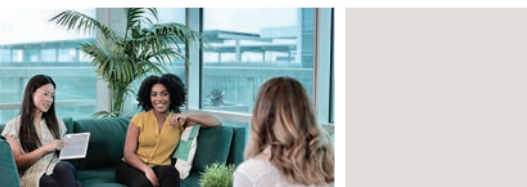
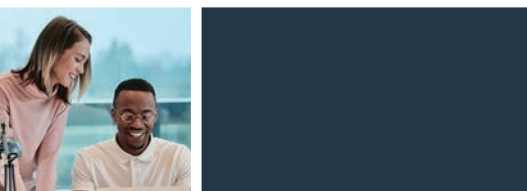
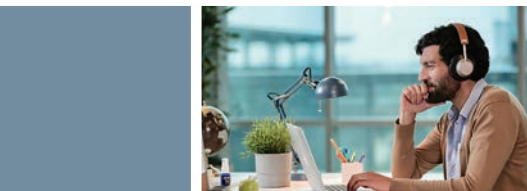




Long Term Workplace Wellness Study

How does having daylight and views in the office impact employee wellness and engagement?



Executive Summary

Healthy workplaces are successful workplaces

Employees are a company's greatest asset. Providing a workplace that promotes their personal wellness ultimately benefits a company's bottom line, not only by reducing costs of healthcare and absenteeism, but also by increasing employee engagement and improving the company's ability to retain and recruit talent.

Key Findings

After relocating to a floor in their building with smart window technology that optimizes daylight and views to the outdoors, employees reported long-term benefits for:

- **Workplace engagement** – 3-5x greater excitement and pride for their company
- **Physical health** – Fewer headaches, eyestrain, and drowsiness
- **Performance** – Greater concentration and alertness

to colleagues increased three-fold. Contrary to the expectation that these sentiments would normalize over time, the researchers found that these benefits were sustained even after six months of settling into their new environment.

Physical Health. After relocating, employees also reported fewer health symptoms that are commonly experienced by office workers. They reported 40% fewer headaches, 75% less eyestrain, and an elimination of drowsiness.

Research Methods

To better understand how daylight and views in the workplace impacts employee wellness and engagement, Dr. Joon-Ho Choi of University of Southern California and Dr. Vivian Loftness of Carnegie Mellon University conducted a multi-season study of a long-term tenant of a building who moved from one floor of a building with conventional windows and blinds to floor in the same building with windows that intelligently optimize daylight and views (View Smart Glass).

Performance. By prioritizing and optimizing daylight in the office, companies can increase their employees' ability to work comfortably longer. A more engaged workforce also means a more excited and motivated workforce, factors that drive overall company performance. After relocating, employees reported 29% higher alertness and 13% greater concentration.

Conclusions

Providing employees with optimized daylight and views unlocked significant benefits for employee engagement, health, and performance. These not only enhance the personal wellbeing of employees but also are key to organizational success as these outcomes have been shown to boost employee retention, talent attraction, and company performance.

Results

Employee Engagement. After relocating to the floor with optimized daylight and views, employee surveys revealed that pride in the company and likeliness to rate the workplace as healthy increased five-fold, and excitement to go to work and likeliness to recommend the building

Carnegie Mellon University





Site of the Long Term Workplace Wellness study, where a tenant relocated to a floor with electrochromic glass.

Research Methods

The Long Term Workplace Wellness study was conducted in a Class A office building in the heart of downtown Toronto, where the tenant – a financial company – relocated from the 12th floor of the building which had traditional window glass and blinds, to the 17th floor which had been fitted with electrochromic glass (View Smart Glass).

To study the impact of the optimized daylight and view conditions on employee experience, 17 employees were surveyed pre- and post-relocation with detailed questionnaires relating to employee engagement, satisfaction, self-reported alertness and concentration, physical health symptoms, emotional affect, and perceptions of their environment. Employees were surveyed at four time points: 30 days prior to relocation, and 30 days, 90 days, and six months after relocation in order to observe whether their experiences altered after having time to normalize to their new environment. These time points also captured employee responses across three seasons of the year.

In addition to installation of dynamic glass, the 17th floor differed from the 12th floor in that the average workspace per employee decreased by 26% and the floorplan transitioned from mostly private offices to a more open workspace plan – changes that research has suggested may negatively impact performance and productivity¹.

The Experts

Dr. Vivian Loftness is a Professor and former Head of the School of Architecture at Carnegie Mellon University. She is an internationally renowned researcher with over thirty years of expertise on advanced building systems integration and design for performance in the workplace of the future. She has served on ten National Academy of Science panels and has given four Congressional testimonies on sustainability.

Dr. Joon-Ho Choi is an Assistant Professor of Building Science in the School of Architecture at the University of Southern California. His research topics include high performance buildings, human-centered building environmental control, building systems integration and comprehensive post-occupancy evaluation, and work productivity.



Dr. Vivian Loftness

Professor
Former Head of the School of Architecture
Carnegie Mellon University



Dr. Joon-Ho Choi

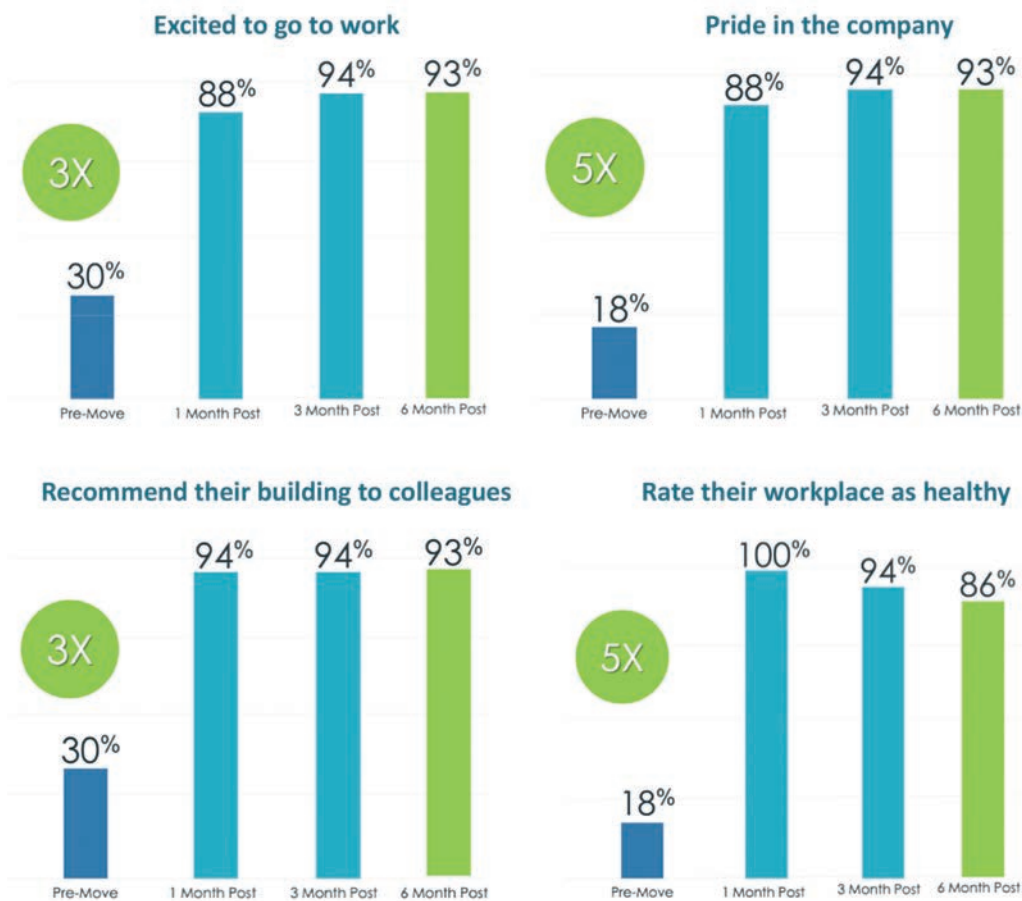
Associate Dean of Research & Creative Work,
Associate Professor of Building Science
University of Southern California

¹ Bernstein, E. and Waber, B. The Truth About Open Offices. Harvard Business Review. November-December 2019.

The Results

Employee Engagement

After relocating to the floor with optimized daylight and views, employees reported being more excited to go to work, having more pride in the company, being more likely to recommend their building to colleagues, and being more likely to rate their workplace as healthy.



Not only that, these impacts were sustained over time. Even after 6 months of settling into their new environment, excitement and pride for their company and workplace were 3 to 5 times higher than before the move.

These benefits unlock significant advantages for employee retention and attraction. A study of 800 employees conducted by Gartner, a global research and advisory firm and a thought leader in employee engagement, revealed that companies with higher employee satisfaction with their workplace had 18% higher retention and 30% higher talent attraction².

² Gartner. Make Your Digital Workplace Employee-Friendly with These Six IoT Best Practices, Achint Aggarwal, Carol Rozwell, 20 August 2018.

Intelligently optimized natural light can reduce the risk of Computer Vision Syndrome symptoms by providing workers with greater access to natural light while significantly reducing glare conditions.

Furthermore, the American Optometric Association recommends self-treatment by utilizing the “20-20-20 rule” of looking into the distance at least 20 feet away, for 20 seconds for every 20 minutes of computer work. Unobstructed views of the outdoors can motivate workers to employ this rule more often, and therefore provides an element of recovery for Computer Vision Syndrome symptoms.

Physical Health

Offices where natural light is intelligently optimized significantly reduces symptoms of Computer Vision Syndrome, an occupational hazard impacting 70 million workers worldwide. Computer Vision Syndrome, also known as “digital eyestrain”, is a condition that can result from prolonged computer use (i.e. three or more hours a day), and symptoms include eyestrain, blurred or double vision, and tension headaches³.

Lack of daylight and harsh conditions such as glare reflected on the computer screen are known to increase risk of Computer Vision Syndrome, as these conditions cause excessive visual demands.

After relocating, employees experienced



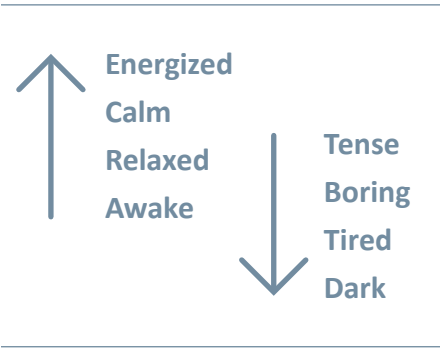
After relocating to the office with View Smart Glass, employees experienced a 75% reduced eyestrain and 40% fewer headaches. Dynamic windows also contributed to reducing symptoms related to thermal discomfort and lack of daylight penetration, with employees reporting a 100% elimination of drowsiness after relocation. They were also 60% less likely to report annoyance by glare and visual discomfort while performing computer work. These physical health benefits were consistent with previous studies on access to optimized light and views⁴.

Mood, Emotional Wellness, and Work Performance

Employees reported 25% better moods and a 25% increased ability to relax after relocating to the office with View Smart Glass. When prompted with a series of positive and negative emotional affect keywords, employees responded significantly higher by an average 26% for all positive emotional responses (such as energized, delighted, calm, relaxed, and awake) and significantly lower by an average of 22% for the six significant negative emotional responses (such as tense, dark, boring, and tired).

These patterns were maintained across all seasons during which post-relocation surveys were administered, demonstrating the ability of the dynamic glass to optimize lighting, temperature, and glare conditions in a variety of seasons with variable conditions.

Poor mood and emotional wellness, as well as health symptoms and discomfort with environmental conditions. can significantly detract from work performance. By prioritizing and optimizing daylight and temperature conditions in the office, companies can increase their employees’ ability to work comfortably and happier for longer. After relocating into the space with View Smart Glass, employees reported 29% higher alertness and 13% higher concentration.



3 American Optometric Association. Computer Vision Syndrome. 2018.
4 Hedge, A., and Nou, D. Worker reactions to electrochromic and low e glass office windows. *Ergonomic International Journal*. 2018.

After relocating, employees experienced



Satisfaction with the indoor environment rose from below average to the **top 7.5th** percentile of workstations in North America.

Organizational Performance

Employee engagement is a strong driver of key organizational outcomes and overall company performance. A study by Gallup⁵ revealed that businesses in the top quartile of employee engagement have 41% lower absenteeism, 59% lower turnover, and 21% higher profitability compared to businesses in the bottom quartile. Organizations that are the best in engaging their employees achieve earnings-per-share growth that is four times that of their competitors.

Satisfaction with the Environment

The survey also revealed that employees experienced 41% increased satisfaction with views to the outside and 38% higher satisfaction with daylight conditions compared to their original environment, with benefits consistently observed across all three time points in three different seasons post-relocation.

Utilizing the COPE⁶ survey, the study found that in their original office space with conventional windows and blinds, employees reported their overall indoor environmental quality satisfaction and overall thermal quality satisfaction to be below average when compared to the COPE database of 2300 workstations across North America (at the 62nd percentile and 96th percentile, respectively). After relocation into the space with dynamic glass, their ratings for overall indoor environmental quality rose to be at the top 7.5th percentile and their ratings for thermal quality satisfaction rose to be in the top 9.5th percentile in summer and 15th percentile in the winter.

Interestingly, these benefits were observed both by those whose workstations were located in the perimeter of the floorplan and by those who were located in the core zones. This demonstrated that no matter their location within the space, due to the optimized daylight conditions and the increased availability of views to the outdoors present across the floorplate, employees experienced the emotional, satisfaction, and performance benefits.

5 Gallup. Q12 Meta-Analysis Report. 2016.

6 Cost-Effective Open-Plan Environments (COPE) survey. Carnegie Mellon University. National Environmental Assessment Toolkit (NEAT). 2017.

Conclusions

After relocating to a floor in their building with dynamic glass that intelligently controls daylight penetration throughout the day, employees reported three- to five-fold higher engagement with their workplace, significant benefits to their physical health, greater environmental satisfaction, positive impacts on their emotional affect and mood, and enhanced concentration and performance at work.

Remarkably, these benefits were maintained even after six months after the relocation; this revealed that the observed impacts were not short-term benefits resulting from the relocation into a new and different space but rather, long term benefits impacting their employee health and wellbeing.

The Long Term Workplace Wellness research study emphasizes how the physical workplace environment is crucial to employee wellness, engagement, and satisfaction. By prioritizing environmental and design elements in the workplace that helps employees come to work happier and healthier, workplaces also help employees perform at their best.