



# THE SNOWBALL EFFECT OF Healthy Offices

**CBRE**

# HEALTHY OFFICES RESEARCH AT A GLANCE

CBRE HEALTHY  
OFFICES RESEARCH








7 MONTHS



Improved performance  
(based on objective experiment)

People function and perform significantly better in a healthy work environment. It also makes people more aware of their health and it inspires them to live healthier at home.

 <b>NATURAL SPACE</b>	MORE PLANTS ON THE WORK FLOOR	<b>+ 10%</b>
 <b>RIGHT LIGHTING</b>	CIRCADIAN LIGHTING	<b>+ 12%</b>
 <b>HEALTHY NUTRITION</b>	HEALTHY ALTERNATIVES TO SUGAR AND CAFFEINE	<b>+ 45%</b>
 <b>MENTAL BALANCE</b>	MEDITATION, YOGA, POWERNAPS AND MASSAGES AT WORK	<b>+ 30%</b>
 <b>PHYSICAL EXERCISE</b>	LESS SITTING DOWN, MORE EXERCISE	<b>+ 12%</b>



UNIVERSITY OF TWENTE IN  
COLLABORATION WITH CBRE



124 PARTICIPANTS



5 RESEARCH METHODS



GROUNDBREAKING



MULTIDISCIPLINARY  
STUDY

> 100,000  
DATA POINTS



Improved performance  
(based on interviews)



Percentage of participant  
who felt more energised



Percentage of participant  
who felt happier



Percentage of participant  
who felt healthier

**+10%**

**76%**

**78%**

**65%**

**+18%**

**71%**

**76%**

**50%**

**+20%**

**78%**

**66%**

**52%**

**+16%**

**66%**

**63%**

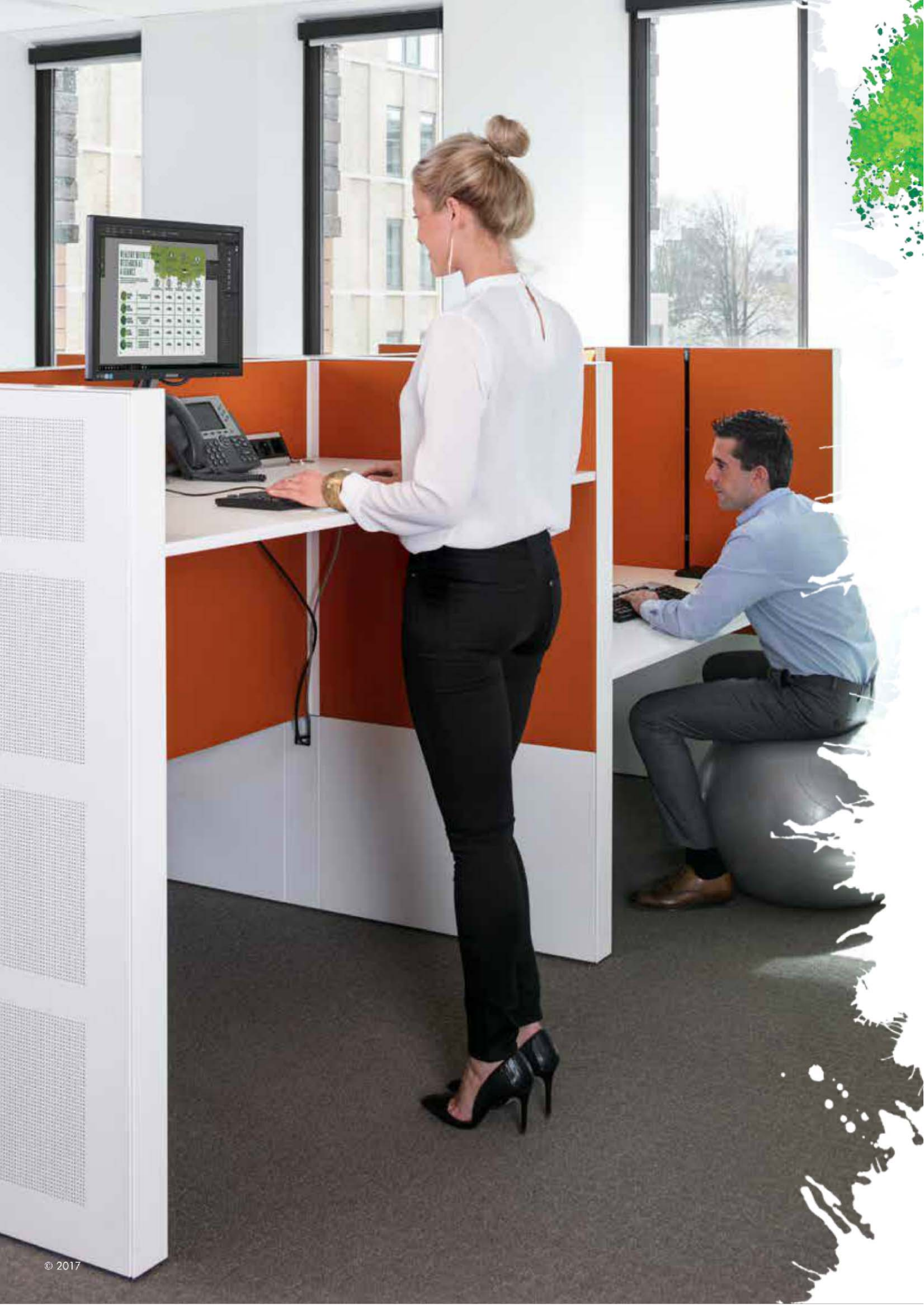
**53%**

**+11%**

**65%**

**36%**

**71%**



# HEALTHY OFFICES

Everyone has experienced them – those days at the office that never seem to end and when you just can't seem to get any work done. Maybe it's the weather, the onset of flu, or the stress that comes with that never-ending list of deadlines. But imagine if we all worked in an environment that fully supported our health and wellbeing. Would that make us healthier? And would it make us perform better? The answer is 'yes'. We have carried out unique, in-depth research which confirms the relationship between people's working environment, their health, well-being, and ability to perform at their best. This article describes our extensive Healthy Offices research and the results obtained for each aspect.

## DESIGNED TO CHANGE BEHAVIOUR

We don't normally realise that the environment that we're in affects our behaviour, but many are designed to do exactly that. Take a supermarket, for example. Fresh flowers near the entrance, and then maybe some attractive fruit, and after that the smell of baked goods in the air. What all these aromas have in common is their effect on the brain. Neurotransmitters like serotonin spike when individuals are exposed to them and this puts shoppers in the ideal state of mind for spending (more) money.<sup>1</sup>

## THE REALITY OF AN OFFICE SPACE

In a perfect world, office space would be designed to help employees to focus and perform at their best. But the reality is that most offices do not. Even modern workspaces with open floor plans have been questioned for their lack of noise control and privacy.<sup>2</sup> Spending at least one-third of our week at the office, and with many of us exceeding these hours, it would seem reasonable to expect that changing the office environment for the better would have a significant impact. And then there are the many bad habits that are often associated with office working – coffee, sugar, smoking breaks, after-work booze, or enjoyable but unhealthy Friday nights out as a reward after a hard week's

work. Do these things help our energy and mood? And if so, how long does this enjoyment last? The simple answer is 'not really' and certainly 'not for long'.

## TRENDS ARE POINTING THE RIGHT WAY

Fortunately, demographic and social trends point to a growing interest in workplace wellness. With employees living longer but perhaps less healthy lives, the focus on health and wellness in the workplace aims to address this situation. And in the ongoing war for talent, what companies offer in terms of wellness is likely to become a crucial aspect of recruiting and retaining talent over the next ten years. Another important trend is the growing awareness of stress, a common ingredient of the working week and a major cause of burn-outs and depression. Last but not least, technology can also help people to get fitter, faster and stronger. It is quite possible that apps that use tracking technologies will also have a role in the workplace.<sup>3</sup>

# THE RESEARCH

The University of Twente, VU Amsterdam and CBRE joined forces for a unique study on employee health. This multidisciplinary research focused on the effects of the working environment on employee potential and involved the departments of neurocognitive psychology, biomedical engineering and business. Even though earlier research already suggested that such a relationship existed, 'normal' situations and 'healthy' people had never been studied to this extent before. Dutch people are among the happiest and healthiest people in the world, yet burn-out rates are on the rise. We measured the effect of changes in the working environment and health over a period of seven months at CBRE's Amsterdam office, using surveys, experiments, biological data, movement daily ratings, and interviews.

12%  
age  
46-50 (15)

## SELECTING THE CHANGES THAT HAD THE GREATEST IMPACT

Based on an extensive literature review, the research team selected the five changes in the working environment that would, in theory, have the greatest impact on employee health and potential. These five changes can be divided into environmental adjustments and healthy choices. All employees were subject to the two environmental adjustments and the results therefore were a direct response to being in the modified environment. These environmental adjustments included Natural Space and Right Lighting. The three health-related aspects, on the other hand, were optional and included Healthy Nutrition, Mental Balance, and Physical Exercise. To establish a baseline, the research team observed and collected data for two months before actually changing anything in the working environment. After this, we created a test zone in which all five changes occurred. We called it the Healthy Spot.

## THREE GROUPS

The 124 employees of CBRE who participated in our research were divided into three groups. Group 1 sat in the healthy spot and the participants were given activity trackers that monitored health data, provided feedback, and regulated activity and sleep. In addition, the technology had gamified elements such as daily progress, feedback or encouragement to meet goals, and competitions with friends or family. Group 2 also sat in the healthy spot but did not wear the activity trackers. This allowed us to see the extent to which activity trackers influenced the behaviour of group 1. To compare the effect of the healthy changes to the 'norm', or what we would expect these employees to experience at CBRE without any of these changes, our third group was a control group. This group participated in research activities such as interviews and surveys, but did not experience any of the changes in the working environment and did not wear activity trackers.

6%  
age  
50+ (7)

36%  
age  
26-30 (45)

58%  
male (72)

42%  
female (52)

15%  
age  
36-40 (18)

31%  
age  
31-35 (39)

# RESEARCH RESULTS

A human-centric work environment has a massive impact when it comes to the performance, well-being and health of employees. During the entire research period, participants were tested, interviewed and measured.

## BETTER PERFORMANCE

All the experiments showed an improvement in task performance in the healthier environment compared to the control group. During the research period, we tested the task performance of the participants every month. We compared the task performance in different environments. For the purpose of this study, this was a comparison between the participants in the healthy environment and those in our control group.

CHANGE	ENVIRONMENTAL ADJUSTMENT OR HEALTHY CHOICE	IMPROVEMENT IN TASK PERFORMANCE
Natural Space	Plants versus no plants	10%
Right Lighting	Circadian lighting versus old lighting	12%
Healthy Nutrition	Avocado and spinach smoothie versus Moorkop (cream filled donut)	45%
Mental Balance	Mindfulness meditation versus stress-test	30%
Physical Exercise	Activity versus no activity	12%

## EXPERIMENT

### DR ROLAND PEPERMAN

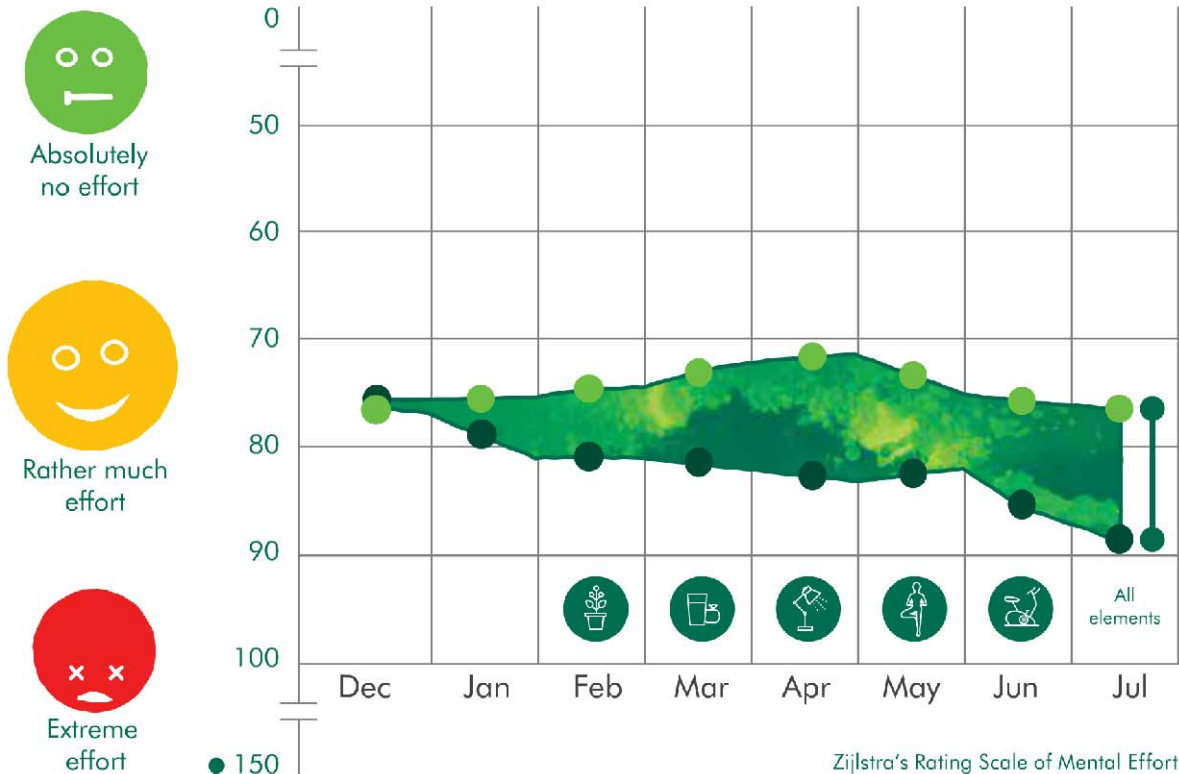
Vrije Universiteit Brussels

All participants received a few sheets of paper and were instructed to find and cross out all of one letter before moving on to the next page (for example the letter V).

Participants were given on average 10 minutes to finish the task before rotating to the next work station.

In total, there were four work stations: two healthy and two unhealthy. Participants were rotated equally between healthy and unhealthy, mitigating the risk of a learning curve on certain work stations.





Zijlstra's Rating Scale of Mental Effort

**LOWER MENTAL EFFORT**

Due to changes in the work environment, participants assessed their own performance more positively. Participants evaluated their performance daily using Zijlstra's Assessment Scale of Mental Effort (RSME). This scale is used to measure mental effort, for example, how difficult a particular task is. It is also an excellent predictor of pre-burn-out, burn-out or work-related disease. Because we conducted this measurement every business day during the research period, we collected more than 11,000 responses. These reactions show that the mental effort of staff in the control group increased to critical levels in which they experienced extreme effort in their daily work. This in contrast to the participants who were exposed to healthy changes.

Data motion sensors (baseline)

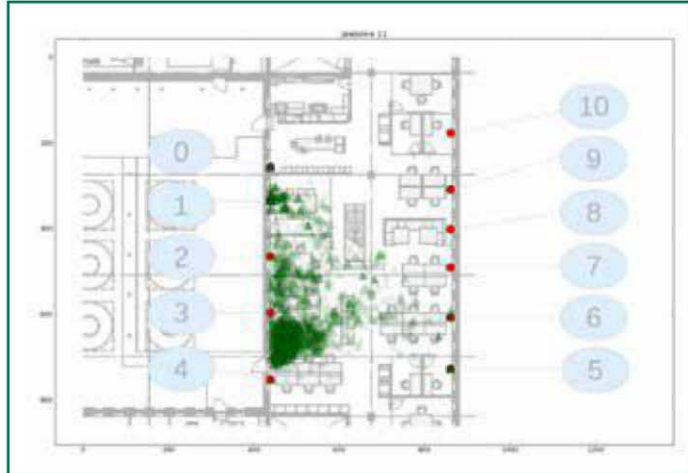


**MORE MOVEMENT**

Research participants started moving more during the investigation. Motion sensors measured the physical activity of participants. The green triangles in the following visual show the movement of participants at the beginning of the research.

As the research period passed, participants moved significantly more. The green triangles in the following visual show the movement of participants at the end of the research.

Data motion sensors (after 7 months)



# NATURAL SPACE



## GREEN MATTERS

Plants and gardens have been used to improve health for centuries.<sup>4</sup> Hospitals have conducted research into the effects of plants on patient outcomes and health, which showed that patients recovered faster in environments with plants than in environments without plants. But plants are not only for sick people, they also improve overall health and wellbeing in the places where we live and work. For example, plants have been shown to prevent and alleviate headaches, depression, anxiety disorder, asthma, heart disease, concentration, self-discipline, and physiological stress. An interesting fact is that this does not necessarily have to be long-term exposure. Hours or even minutes of exposure can affect mental and physical wellbeing.<sup>5</sup> Even more remarkable is that this benefit can come from either real or 'fake plants' and, by the same token, posters or wall murals showing images of plants.

## THE 'UNNATURAL' NATURE OF THE OFFICE

In an average office, we don't benefit from the positive effects of plants. Even though many offices have some plants or flowers inside the office, this is nothing compared to being outside in a natural environment. Usually there might be one or two plants in a room and this is only enough to achieve about 1% of the plant density of an outdoor area. Lately, the sterility of office spaces has been questioned more and more.<sup>6</sup> A study involving 3,600 workers in eight countries in Europe, the Middle East and Africa (EMEA) has shown that employees who work in environments with natural elements have a 13% higher level of well-being and are 8% more productive.

## GREEN DESIGN

To bring the benefits of plants to employees at their desks, a new design was required. Before the study started, there were some flowers near the coffee areas at the CBRE office. However, very few were visible from the areas where staff actually worked. Employees had virtually no opportunity to benefit from green spaces while they worked. For our research, a combination of full length wall murals, real and fake plants were distributed in the healthy areas. Murals were placed on a few key walls and in some small offices. Plants were added in the middle of working spaces and in eating areas. Then, plants (real or fake) were placed within the field of view of every work place in the healthy area.

## THE GREEN EFFECT

The participants who were working in the healthy spot, with and without an activity tracker (groups 1+2), perceived their work performance as 10% better. Just as in other studies, the effects of both real and fake plants were also confirmed by our study.

"BECAUSE  
I STRONG  
A MORE

– Participant Hee

76% of participants felt more energised



78% of participants felt happier



65% of participants felt healthier



USE OF THE DRY AIR,  
GLY BELIEVE IN PLANTS TO CREATE  
HEALTHY WORKPLACE."

Healthy Offices Research



CBRE

71% of participants felt more energised



76% of participants felt happier



50% of participants felt healthier



"FROM THE OUTSIDE, VERY UNATTRACTIVE. SITTING IN THAT ARE THE LIGHT BECOMES AND KEPT ME MORE

- Participant Healthy Offices Research



# RIGHT LIGHTING

## LIGHT CUES

Decades of research have shown that light can substantially influence our mood and ability to focus, and the most important aspect of good lighting is timing.<sup>7</sup> Our brains regulate the body's circadian rhythm based on light cues from our environment. This circadian rhythm controls energy levels, mood and sense of wakefulness/sleepiness.<sup>8</sup> When these schedules get out of sync, it can make us euphoric or manic, slowing our responses down. We become less alert and find it harder to focus. This can sometimes affect our perception, memory, and other executive functions. Interrupting or disturbing the circadian rhythms not only affects employees at the office, but it can disrupt the balance of chemicals in the brain. These changes can cause people to stay longer at the office but throws off their circadian rhythm during the night and days that follow.

## DRAMATIC CHANGE

Even though the lighting environment at the CBRE office met the norms for most workspaces, a drastic change was needed. We discovered that the lighting in the office was actually more suitable for people after work or just before going to bed. In order to help promote healthy

sleep patterns and energy levels, we installed a lighting system with a timer on a circadian-friendly schedule in the Healthy Spot. Warm light in the morning, strong bright light in the afternoon and dimmer light in the evening. Light sources were mainly directed towards a wall to simulate the sensation of light coming in through a window and avoid glare. The lights were almost doubled in brightness and, in some areas, lowered from the ceiling to allow the light to shine on the right part of the face and avoid glare. All the lights changed from a yellow tint in the morning to a blue tint in the afternoon, returning to a softer yellow toward the end of the day.

## TRUE ENLIGHTENMENT

The participants who were working in the healthy spot, with and without an activity tracker (groups 1+2), perceived their work performance as 18% better. On the first day of the research period, the participants struggled with the new lighting. But they soon got used to it and reported that they were very happy working in that area. The positive effect of the new lighting was also evident when we switched the office light back to the old setting. In the afternoon, employees believed for a minute that the lights were not just dimmer but actually off entirely! It took quite some time for the participants to get used to the old lighting again and it was also one of the first things they asked to bring back after the study.

THE LIGHT LOOKS  
BUT WHEN YOU'RE  
A IT'S VERY PLEASANT.  
ALMOST LIKE DAYLIGHT  
ALERT."



78% of participants felt more energised



66% of participants felt happier



52% of participants felt healthier



"WITH THESE KINDS OF RESULTS, IT'S **AMAZING** THAT WATER IS NOT 'INCENTIVISED' MORE OFTEN, USING **FRUIT** LIKE BERRIES OR ORANGES, HERBS LIKE MINT OR LAVENDER AND VEGETABLES LIKE CUCUMBER."

- Elizabeth C. Nelson – Head of Healthy Offices Research team



# HEALTHY NUTRITION

## OFFICE CONSUMABLE NUMBER 1

Alarming stories about unhealthy eating, overeating and lack of nutritional knowledge contribute to making nutrition an important factor.<sup>9</sup> Nutrition also has a significant tendency to 'snowball' outside working hours, affecting employees' meal choice outside the office and general approach to their diet. The number 1 'office consumable' these days is coffee. And since coffee shops like Starbucks were introduced in the 1990s, this trend has increased exponentially in terms of both the amount consumed and the overall 'cool' factor. Medical professionals advise a maximum of five cups of coffee a day, which is the equivalent of 400 milligrams of caffeine. According to the US Food & Drug Administration, this amount of caffeine a day is safe for healthy adults who aren't pregnant or sensitive to caffeine. It does, however, increase the amount of cortisol (the stress hormone) concentrations circulating.<sup>10</sup> After drinking a cup of coffee, cortisol concentrations are significantly higher compared to people who have not drunk any coffee, and this effect lasts for 60 minutes afterwards.

## SOUND THE ALARM ON SUGAR

In general, we have seen sugar consumption rise by 50% since 1970, but research shows that the brain of someone who has consumed sugar resembles that of a drug addict.<sup>11</sup> This is alarming, especially since sugar is another common office consumable. It's not unusual for chocolates, mints, or jelly candies to welcome guests at an office reception area. Eating sugar makes your dopamine levels spike, reinforcing your desire for more sugar, and neurotransmitters like serotonin calm and elevate your mood. Sugar also compromises the ability of nerve cells to communicate with each other, affecting things like remembering instructions, processes ideas, and handling our emotions. Many doctors even advocate making sugar a restricted substance, like alcohol or cigarettes.

## HEALTHY DRINKS AND SNACKS ALL AROUND

During the research period, every afternoon we provided healthy snacks, such as nuts and rice waffles with humus and cucumber, in order to curb the well-known afternoon sugar cravings that can occur a few hours after lunchtime. In an effort to curb coffee drinking, especially in the afternoon, water pitchers filled with mint, cucumber and various fruits were put out in the healthy area. Carbonated sodas were taken away and more decaffeinated tea was added to the tea selection (about 30% of the available tea). In order to educate participants on healthy food, we organised Health Seminars, and specific individualised tips were provided through the activity tracker app.

## THE HEALTHY CHOICE

The participants who were working in the healthy spot, with and without an activity tracker (groups 1+2), perceived their work performance as 20% better. Encouragingly, but not surprisingly, providing a healthy alternative did help participants to make healthier choices. The healthy snacks were very popular, even among non-participants. We even received complaints when we stopped providing the snacks. During our monthly survey, we consistently asked employees about their choices regarding beverages. These included water, caffeinated tea and coffee. The participants involved in the study decreased their coffee intake by 47% and increased their water consumption. The healthy group went from 60% of people drinking no more than the recommended amount of coffee per day (less than five cups) to 94%, and this continued into the following month after the nutritional initiatives were taken away. More than 90% of the (healthy office) participants continued drinking less than 5 cups of coffee per day the following month.





# MENTAL BALANCE

"PEOPLE JUST NEED TO **FEEL**  
THAT IT'S OKAY TO TAKE  
10 MINUTES TO  
**RELAX** / STRETCH  
AND REBOOT. THE SILENT  
HEADPHONES ARE DEFINITELY  
A KEEPER!"

- Participant Healthy Offices Research

**66%** of  
participants felt  
more energised



**63%** of  
participants  
felt happier



**53%** of  
participants  
felt healthier





## A STATE OF MINDFULNESS

Mindfulness is an incredibly empowering tool that can be used to relax and improve mood and overall state of mind. A study carried out by Johns Hopkins University showed that mindfulness meditation reduces the symptoms of depression, anxiety and pain just as effectively as antidepressant drugs.<sup>12</sup> According to Yale University, mindfulness and meditation positively affect the Default Mode Network connectivity in the brain which is responsible for mind-wandering and reflective thought. Mindfulness has become increasingly popular in workplaces, especially around Silicon Valley. Influenced by the great popularity of Deepak Chopra, workplaces have provided training and introduced designated areas for mindfulness, meditation and yoga at work. In the Netherlands, mindfulness in the workplace has not yet become mainstream, but there have been some initiatives.

## MEDITATING IN A HOUSE ON FIRE?

Mindfulness can greatly benefit employees, provided that they are in a calm state going into mindfulness sessions. Working long hours in a very stressful environment makes trying to do mindfulness practices a bit like trying to meditate in a house on fire – it might calm you down for a bit, but it will not stop you from going up in flames. Management practices that are based on fear, for example, can cause or heighten stress. Instead of motivating teams through positivity and support, fear-based management makes employees feel insecure about their work, their commitments, or their position in the company.<sup>13</sup> This type of stress negatively affects employees and makes them perform worse. Mindfulness meditation therefore needs to be added to offices alongside management training to prevent decreased work performance due to stress.

## MAKE ROOM FOR MINDFULNESS

Two rooms were acquired to facilitate meditation, yoga, naps and weekly massages. Although participants had the option of participating in these activities, they were not pushed to do so. We simply altered their environment to enable them to participate, to see if they would make use of them and if there were any improvements as a result. We offered weekly 15-minute massage sessions and naps were possible whenever there were no massages taking place. Yoga and meditation classes were held in a private conference room for 5, 10, or 15 minutes. In addition, silent headphones were made available in the sometimes noisy open-plan office.

## OVERCOMING THE INITIAL BARRIER

The participants who were working in the healthy spot, with and without an activity tracker (groups 1+ 2), perceived their work performance as 16% better. Based on their experience during the research period, 68% of the participants believed that massages should be made a regular feature of the working environment, 32% of employees believed this about meditation and 29%

regarding yoga. Even though 23% of the participants believed the same for the nap room, several participants were doubtful about this facility because they thought it may not have the support of managers. From the first week, the massage sessions were fully booked. Initially, however, only women received the massages. Male participants said that they were more hesitant to participate, but after hearing positive feedback from their female colleagues, a few men decided to try the massage sessions and soon the men were making massage appointments at an almost equal level. Meditation, yoga and the nap room seemed more dependent on personal preferences and beliefs around company culture.

We conducted a stress test experiment to test the effects of mindfulness on employees. The participants completed a simple test in four different environments. Two of these environments were stress-inducing and two were meditative/mindfulness environments. Each participant started in a different environment and rotated between a stress-inducing task and a mindfulness task. In one of the stress-inducing environments we asked them to defend their work against criticism from colleagues and say why their work was the best. While this may be a more common task in countries like the US, this is quite uncomfortable for many Europeans (in this case the test subjects were Swedish CBRE employees). The Swedish employees performed 30% worse in the stressful environment compared to the meditative environment. They also reported higher stress levels in the post-test survey. In the second stress-inducing environment, we asked participants to sing in public – a fear which is rated as number 1 and higher than the fear of death, which is second! In this case, participants performed 16% worse compared to the meditative environment.



# PHYSICAL EXERCISE



## SITTING IS THE NEW SMOKING

Several studies have revealed the obvious connection between health and physical activity, with the Huffington post even claiming that ‘sitting is the new smoking’ in 2014.<sup>14</sup> Activity is important in fighting heart disease, because it produces good cholesterol and this reduces unhealthy triglycerides. Some doctors recommend getting up as often as 32 times per working day and at least twice every hour.<sup>15</sup> This conflicts with the traditional idea of being available and at your desk 8+ hours per day. Researchers also suggest that sitting reduces circulation, making it harder for “feel-good hormones”, such as serotonin, to make their way to receptors. Physical activity may therefore also help to alleviate depression symptoms and prevent future symptoms. Research published in the American Journal of Preventative Medicine studied 9,000 middle-aged women and determined that women who sat for more than 7 hours per day were 47% more likely to be depressed than women who sat for 4 hours or less. Women who never exercised had a 99% higher risk of developing depression than those who did at least some exercise.

## STAND UP FOR YOUR HEALTH

Sitting for extended periods has been shown to affect blood sugar levels and insulin in the body. Results of 18 studies (involving nearly 800,000 participants) prove that individuals who were more sedentary were twice as likely to develop type 2 diabetes.<sup>16</sup> Another study found that men and women who sit 6+ hours a day die earlier than individuals who sat for 3 hours or less per day.<sup>17</sup>

## AN ACTIVE OFFICE WORK MODE

To promote more activity in the office, we provided healthy alternatives to sitting. We added alternatives to chairs such as medicine balls, stationary bicycles, and treadmills in the office. In one of the conference rooms we replaced regular tables with standing conference tables and bicycle seats. There were also balancing boards to increase movement and work on balance and strength when standing.

To promote lunch-time walks and walking meetings, a map was made and distributed showing paths near the office for walking meetings, along with the estimated time per walk.

## LEAVING OLD HABITS BEHIND

Participants who were working in the healthy spot, with and without an activity tracker (groups 1+2), perceived their work performance as 12% better. All the participants believed that the active spaces were a good feature for an office to have and 75% of them used these for at least part of a day. Interviews and data proved that participants had begun to change their working habits, and specifically their sitting habits. For example, there was more face-to-face contact rather than sending e-mails. The participants struggled to combine some active elements with working activities such as typing or writing, however. The treadmills in particular were a challenge in combination with typing at a desk. On the other hand, the medicine balls were widely embraced as chair replacements either for the whole day or part of the day. The bicycles in meeting rooms were also felt to be good to combine with discussions during meetings. Although walking meetings were not embraced by all individuals, participants remarked that walking meetings were a great break in the day when they occurred.

65% of participants felt more energised



36% of participants felt happier



71% of participants felt healthier



"THE FACT THAT CBRE GIVES US THE OPPORTUNITY TO **RELAX** HAS ENCOURAGED ME TO BRING MORE **MINDFULNESS/** RELAXATION INTO MY WORK LIFE."

- Participant Healthy Offices Research



# A BRIGHTER FUTURE FOR PEOPLE AND BUSINESS

Creating an environment which allows people to stay healthy and more engaged has a massive impact! Current offices incorporate many dynamics in their environment or company culture that are unhealthy and can make people sick. This research, like previous studies, shows that offices are ecosystems involving hundreds or even thousands of different components that involve choosing between a healthy or an unhealthy approach, many of which we are unaware of. Changing our working environment could lead to a brighter future for people at work, and it also represents a smart business investment. The costs associated with sickness and burn-outs as well as employee turnover are significant expenses that could be drastically reduced or eliminated by introducing healthier offices.

## THE SURPRISE 'SNOWBALL EFFECT'

In addition, the healthy office can cause a ripple effect, helping to generate wider benefits. Improving the 8+ hours that employees spend at work can greatly improve their overall physical and mental health and encourage them to take

those healthier habits home with them too. We call this the 'snowball effect'. When we were measuring the effects of changes in the working environment, we never expected to see that it would also inspire employees to change their habits and lifestyles at home too.

## EMPOWERING PEOPLE IN THE WORKPLACE

Workplaces can contribute to employees becoming more aware of their health, making them feel more in control. Another study published last year by the main researcher in this Healthy Offices Research, Elizabeth C. Nelson, and co-researchers Matthijs Noordzij and Tibert Verhagen, examines the concept of health empowerment.<sup>18</sup> Empowering an individual will, by definition, make them feel more in control and less stressed. This can lead to lower burn-out rates and higher levels of commitment to both health and the workplace.

An empowering workplace means that people can perform better and operate at a higher level, as confirmed by our experiments with task efficiency. And as our monthly survey responses revealed, employees feel happier, more energised, and healthier. What is perhaps even more interesting is that the participants took their healthy habits home with them. Empowering workplaces are therefore an incredible tool with which to create an environment that encourages healthy and happy employees to achieve even bigger and better things. And this benefits both employers and employees!



# HEALTHY OFFICES RESEARCH TEAM

The composition of the Healthy Offices Research Team is an unusual one. While collaboration occurs across departments at the University of Twente, doing a study of this size with departments this diverse is quite an undertaking. These different perspectives were combined for the first time for a holistic study of the health of office workers and this is exactly what Elizabeth and the rest of the research team had in mind. The result is this unique study that clearly shows the added value of the multidisciplinary approach.

## TEAM

**Dr Matthijs Noordzij**  
PhD Neurocognitive Psychology

**Dr Tibert Verhagen**  
PhD International Economics

**Dr Miriam Vollenbroek (promoter)**  
PhD Biomedical Science

**Elizabeth C. Nelson (Head of Healthy Offices Research Team)**  
PhD Candidate Biomedical Engineering

## ABOUT ELIZABETH

Burn-outs are a common worldwide problem and the number of cases continues to rise. It's time for action. Elizabeth and CBRE believe that the business community plays a decisive role. With the help of wearable technologies and the right working environment, organizations can encourage employees to strive for the best in terms of their health and performance. In this way businesses help reduce the number of burn-outs, but also improve the quality and performance of organizations in general.

Elizabeth's passion for the subject and this project came from her own experience in the intense American working culture seeing staggering burn-out rates. She even wrote a book about this experience and her decision to change course. She describes how she came into contact with the burn-out-phenomenon and how she came to her transition from business to science. Her book *The Healthy Office Revolution* will be in stores in the near future.



# CONTACT

## HEALTHY OFFICES QUICKSCAN

Curious about how your office supports the health, well-being and performance of your staff? Our Healthy Offices QuickScan provides an insight. Find out more about our latest innovation in the field of workplace concepts on our website or contact us directly.



## CBRE TEAM

### **Maaïke Boné**

Director Client Solutions  
E [maaïke.bone@cbre.com](mailto:maaïke.bone@cbre.com)

### **Wouter Oosting**

Senior Director Workplace  
Strategies & Design  
E [wouter.oosting@cbre.com](mailto:wouter.oosting@cbre.com)

## **CBRE**

Gustav Mahlerlaan 405  
1082 MK Amsterdam  
T +31 (0)20 626 26 91

 [@CBREnederland](https://twitter.com/CBREnederland)

 [linkedin.com/company/cbre-nederland](https://www.linkedin.com/company/cbre-nederland)

[cbre.nl/healthy](https://www.cbre.nl/healthy)

## INDEX

1. Firestein, S. (2001). How the olfactory system makes sense of scents. *Nature*, 413(6852), 211-218.
2. Kaufman, Lindsey (2014, December 13). Google got it wrong. The open-office trend is destroying the workplace. Retrieved from [https://www.washingtonpost.com/posteverything/wp/2014/12/30/google-got-it-wrong-the-open-office-trend-is-destroying-the-workplace/?utm\\_term=.c42ad2a9ec26](https://www.washingtonpost.com/posteverything/wp/2014/12/30/google-got-it-wrong-the-open-office-trend-is-destroying-the-workplace/?utm_term=.c42ad2a9ec26).
3. Hahn, Hannah (2016). Wellness in the workplace.
4. Ulrich, R. S. (2002, April). Health benefits of gardens in hospitals. In Paper for conference, Plants for People International Exhibition Floriade (Vol. 17, No. 5, p. 2010).
5. Groenewegen, P. P., Van den Berg, A. E., De Vries, S., & Verheij, R. A. (2006). Vitamin G: effects of green space on health, well-being, and social safety. *BMC public health*, 6(1), 149.
6. Sturt, David and Todd Nordstrom (2015, January 13). Is sitting the new smoking? Retrieved from <http://www.forbes.com/sites/davidsturt/2015/01/13/is-sitting-the-new-smoking/2/#3044d7fa116b>.
7. Humble, M. B. (2010). Vitamin D, light and mental health. *Journal of Photochemistry and Photobiology B: Biology*, 101(2), 142-149.
8. Kelly, T. L., Smith, D., & Naitoh, P. (1989). Melatonin, Light and Circadian Cycles (No. NHRC-89-38). Naval Health Research Center San Diego CA.
9. Levinson-King, Robin (2016, December 28). Canada's healthy-eating guide fights to stay relevant. Retrieved from <http://www.bbc.com/news/world-us-canada-38324636>.
10. Gavrieli, A., Yannakoulia, M., Fragopoulou, E., Margaritopoulos, D., Chamberland, J. P., Kaisari, P., Kavouras, S. & Mantzoros, C. S. (2011). Caffeinated coffee does not acutely affect energy intake, appetite, or inflammation but prevents serum cortisol concentrations from falling in healthy men. *The Journal of nutrition*, 141(4), 703-707.
11. Ruff, J. S., Suchy, A. K., Hugentobler, S. A., Sosa, M. M., Schwartz, B. L., Morrison, L. C., ... & Potts, W. K. (2013). Human-relevant levels of added sugar consumption increase female mortality and lower male fitness in mice. *Nature communications*, 4.
12. Goyal, Madhav M.D. (2014, January 6). Meditation for anxiety and depression? Retrieved from [http://www.hopkinsmedicine.org/news/media/releases/meditation\\_for\\_anxiety\\_and\\_depression](http://www.hopkinsmedicine.org/news/media/releases/meditation_for_anxiety_and_depression)
13. Ryan, Liz (2015, November 25). The five characteristics of fear-based leaders. Retrieved from <http://www.forbes.com/sites/lizryan/2015/11/25/the-five-characteristics-of-fear-based-leaders/#1f7b4a9a56fb>
14. Patel, A. V., Bernstein, L., Dekker, A., Feigelson, H. S., Campbell, P. T., Gapstur, S. M., ... & Thun, M. J. (2010). Leisure time spent sitting in relation to total mortality in a prospective cohort of US adults. *American journal of epidemiology*, 172(4), 419-429.
15. Gerstacker, Diana (2014, December 13). Sitting is the new smoking: Ways a sedentary lifestyle is killing you. Retrieved from: [http://www.huffingtonpost.com/the-active-times/sitting-is-the-new-smokin\\_b\\_5890006.html](http://www.huffingtonpost.com/the-active-times/sitting-is-the-new-smokin_b_5890006.html).
16. Storrs, C (2015, August 7) Stand up, sit less and move more, researchers say; here's how to do it. Retrieved from: <http://edition.cnn.com/2015/08/06/health/how-to-move-more/>
17. Henson, J., Yates, T., Biddle, S. J., Edwardson, C. L., Khunti, K., Wilmot, E. G., ... & Davies, M. J. (2013). Associations of objectively measured sedentary behaviour and physical activity with markers of cardiometabolic health. *Diabetologia*, 56(5), 1012-1020.
18. Nelson, E. C., Verhagen, T., & Noordzij, M. L. (2016). Health empowerment through activity trackers: An empirical smart wristband study. *Computers in Human Behavior*, 62, 364-374.

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