purpose, non-work pressures, psychological well-being, and personality. While these factors can contribute to performance gaps of up to and over 40%[30], the individualistic nature of these factors can mean they are more difficult to manage in order to elicit productivity increases of this scale. Looking then at the 6% increase in productivity for those working in environments that incorporate nature, employers and designers alike are presented with an option for increasing productivity that is less specific and much easier to implement in order to increase productivity organization-wide.

The Impact of Biophilia

Presenteeism in the Workplace

Presenteeism is a relatively new area of study. It is defined as both the act of turning up to work while ill, and also of displaying low productivity and engagement at work despite being healthy – in both cases it is often referred to as showing 'face time'. Global figures to estimate its cost to employers do not yet exist, but according to the Foresight study of mental capital and well-being, presenteeism costs UK businesses £1billion per year, a cost estimated at 1.3 times that of absenteeism. In the US, these figures sit at over $200 billion lost per year due to lost productivity associated with poor health[36]. These figures are a clear indicator of the benefit for businesses tackling the issue of presenteeism through a range of measures, including workplace design.

An employee's perception of how valued and supported they are by their employer can be a key determinant of well-being at work. This perception is accounted for in many validated psychological tools that seek to measure well-being in the workplace and it represents a possible inherent benefit of biophilic design - that the act of providing a purpose-designed environment for employees can boost those perceptions of value and support and in turn, impact well-being.

Given the economic imperative for organizations to provide positive work environments, and the wealth of academic evidence that shows the positive impact of biophilia, it is surprising that significant percentages of office workers across the globe still have no access to natural light (47%) or greenery (58%) within their environment. Such findings highlight a relatively straight-forward opportunity to improve workspaces and increase well-being, ultimately also reducing the likelihood of presenteenism among employees and keeping productivity levels high.

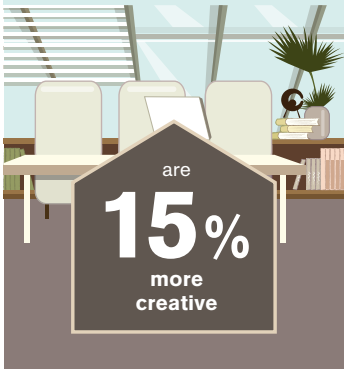
The Impact of Biophilia

3. Creativity

The impact of biophilic design on the individual's ability to act, behave and perform creatively within the context of their role is something that has received less focus within the realm of research into biophilic design.

The analysis of the global data sample revealed that a worker's creativity can be strongly influenced by their surrounding environment and the extent to which this incorporates natural elements. More specifically, we found that for those working in environments that incorporate these natural elements, such as daylight and live plants, reported levels of creativity are 15% higher than the levels reported by those who work in environments devoid of nature.

Workers in office environments with natural elements, such as greenery and sunlight



Again, this highlights an important consideration for employers and designers to think about how they can incorporate aspects of biophilic design into the work environment that they are either creating or providing.

In all countries analyzed in the study, when elements of nature were incorporated into the workplace, the impact on workers' creativity was positive. In the past, some academics have discussed the concept of 'creativity potential' when it comes to office design. This is the idea that some spaces, depending upon their design features, have different influences on the creativity of those who occupy them[37]. This is supported empirically and identifies two types of offices: those with high; and those with low creativity.

Although it may seem obvious that poorly-lit environments that lack color and nature elements dampen creativity, the findings, as mentioned previously, show that a significant number of people don't have natural lighting or elements of nature within the workplace. Considering the simple changes that can be made (increasing access to natural light through office layout or bringing greenery and plants into the office), there are plenty of ('low hanging fruit') options for organizations wanting to inspire creativity in their workforce.

It is also clear that biophilic design elements can have differing effects on workers in each country. For example, in Spain, the provision of greenery in the office, in the form of plants or green walls, was linked to greater levels of creativity. In comparison, water was particularly important when it came to the productivity of Brazil's office workers, who, when working in offices that either afforded window views of water or incorporated water features into the office space, reported high levels of creativity. Office color was also important for creativity in some countries, specifically in India where the incorporation of the color red within the office design was strongly linked to greater levels of creativity.

The Impact of Biophilia

Minimalist (38%) was most often cited as the style of building design that would inspire at work

The global study findings identify that simple, minimalist design is the most preferred style, with natural lighting, plants and natural colors all topping the list of the most wanted elements in the workplace. More specifically, window views were found to be crucial in maintaining creativity within a workforce, as were using bright colors to stimulate workers and promote creative working.

GLOBAL RESEARCH FINDINGS

Natural elements positively linked to creativity at work -

Nature views: Having no window had a significant negative effect on employee creativity.

Colors: Gray offices were associated with lower levels of employee creativity. Bright colors like yellow, blue and green were beneficial in promoting creativity.

Nature within the workspace: Natural elements in the office space had a positive effect on levels of creativity.

Color and Creativity

While color is often the first design element one notices when stepping into a space, surprisingly little research exists that explores the effect that color has on human cognition and behavior.

The research shows that, for employees wanting a creative environment, incorporating accent colors of green, blue and white could have positive benefits. Green in particular seems to be important, with research[38] finding that when people see just a brief glimpse of green prior to a creative task, it indeed enhanced their creativity performance, in comparison to glimpses of white, gray or other bright colors.

What this does show is that while we can draw some similarities between different research studies (for example that green accents in offices can positively impact on workers' motivation, enthusiasm and productivity), it is still difficult to make definitive recommendations, with this area of research still being explored in great depth.

Dr. Stephen Kellert, Professor of Social Ecology and Senior Research Scholar at the Yale University School of Forestry and Environmental Studies, and author of the book Biophilic Design, comments: "*The biophilic application of color should favor muted "earth" tones characteristic of soil, rock, and plants. The use of bright colors should be cautiously applied, emphasising hues found in appealing environmental forms, such as flowers, sunsets, rainbows, and certain plants and animals.*"

The Impact of Biophilia

Bill Browning: Savanna Hypothesis

Scientific evidence for the biophilic effect of color is still emerging. While the consensus around these effects is currently limited, it can be an important factor in creating a healthy, vibrant, and biophilic environment. Based on what information is available, here is some general guidance for design application:

- *Through the work on the Savanna Hypothesis there is a clear preference for the blue water, greens, tawny golds, tans, browns, and earth colors found on the African savannas. This tells us there is a general preference for earth tones.*

- *Humans are attuned to seeking out colors indicative of flowers and fruit. Therefore a judicious use of bright colors will help liken a space to natural conditions and improved user preference.*

- *Vibrating color combinations can be exciting in limited applications or, in the extreme, they can cause after image effects and induce unpleasant responses such as dizziness. This tells us that a minimal use of vibrating color combinations will help maintain a restorative and healthful environment.*

The operating theory has been that colors found in nature that indicate resources, or conditions supportive of survival, would elicit positive responses. In the African savanna setting, blue is frequently the color of water, medium and darker greens are indicators of the presence of water and healthy vegetation, red is a common fruit color, while yellowed or brown vegetation is frequently a sign of drying or dying vegetation. This has been called an "ecological valence theory" (Palmer & Schloss, 2010)[39]. There is a clear preference for trees that have dark green, medium green and bright red colors (Kaufman & Lohr, 2004)[40]. Seeing these color varieties in different plants of the same species can produce different responses: dark green – relaxation, green yellow – excitement, red – high concentration (Sadek, Sayaki, et. al. 2013)[41].

The color red is associated with an increased performance on tasks requiring cognitive focus and the color blue is associated with increased creativity (Hatta, Yoshida, et.al. 2002; Mehta & Zhu, 2009)[42,43]. Medium green may also support enhanced creativity (Litchenfeld, et.al. 2012)[38]. Physiological responses can include slightly increased muscular strength from seeing red (Elliot & Aarts, 2011)[44]. Red is also associated with increased galvanic skin response and heart rate, while blue is associated with the opposite response (Harkonen, et.al. 2012)[45].

HUMAN SPACES:

Summary

Summary

Key Themes Across Countries

- ***Natural light was a crucial determinant of all three employee outcomes – well-being, productivity and creativity.***
- ***Most commonly, it was views of greenery, water and wildlife that had the strongest impact upon these factors.***
- ***Having no window view was frequently predictive of lower levels of creativity.***
- ***Office color schemes that incorporated accents of green, blue and brown were more predictive of employee happiness, productivity and creativity than blank white walls. However, the particular colors associated with these outcomes appear to differ between countries.***

The science supporting biophilic design is still developing. However, some may say that this field of research is really just a re-emergence of what people have known for centuries – humans have an innate affinity for, and a deep connection with, the natural environment.

Throughout this report, the benefits of providing workers with access to nature-inspired elements in the workplace have been justified. Yet despite this, the global research we have engaged in shows a vast deficiency in the provision of even the most basic biophilic needs, such as natural light and views of nature.

It is likely that for some organizations, providing natural light and window views may not be feasible within the constraints of their current building design. Yet there are ways of mimicking nature indoors and arranging the office that can still deliver the same benefits as the real thing. Research has shown that effectively re-creating nature indoors can reduce stress and restore energy levels with the same degree of impact as real contact with nature[46]. However, it is still important to note that real living nature contact results in significantly stronger physiological responses than simulated nature (Kahn et al., 2008)[19].

In their article on the 14 Patterns of Biophilic Design, Browning, Ryan & Clancy[47] describe a non-visual connection with nature as one of the ways in which humans' biophilic needs can be met. They note that a space with a good non-visual connection with nature feels fresh and balanced - the space should provide complexity and variability as well as being familiar and comfortable. Additionally, by providing sounds, aromas and textures that are reminiscent of being outdoors, we are able to provide a symbolic connection to nature. This is backed by research[48] showing that following exposure to a stressor, nature sounds can accelerate psychological restoration by up to 37%.

Summary

Creating Symbolic Connections

Effective ways of creating symbolic nature connections indoors include: water features with free flowing water; natural plants; the use of natural elements, such as wood and stone; providing natural ventilation (for example, operable windows and breezeways); and using highly textured fabrics that mimic the textures of natural materials.

Ultimately, the research in this area indicates that bringing elements of nature into the workplace, whether real or artificial, provides positive effects on employee outcomes. As such, when thinking about office design and its impact on employees, employers should take serious consideration of the amount of nature contact provided in the workspace in order to both maintain positive levels of well-being among employees and keep employee performance at optimal levels. Specifically, our research has shown that various nature elements can have a positive impact on the individual employee and the most important of these globally tend to be the provision of natural light, a window and greenery within the office space.

The Human Spaces global research study has shown that indeed there are many benefits to providing this nature contact. To not provide it may be potentially damaging to organizations. Many respondents, a third (33%) in fact, reported that they would be affected by workplace design when choosing to work for a company. This emphasizes how an individual's surrounding environment can directly influence how they feel about the organization which will inevitably influence their feelings and behaviors when they are working. Therefore, providing workers with an environment that they are comfortable and happy within is likely to go a long way in increasing well-being and productivity, as well as contributing to the retention of staff and reducing employee turnover.

Finally, it is important to note the impact of culture in the realm of workplace biophilic design. The global nature of this study has allowed a broad range of countries and regions across the globe to be investigated and analyzed in terms of employee preferences for biophilic design and how elements of this design may have differing impacts on various employee outcomes. It has been clearly demonstrated that cultural differences do exist, suggesting that these preferences may even be found at the organizational or individual level. Therefore, it is crucial for organizations and designers to carefully consider these differences in order to ensure that the work environment they create is optimal for a high-performing, happy and healthy workforce.

HUMAN SPACES:

Key Messages

Key Messages

1. ***It is clear that biophilic design in the workplace has a strong, measurable impact on key employee outcomes such as well-being, productivity, creativity:***

    - ***Those who work in environments with natural elements, such as greenery and sunlight, report a 15% higher level of well-being than those who work in environments devoid of nature.***
    - ***Those who work in environments with natural elements, such as greenery and sunlight, report a 6% higher level of productivity than those who do not have the same connection to nature within their workspace.***
    - ***Those who work in environments with natural elements, such as greenery and sunlight, report a 15% higher level of creativity than those with no connection to natural elements in the workplace.***

2. ***Across the world, a third of all respondents report that the design of an office would affect their decision to work for that organization, presenting biophilic design as an important consideration for those companies that want to attract and recruit the best employees.***

3. ***Given its positive impact, surprisingly large numbers of employees reported having little or no contact with nature in their workplace – 47% report having no natural light in their workplace and 58% report having no natural greenery (live plants).***

4. ***Overall, the existing literature in the field of biophilia and biophilic design suggests that nature contact has a restorative effect on people, helping them deal with day-to-day stress and work to maintain their work performance.***

5. ***Providing people with symbolic connections to nature appears to produce almost as great an impact on employee outcomes as the real thing.***

6. ***The research shows that when people enter a workplace that incorporates nature, they are more likely to feel happy and motivated for the day ahead.***

7. ***Considering the benefits achieved by bringing natural elements indoors, employers wanting to create better work environments and strengthen relationships between colleagues have an opportunity here to increase employee outcomes.***

8. ***The agenda for biophilic design in the workplace is developing quickly in the field and a number of leading organizations are now providing employees with contact with nature. This latest research presents a further call to action for employers to consider the environments they provide and continues the discussion of the importance of biophilia within their workplaces.***

HUMAN SPACES:

Appendix

Appendix One
Summary of Global Findings

Impact of Office Colors

- Colors with a significant impact on workers' **MOTIVATION: blue, green and white**
- Colors with a significant impact on workers' **PRODUCTIVITY: blue, green, yellow, and white**
- Colors with a significant impact on **INSPIRING workers: yellow, green and white**
- Colors with a significant impact on **HAPPINESS in the workplace: green, blue , brown and white**
- Colors that significantly impacted workers' **CREATIVITY: yellow, green and white**
- Colors that significantly impacted workers' **ENTHUSIASM: green, blue and white**
- Colors that significantly impacted feelings of **STRESS: gray only***

*Predominantly "gray" offices were reported as uninspiring and were associated with lower levels of enthusiasm, creativity and productivity.

Impact of Window Views

- People who had no window view reportedly spent significantly fewer hours per week at the office. In contrast, those with windows that afforded views of greenery spent significantly more hours per week in the office.
- Having no window view was significantly linked to greater levels of stress whereas those with views of trees and water outside were significantly less stressed.
- Viewing nature regularly through a window in the office significantly impacted levels of worker productivity.
- Having no window view also had a negative impact on workers' creativity.
- Window scenes of nature, such as countryside views, natural landmarks and wildlife, all positively impacted creativity and productivity.

Appendix One: Summary of Global Findings

Impact of Natural Elements within the Office

- Those who worked in offices that provided natural light, live plants, and indoor and outdoor green space reported significantly higher levels of productivity across the globe.
- Greenery in the office, such as plants and green walls, was associated with higher levels of creativity.
- An absence of greenery both within the workspace and in the immediate outdoor environment was associated with higher levels of employee stress.
- Workspaces where individuals had no natural light or greenery report higher levels of sickness absence.

Impact of a Light and Spacious Work Environment

- Those who reported working in environments that were light and spacious had higher levels of well-being, motivation, productivity and creativity.

Appendix Two
Cross Country Findings

Happiness

Australia:	Having window views of trees, whether natural or purposely planted was associated with greater levels of happiness.
Brazil:	The use of blue and white colors in the office was linked to greater happiness at work, as well as viewing wildlife regularly.
Canada:	The availability of external green space was linked to greater happiness at work. Also, the color purple was predictive of employee happiness.
China:	The availability of natural light was important for workers' happiness and so were window views of natural trees and landmarks. Also, the color brown used within the office was associated with greater employee happiness.
Denmark:	The availability of natural light and green space within the office environment was associated with greater levels of happiness among staff.
UAE:	Natural light and window views of closed water, such as lakes, were positively associated with levels of happiness at work.
France:	Views that portray wildlife and open water (e.g. sea) were associated with greater levels of happiness. In contrast, window views of roads were associated with lower levels of happiness at work.
Germany:	Having no window view in the office had a negative impact on levels of happiness.
India:	Having no window view negatively impacted people's happiness at work.
Indonesia:	Using stone elements in the office, as well as having views of the countryside, were linked to greater levels of happiness.
Netherlands:	Natural light and external green space were associated with higher levels of staff happiness. Also, views of trees had a positive impact on reported happiness at work.
Philippines:	Viewing natural trees from inside the office was linked to employees' happiness.
Spain:	Workers' levels of happiness were positively impacted by external green space and natural light.
Sweden:	Natural light had a positive impact on levels of happiness at work. The use of gray colors in the office was significantly related to greater levels of stress among workers.
UK:	Natural elements of light, wood and stone had a positive impact on levels of happiness. Plain white offices were also associated with happiness at work.
United States:	Window views of trees were predictive of greater levels of workplace happiness.

Appendix Two
Cross Country Findings

Creativity

Australia:	Window views of trees were linked to greater creativity among office workers. The use of green office colors was also linked to higher levels of creativity.
Brazil:	Views of lakes and other areas with closed water were predictive of greater levels of creativity. Also having water elements present in the office environment.
Canada:	Window views of trees were associated with greater levels of creativity.
China:	Having natural light in the office was the strongest predictor of creativity among office workers.
Denmark:	Natural elements within the individuals' workspace were associated with greater creativity. In addition, window views of nature, and the color blue in particular, were also associated with high creativity.
UAE:	Natural light was positively associated with creativity.
France:	The use of wood within the office design was positively associated with creativity. Also, views of manmade landmarks were positively linked to creativity.
Germany:	Providing internal green space had a positive effect on creativity. Additionally, water and wood elements positively impacted levels of creativity.
India:	Incorporating the color red within the office design was strongly linked to greater levels of creativity, as was having a window that afforded views of wildlife.
Indonesia:	Having no window view had a negative effect on creativity.
Netherlands:	Yellow, blue and white office colors were associated with greater levels of creativity. Also a non-natural window view (e.g., construction site) had a negative impact on workers' levels of creativity.
Philippines:	The availability of natural light, elements of water and also the color blue in offices were all associated with greater levels of creativity.
Spain:	The presence of live plants had a positive impact on workers' creativity.
Sweden:	Window views of the countryside had a positive impact on creativity.
UK:	The use of purple and green colors within the office was associated with higher levels of creativity.
United States:	Having no window view had a negative effect on creativity. There is also a need for natural elements in the office.

Appendix Two
Cross Country Findings

Productivity

Australia:	The use of wood elements in the office, as well as the use of blue colors, was associated with greater worker productivity.
Brazil:	Predominantly dull, gray offices had a negative impact on productivity. However, the view of the countryside had a positive effect.
Canada:	Having live plants in the office was linked to greater levels of productivity among workers.
China:	Window views of wildlife, natural landmarks and the countryside were all predictors of high worker productivity.
Denmark:	The use of the color blue within the office was predictive of greater levels of productivity.
UAE:	Neither office color nor the presence of natural elements had a direct impact on productivity.
France:	The use of orange colors within the office significantly predicted higher levels of productivity.
Germany:	Natural light and elements of natural stone predicted greater productivity, and regular views of nature outside also positively impacted productivity.
India:	Green office colors were linked to productivity but by far the strongest predictor of productivity was having natural light in the office.
Indonesia:	Green office colors, as well as, having green window views (trees, countryside etc.) were both strong predictors of greater levels of employee productivity.
Netherlands:	Natural light and living indoor plants had a positive impact on productivity.
Philippines:	The presence of live plants was linked to greater levels of productivity.
Spain:	Blue colors within the office had a significant positive impact on levels of productivity.
Sweden:	Natural light and views of nature positively impacted productivity.
UK:	Live plants and natural light within the office space positively impacted creativity.
United States:	Having no window view had a significantly negative effect on productivity, and orange and green colors were good for productivity.

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Biographies

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Cary is recognized as one of the world's leading experts on well-being and stress at work and is the media's first choice for comment on workplace issues. He is a Fellow of the British Psychological Society, The Royal Society of Arts, The Royal Society of Medicine, The Royal Society of Healthful and an Honorary Fellow of the Royal College of Physicians, Editor-in-Chief of the Blackwell Encyclopaedia of Management and the author/editor of over 120 books.

Cary was awarded the Lifetime Practitioner Award from the British Psychology Society in recognition of his services to the profession. He acted as Lead Scientist in the 'Foresight Review of Mental Capital and Well-Being' which influenced government policy regarding well-being in all aspects of society. He is an active member of the Robertson Cooper team, focusing on strategy, external relations and PR activity. In June 2014 he was awarded a Knighthood in the Queen's Birthday Honours list and was also voted the 1st Most Influential HR Thinker of 2014 by HR Magazine.

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Bill Browning is one of the green building industry's foremost thinkers and strategists, and a Partner in Terrapin Bright Green LLC. His expertise has been sought out by organizations as diverse as Fortune 500 companies, leading universities, non-profit organizations, the US military, and foreign governments. Bill was a founding member of the US Green Building Council's Board of Directors, and is the Chair of Greening America. In addition to research and consulting, Bill writes and lectures widely on sustainable design and building practises.

Bill is based in Washington, D.C. and Manhattan, New York.

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Interface was one of the first companies to publicly commit to sustainability, when it made a pledge in the mid-nineties to eliminate its impact on the environment by 2020. Known as Mission Zero, it influences every aspect of the business and inspires the company to continually push the boundaries in order to achieve its goal.

Interface is now more than half way to reaching Mission Zero and has been widely recognized for its achievements to date. Its products have also received several awards, specifically for design and innovation, the most recent being The Athenaeum Good Design Awards for Fotosfera and Urban Retreat.

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