

Establishing Sit-Stand Wellness Cultures in Large Enterprises

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How Interior Design Choices Can Reduce Workplace Health Risks

JustStand™ Wellness Summit 2012

Presenters

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Abstract

Interior designers can lead changes in workplace design to improve health for office workers. Methods to accomplish this were presented by four speakers in July, 2012 in St. Paul, Minnesota at the Ergotron 2nd Annual JustStand™ Wellness Summit.

Because work has become largely sedentary over the last 50 years, workers face a health risk from sitting at their desks or workstations. Medical research conducted during the last decade highlights the connection between sitting and obesity, diabetes and related diseases. Reducing the risk involves adapting workplace design for more activity while working and emphasizing healthy habits at work.

The JustStand panel included Dr. James Levine of the Mayo Clinic, Dr. Kevin McCabe of SC Johnson, Lori Nicholson of GE Healthcare* and Stephen Witte of Stephen Witte Associates. The presentation concerned research and interventions in behavior and design to reduce workplace health risk through more activity in the workday.

What makes this conversation timely is the current pressure on a smaller workforce to complete more tasks, work longer hours and accept these challenges in workplaces with a sitting health risk. The smaller workforce includes older workers trying to adapt to more open workspaces, and team-oriented work styles that emphasize the output of the group rather than the individual. Such changes are proving unpopular among older workers. These and other factors are driving stressors in the workplace, compounding the physical health risk with a mental one.

Adding to the timeliness of this issue is the declaration of obesity as a disease by the American Medicine Association. It is a disease that affects 78 million adults and now requires that physicians address diagnosis and treatment of obesity (*LA Times*, 2013).

Coupling treatment and behavior modification with interior design opens up fresh potential in workplace health. Theories for creating behavior modifications include individual scenarios and environmental re-engineering. Implementing programs that give workers incentives for increasing non-exercise activity while working is as important as bringing furniture and accessories that enable activity to individual workstations. Understanding where workplace design intersects with the goals of worker health incentive programs helps engage corporate wellness managers, even if such programs lie outside the design discipline.

Reducing the sedentary health risk involves adapting workplace design for more activity while working and emphasizing healthy habits at work.

Delivering on projects where clients seek active workplace interventions will be supported by the ideas presented in this paper. Where active workplaces can become part of the dialog when not requested, designers are presented with starting points and resources for launching the conversation.

In terms of return on investment, the data presented in this paper support the proposition that active workplaces reduce healthcare costs while providing a speedy return on investment.

We can make a course correction in workplace health by incorporating active workplace theories into the design process. In doing so, we are recognizing that sedentary health risk adds no value; that sustaining the workers is important for sustaining human resources; that a non-adjustable workstation has a toxicity all its own; and the trends in design and work style are uniquely aligned for active workplace transformation.

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*Lori Nicholson is now EHS Manager at Covance, Madison, Wisconsin.



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1 // Realities from Harry Potter's Ride on the Knight Bus

The problem has nothing to do with chairs. The problem has everything to do with the human body and the way work has changed in the last 50 years.

Anyone familiar with the Harry Potter stories will recall the wild ride that Harry receives from the Knight Bus. Temporarily homeless after a run-in with his Muggle relatives, Harry is planning his next move when out of the mist appears a triple-deck London bus. The conductor helps him and his luggage aboard, walks to the driver's compartment and gives the signal to get going. For the bus's next stop, a passenger on an upper deck has to be summoned. The conductor walks to back, climbs the stairs and returns a few moments later with the passenger in tow.

As the Knight Bus scene unfolds, the conductor is standing, walking and climbing stairs while the driver sits behind the wheel. Doing their jobs requires each character to have different levels of mobility. The conductor is constantly on his feet, moving throughout the bus. As the conductor does his job, the driver sits in one place, quite sedentary, because his job requires it.

The situation of the seated driver and the mobile conductor is more real than its fictional setting suggests. There is a striking difference in the health outlooks for those who spend their working hours seated and those who are active while working. Although recent headlines have heightened awareness of this difference, it was not always the case.

Epidemiology is a relatively new branch of medicine that studies causes, effects and cures for the chronic diseases. In studies of the pulmonary, endocrine, musculoskeletal and other systems of the human body in connection with disease, epidemiology can sometimes offer proactive steps to avoid disease and live longer.



There is a striking difference in the health outlooks for those who spend their working hours seated and those who are active while working.

When his research interest caused him to begin observing behaviors on London's bus system, Dr. Jerry Morris may or may not have known he was among the earliest practitioners of epidemiology. He observed the difference in the working conditions between the bus drivers and the bus conductors. He had some advance knowledge. Knowing that the bus drivers were experiencing a higher incidence of coronary heart disease than the conductors, Dr. Morris took to the buses to find out why.

Eventually he expanded his research to include two groups of postal workers. One was composed of workers seated at the service windows and the other was of workers making deliveries on foot or by bicycle. Dr. Morris again found that the seated workers had more heart attacks as a group than the delivery workers.

His report, published in 1953, was received with skepticism. That he linked exercise with avoiding heart disease was too revolutionary for those conservative times. Years later, his findings ring true. Not surprisingly, he lived to see the rediscovery of his research. In a 2009 interview for the *Financial Times*, Professor Morris discussed how this finding was revealed to him (Kuper 2009):

The data were so telling because drivers and conductors were men of much the same background and age. There was only one obvious difference between them. “The drivers were prototypically sedentary,” explains Morris, “and the conductors were unavoidably active. We spent many hours sitting on the buses watching the number of stairs they climbed. The conductors ascended and descended 500 to 750 steps per working day. And they were half as likely as the drivers to drop dead of a sudden heart attack.

What has the active workplace to do with the findings of Dr. Morris? Some may be thinking that manufacturers have refined office seating to where chairs conform, adapt or adjust to their users. Where is the problem? The problem has nothing to do with chairs. The problem has everything to do with the human body and the way work has changed in the last 50 years. There is plenty of evidence that says because the work itself has changed, our habits at work need to change, too.

The reason? Work today in the United States is less physically engaging than it was in the 1960s.

A study published in 2011 found that weight gain has increased in the United States as the number of jobs that require moderate/light physical activity has decreased. The researchers focused on data that revealed workers are burning fewer calories while at work, making the workplace a driver of obesity in the United States.

The finding reflects an increase in sedentary work and service jobs with light physical demands while the number of jobs in manufacturing and agriculture has declined. They summarized the finding by writing, “In the early 1960s almost half the jobs in private industry in the U.S. required at least moderate intensity physical activity whereas now less than 20% demand this level of energy expenditure.” The authors contend this is a trend unlikely to reverse itself (Church, et al. 2011).

Furthermore, they advocate the need for a discussion of work-related physical activity “if we’re going to try to get to the root of what’s causing the obesity epidemic.”

What is at risk? A 2007 study connects sitting too much with changes in the body’s metabolism (Hamilton, et al. 2007). The change in metabolic action is like applying the benefits of structured exercise in reverse. This reversal of benefits could be creating elevated risks for cardiovascular disease, type 2 diabetes and obesity.

Work today in the United States is less physically engaging than it was in the 1960s.

2 // Active Workplace Theory

“We need to integrate the mind and body” while at work because during work hours, the “body is suffering from neglect.” Carrie Schmitz, Ergotron

The evidence has been growing since the 1950s that there is a difference in health outcomes depending on whether you are sitting all day long or are up and moving around,” said Carrie Schmitz, Manager, Engineering Publications and Ergonomic Research, for Ergotron. Literally, taking a stand while working is among the simple actions for reversing the ill effects of too much sitting that have developed over at least fifty years.

“When we get to work, many of us park our bodies in chairs just as we parked our vehicles in the parking lot,” says Ms. Schmitz as she describes what she perceives as a disconnect between mind and body. “We have to remember that we have a body that needs to be dynamic.” She contends that this is forgotten during the workday, to the detriment of the body. “We need to integrate the mind and body” while at work because during working hours, the “body is suffering from neglect.”

Dr. Booth’s statements from the year 2000 presaged and gave foundation to acceptance of the need for more exercise in the United States, including increased activity at work.

“Approximately 250,000 deaths per year in the United States are premature due to physical inactivity. Epidemiological data have established that physical inactivity increases the incidence of at least 17 unhealthy conditions, almost all of which are chronic disease or considered risk factors for chronic disease.”
-- February, 2000

“...the underlying mechanistic details of how physical activity confers such protective effects are not well understood and consequently constitute an active area of research.”
-- February, 2002

“...perhaps a crucial mechanism to break the stall of the metabolism processes would be via exercise through the regulation of ‘physical genes,’ some of which may also be potential candidates for the ‘thrifty genes’ of our hunter-gatherer ancestors.”
-- January, 2004

“Physical inactivity increase the relative risk of coronary artery disease by 45%, stroke by 60%, hypertension by 30% and osteoporosis by 59%.”
-- January, 2007

Ms. Schmitz singled out Dr. Frank Booth when asked who in more recent years raised the issue of sedentary health risk. In her paper, “Standing Up for Workplace Wellness”, she wrote that Dr. Booth “didn’t mince words” in using “Sedentary Death Syndrome” for referencing “the host of health disorders” attributed to inactivity. Abbreviated as “SeDS”, this term was a creation of the nation’s 200 leading physiologists.

Dr. Booth’s campaign began with educating lawmakers, physicians and the public in understanding what was at risk from too little physical activity. Mostly what he wanted to accomplish was more funding for physical activity programs and teaching sedentary prevention strategies, while making research into Sedentary Death Syndrome eligible for federal grants. A primary objective was to inspire school-aged children toward more activity and less TV-watching or computer game-playing in their daily lives. Not that it was too late for older Americans, because he addressed the severe decline in the health of adults by citing 35 known conditions made worse by physical inactivity.

Ms. Schmitz credits Dr. Booth’s efforts with turning the gears of public policy development; gears whose movements are sometimes imperceptible by the human eye. A Washington, D.C. speech by Dr. Booth in May 2001 was an initial volley in getting SeDS recognized. In April 2006, the American College of Sports Medicine (ACSM) initiated a meeting of more than 40 national organizations. This meeting produced a call to action for a “healthier America through increased physical activity and exercise.”

Two pivotal events followed. The first-ever Physical Activity Guidelines were released by the U.S. Centers for Disease Control and Prevention. Then, in May 2010, came the U.S. National Physical Activity Plan, which envisaged, “one day, all Americans will be physically active and they will live, work, and play in environments that facilitate regular physical activity.”

The National Physical Activity Plan, or NPAP, makes recommendations in eight sectors of society with a specific sector for Business and Industry. The rationale for it includes these words:

Technological advancements in the workplace have greatly improved efficiency, reduced redundancy of tasks, and maximized output. However, an unfortunate consequence is that many job tasks in the modern workplace have become increasingly sedentary...because of their close employee ties, business and industry can encourage employees to positive physical activity...

Mayo Clinic physician Dr. James Levine offered two scenarios that could get office workers and others back on their feet, if only for a few hours each day. The first, which he termed individualized scenarios, were intended to persuade individuals to stand when they once sat. He suggested allowing individuals to self-select their activity-inducing behavior; help these individuals see results quickly; insure the new activity can be conveniently and easily accessed and, finally, have it be an activity that is more attractive to do than to not do.

In Dr. Levine's environmental re-engineering scenario, he advanced the thought that elements of the design and outfitting of the workplace encourage individuals to sit. Therefore, a redesign of the environment is needed to create an effect that will "seduce people back onto their feet." He suggests that doing so will naturally involve medical specialties, but also architects, interior designers, HVAC specialists, textile designers and others. Though he enumerates advantages for public health toward reversing the effects of years of sedentary living, he concedes that "such endeavors are costly and the standards that define success are ill-defined."

Both of Dr. Levine's scenarios arise from his research findings that the energy spent, or the calories burned, while doing everyday activities can offset the effects of long periods of sitting. Formally, the finding is referred to as non-exercise activity thermogenesis, which is informally known as NEAT.

"While in previous generations our work and recreational activities involved regularly standing up and moving the body's muscles, today's world of cars, desk jobs, TVs and computers has reduced our daily NEAT dramatically. The solution is to add small amounts of non-exercise-related activity into your daily routine. For example, simply standing up triples your energy expenditure compared with sitting. And since a slow (1 mile per hour) walk triggers more than half the metabolic activity of a brisk (3 mph) walk, a leisurely hour-long stroll burns more calories than an intense 30-minute power walk."
— Dr. J. Levine, from "The Extreme Dangers of Sitting", 20 Jan 11.

Dr. Levine offers this example of how adding small amounts of non-exercise-related activities into the day makes a positive difference: "We burn just five calories an hour while sitting and 15 while standing."

A lingering question concerns why exercise outside the workday has so little carryover benefit for sedentary workers. Dr. Emma Wilmot of England's University of Leicester suggests activity inside and outside the workday go together. "There is absolutely no doubt that exercise is beneficial for health ... we are still at risk if we sit all day."

As discussed at the Ergotron 2nd Annual JustStand™ Summit and published later, Dr. David Dunstan's findings illustrate what happens — and what ceases happening — during long periods of sitting. "The most striking feature of prolonged sitting is the absence of skeletal muscle contractions, particularly in the very large muscles of the lower limbs," said Dr. Dunstan, a professor at the Baker IDI Heart and Diabetes Institute in Australia.

This results in low energy expenditure that sets off a metabolic chain reaction that ends up raising the risk of diabetes and other health problems. Gretchen Reynolds of the New York Times summed up the finding, writing, "When muscles don't contract, they require less fuel, and the surplus, in the form of blood sugar, accumulates in the bloodstream, contributing to diabetes risk and other health concerns."

A study by Hamilton, Hamilton and Zderic, published by *DIA-BETES* in 2007 — referred to as the study that stirred everyone up by at least one researcher — offered a stark assessment. They wrote that technologies in homes, workplaces, schools and communities, combined with the trends in how people are living their lives, are "contributing to the progression of human inactivity" on a world-wide basis. The team says this will continue, and lay out the scenario in this way: "It is unreasonable to assume that humans have necessarily reached the pinnacle of physical inactivity — creative strategies could hopefully curb this potential problem of inactivity."

If changing habits in the workplace to create more activity in the workday can help reduce health risk, then what can be done and how can it be implemented? The solutions are available and offer an attractive return on investment.

A redesign of the environment is needed to create an effect that will "seduce people back onto their feet."

3 // Economics of the Active Workplace

Mitigating workplace health risks represents an expense, but it is one with short-term and long-term paybacks.

It was in the Nineties when ideas for preserving value with less work, in less space, absorbing less capital and in shorter periods of time found favor in manufacturing in this country. Over the last twelve years or so, these lean practices were applied in corporate offices. The embrace around lean practices tightened after 2007 when the music stopped on Wall Street. In more recent years, things have boomeranged: the follow-on effect takes the form of fewer workers with heavier workloads, working more hours, while compensation levels remain flat. Analysts say a backlash might be in offing, and bonuses alone might not retain workers.

At the same time, changes are happening in the ways workers do their work, communicate with one another and the kind of workplaces they want. There is acceptance among most workers (not all) for smaller personal work areas or shared workstations in favor of more open, social and neighborly floor plans. An interior designer spoke recently about the influences of individual workers on his design programs: individuals want to be clustered together in what he calls hives; teams that work on related but separate segments of large projects want to be located near each other. He said that older workers are less enthused about lower panel heights, open spaces and work patterns that equalize outputs of group work with individual work. All of this takes place as management teams work to reduce real estate holdings.

If workplace chemistry has changed, so has the chemistry of the surrounding physical environment. Architects and designers are making product and materials choices that conserve non-renewable resources, reduce energy consumption, and inspire innovations in product design, manufacturing and end-of-service life recycling. The same is true of reducing or eliminating toxins from interiors that might have ill health effects on building occupants. One magazine article recently offered designers this encouragement: "Design to protect the health and safety of those working, living and playing in all built environments." [*Interiors & Sources*]

Though purged of toxins and chemical hazards, the irony is that office environments still pose a risk to workers against which they are defenseless. This risk is in the exact place where workers spend hours upon hours creating value for their organizations. The risk to workers – who are any organization's greatest assets – exists at the very chairs, desks and workstations where they work.

The insurance and lost-time cost of unhealthy workplaces is already expensive for employers. Obesity among individual full-time workers can add nearly \$2,500 annually to their healthcare costs. For a workforce one-thousand strong, the total annual cost could reach \$285,000. In that same population of one thousand workers, just 3% of those employees could be responsible for 21% of medical and absenteeism costs connected with obesity.



"Design to protect the health and safety of those working, living and playing in all built environments."

Equally important is the need for reducing work-related incidents of musculoskeletal disorders (MSD). A three-year review of 6,200 employees at American Express produced a finding that the overall MSD rate for those in non-adjustable workstations was three-times higher than those with adjustable workstations. The second finding was that work-related MSD costs for employees in non-adjustable workstations was 20-times higher (Kay. 2012). In a separate report, an ergonomist wrote that the 10-year service-life of adjustable components and furniture reduces worker health risk beyond the first worker to use it. His thought is that at least three workers, maybe more, will benefit from the same equipment during its service life (Reiland. 2003).

Mitigating these risks represents an expense, but it is one with short-term and long-term paybacks. When considering budget priorities for LEED compliance, the expense of active workplace implementation should be considered right alongside it. A comparison in payback between LEED investment and active workplace implementation reveals both approaches to workplace health financially benefit owners and clients, not to mention the health benefits to workers.

Starting with sustainability and low-emitting materials – what payback might be expected for investing in a building that meets criteria for sustainable construction and healthy interiors? Further, how does this payback period compare with that of an active workplace transformation?

To begin, there is the incremental expense for LEED certification on a \$10.7million project. That's \$164,000 with a payback period of 1.7-years — the investment being returned as energy savings. In the other examples, a payback of just under 4 years comes from a \$165,000 investment, and an 8-year payback on a \$1.9-million-dollar investment.

What is the return on investment for adding adjustability to a workstation, or a workplace, and how does it compare with LEED? Projections using an online ergonomic payback calculator provide the information. (Ergotron's Workfit Payback Calculator at planner.ergotron.com)

Using the online calculator designed for finding payback periods on this sort of investment returned paybacks of under one year. The variables entered were four hours of daily computer use and average annual compensation of \$81,500. That formula was then applied to three hypothetical purchases of sit-stand equipment. The calculator projected a payback period of 73 days for a \$160,000 investment in 100 treadmill desks. Next, it projected an 18-day payback period on a \$40,000 outlay for 100 desk-mounted arms. Finally, the payback period was 55 days for 100 adjustable-height desks for \$120,000.

The risk to workers – who are the organization's greatest assets – exists at the very chairs, desks and workstations where they work.

4 // Factors Contributing to Workplace Health Risk

“Even 30 to 60 minutes of jogging a day won’t undo eight hours of sitting.” Dr. Elizabeth Joy, University of Utah

There has been an “unprecedented shift in the human demographic in the last 150 years,” writes Dr. James Levine, of the Mayo Clinic’s Department of Endocrinology. His research highlights what has happened as people walk less, sit more and burn fewer calories than previous generations.

“In a mere 150 years, *homo sapiens* has become addicted to the chair,” says Dr. Levine. Most humans consume more calories than they expend and this, compounded by less physical activity because of technological advances, has led to nearly epidemic obesity and related health concerns. Dr. Levine further charges the computer with being an accomplice in the case. “Half of the world’s population now works behind a computer whereas twenty years ago this was less than one percent.”

Physical activity outside of work is fine, but sitting in a chair all day undoes its beneficial effects.



Working behind a computer usually means sitting, often in long stretches. To mitigate this, studies by Dr. Levine and others emphasize getting workers out of their chairs and onto their feet, if only for a few hours a day. How could this help? By “short-circuiting unhealthy molecular signals causing metabolic diseases,” writes Dr. Marc Hamilton and team in a 2007 study.

Their research team found inactivity triggered “unique cellular processes” quite different from those caused by exercise. In layman’s terms, their significant finding was that being physically active outside of work is fine, but sitting in a chair all day undoes its beneficial effects; by maintaining nonexercise activity throughout the day—such as working while standing—could have beneficial health effects.

“Humans are designed for movement,” says Peter T. Katzmarzyk, of Baton Rouge’s Pennington Biomedical Research Center (Katzmarzyk, 2011). He added, “Since scientific evidence is just now emerging about the ill health effects of sitting, it will also likely take several years before we are able to say just how much sitting is bad, and why.” Non-workplace related findings suggest that two hours of TV watching raises the risk of type 2 diabetes by 20%, heart disease by 15% (Jaslow, 2011).

There is a growing consensus that factors contributing to obesity exist inside the workplace, compounding eating and lifestyle habits outside the workplace. “When people think of obesity they always think of food first, and that’s one side of it, but it’s high time to look at the amount of time we spend inactive at work,” said Dr. Barbara E. Ainsworth, the president of the American College of Sports Medicine and an exercise researcher at Arizona State University (Parker-Pope 2011). She believes that occupational activity is a missing piece of the puzzle, suggesting it is “probably contributing to the inactivity and creeping obesity that we’re seeing over time.”

What about that early morning workout? What about running or exercising on a regular basis? Leading researchers believe it might not be enough to overcome sitting at a desk day after day.

“When people think of obesity they always think of food first, but it’s high time to look at the amount of time we spend inactive at work.”

**Dr. Barbara Ainsworth,
American College of
Sports Medicine**

“Research shows that if we exercise at 6:30 a.m. every day, then go into the workplace and sit in meetings all day long, the brain starts slowing down,” says Dr. Jack Groppel, an exercise physiologist and co-founder of the Human Performance Institute (Internicola 2011).

“Even 30 to 60 minutes of jogging a day won’t undo eight hours of sitting,” said Dr. Elizabeth Joy at the University of Utah’s Health Sciences Center (Bush 2010). “Prolonged sitting has been associated with dying earlier.” Her solution? Dr. Joy walks about 1.2 miles per hour on a treadmill while she works. “It’s not fast enough to elevate your heart rate or even make you sweat,” she says, “but the average adult will burn about 100 calories per mile; burning 250 to 300 calories per day is associated with weight maintenance.”

Recognizing the connection between sedentary work and health risk, the American Medical Association adopted a policy that employers and others should make alternatives to sitting available to employees. These alternatives include sit-stand workstations and isometric balls. “Prolonged sitting, particularly in work settings, can cause health problems and encouraging workplaces to offer employees alternatives to sitting all day will help to create a healthier workforce,” said AMA Board member Patrice Harris, M.D. (AMA. 2013).

5 // Active Workplace Applications

Re-imagined for an active workplace, the settees have been replaced with adjustable height tables and treadmills.

The furniture and accessories useful in creating active workplaces can be integrated into existing or planned working environments. In either scenario, the applications are reasonably straightforward to implement. Whether private office, open plan, education or healthcare, the equipment is readily available at a range of price points.

The Cincinnati office of SHP Leading Design provides an example for implementation of active workplace concepts in an existing environment. Spaces for meetings, professional staff, executives and a common area were included in the update. Photographs of the existing space show the 'before', with rendered images showing the proposed active workplace concepts in place. These proposals include isometric balls and sit-stand desks as suggested by the AMA in their policy for reducing seated health risk (AMA. 2013).

With tackable walls and a standing-height countertop, this space is used for conceptual reviews and presentations among the in-house team. Meetings here are held standing up, as there are no chairs in evidence. As another informal meeting space, the standing approach follows active workplace theory.



Existing Office

Active Workplace



This is one of the conversation alcoves showing the club chairs specified for these spaces. Then, the same space re-imagined with exercise balls replacing the comfortable, yet passive, chairs. There is a bit of engagement required to sit on an exercise ball, but that very activity is healthier than sitting in a chair.



Existing Office

Active Workplace



Known as the commons, this space provides tables for meetings or lunches and some comfortable lounge seating. The resource area is in back, with workstations on the right of the image. Re-imagined for an active workplace, the settees have been replaced with adjustable height tables and treadmills. The intention is that any time of year, but especially in the winter months, someone can jump on the treadmill over lunch, check their personal email, check in with Facebook, and surf the web while burning some calories, instead of doing these things sitting at a desk. They can also be used for meeting in a more active way.

Notice the people walking at the far right of the image. They are using the walking track that exists today at SHP. The walking track rings the perimeter of the floor, offers good outside views, lots of daylight and doubles as the main circulation for the floor.

This is a typical section of workstations, with panel heights of approximately 42-inches, and plenty of worksurface area given the page size of the documents these individuals handle. This same section, re-imagined with devices for sit-stand use of keyboards and monitors integrated into the existing furniture. Notice the figures who are standing or sitting, and the one on the walking track. That the individuals who would actually work here use larger monitors provides some standing privacy – the very size of the monitor more or less screens the user. And the designers there reflect the fact that everyone has adapted nicely to the lower panel height just by recognizing they are in a neighborhood with others. For more privacy there are small conference rooms scattered around. Usually those seated near each other are working on the same project, so the proximity is useful for speaking easily with other team members.

This is a re-imagined version of the president's office, which is about twice the size of the other workspaces. This private office contains both a conventional desk equipped with a sit/stand workstation, as well as a treadmill with an adjustable height desk. Given the space available, the designers wanted to provide two choices for working in a good form.



Active Workplace

Existing Office



Active Workplace

Existing Office



Active Workplace

Existing Office



6 // Evidence and Outcomes from Sit-Stand Mitigation

“Using active workstations to provide variety to the conventional office setting may diminish physical and mental fatigue.”

Professor Leon Straker, Curtin University of Technology

Professor Leon Straker, of Curtin University of Technology's School of Physiotherapy in Perth, set out to uncover the effects of standing on task performance when keyboarding or using a mouse.

When asked about the productivity aspect of introducing active workstations into offices, Professor Straker responded:

"This is where we are looking to go next with our research as there doesn't appear to be good direct evidence that activity in the short term enhances productivity. Evidence has shown that increasing work hours only increases output up to a point, then fatigue and other factors impeded productivity. Using active workstations to provide variety to the conventional office setting may diminish physical and mental fatigue, and thus enhance productivity in the short term. In the long term, activity is related to better weight management and overall physical and mental health, so the current evidence suggests long-term productivity should be enhanced."

Once the sit-stand equipment is specified, purchased and installed, what happens to help workers get the greatest benefits from it? The reductions in MSD and increases in health happen only when workers understand what they have to work with and how to work it. Australia's Dr. Dunstan and Mayo Clinic's Dr. Levine offer strategies to change behaviors.

Regarding the physical health aspect of active workstations, the study by Dr. Straker points to specific benefits in musculoskeletal health:

- **Reduced** time spent in prolonged sitting may reduce exacerbation and perpetuation of low-back pain.
- **Reduced** leg swelling.
- **Increased** spinal motion may also result, which will enhance intervertebral disc nutrition through the facilitated exchange of fluids and may reduce spinal shrinkage.

Summary of findings from Dr. Straker's study:

- **Keyboarding performance:** same for standing as sitting.
- **Combined keyboard and mouse performance:** same as sitting.
- **Actual exertion:** Standing same as a walking speed of 1.6 km/h.
- **Real world feasibility:** 83% agreed with standing feasibility.
- **User perceptions:** A good break from sitting; the most feasible approach; good for posture; and good for musculoskeletal soreness associated with all-day sitting. The most desirable option would be the ability to use one of the sit-stand workstation variations for short periods of time to break up the day.

Participants' favorite ways to encourage sit-stand work patterns from the Australian study:

- **Set a timer to signal** when to stand up, or take a walking break.
- **Stand up when** the phone rings or someone enters the office.
- **When others stand,** stand up with them.
- **Establish standing times** periodically throughout the workday.
- **During meetings,** stand up.
- **Move more** throughout the day by taking the stairs or walking laps.

In an article for Neurosynthesis.com, Dr. Levine pointed to a number of workday modifications whether sit-stand equipment has been installed or not (Levine, 2011)

- **Pace while on the phone**, near your desk, if possible.
- **Schedule walking meetings** when meeting with one or two others.
- **Walk to the workspaces** of co-workers instead of email or calling.
- **Plan ten minutes** of standing for every hour of seated work.
- **Park not in the nearest** spot to the office door, but the farthest.
- **Use mass transit** for benefits of walking to/from the station.
- **Use half of the lunch hour** for taking a midday walk.

In addition to the healthful benefits sit-stand equipment and active workplace theories provide, Dr. Dunstan reports a number of anecdotal comments.

Positive

- **Enjoy** being able to work while standing.
- **Less** muscle stiffness.
- **Significant reductions** in back, neck and shoulder discomfort.
- **Reduced** feelings of fatigue and lethargy.
- **Increased** feelings of energy and well being.
- **Improved** concentration.
- **Fifteen of eighteen** users wanted to keep their sit-stand desks.

Negative

- **No flexibility** to move work surface back and forth on desk.
- **No flexibility** to move keyboard back and forth relative to monitor.
- **Sore** feet and/or legs initially.
- **Keyboard and/or mouse** shelf too small.
- **Work surface shelf** too small.

Additional narrative feedback from the Australian trials colors the emotional connection felt between the participants and their sit-stand equipment:

"I feel much more alert, especially after the lunch break."

"We love it – do you mind if we post photos of our workstations?"

"My lower back pain is getting much better."

"I feel more energetic!"

"I feel so much healthier, so I can eat more chocolate, right?"

7 // Institutionalizing the Active Workplace

Progress is happening. Prominent U.S. based businesses have established programs to adopt and institutionalize active workplace principles.

The workplace provides an ideal opportunity to engage individuals in taking more control of their own health,” says Dr. David Dunstan. “The results suggest simple interventions that can be implemented in the workplace and domestically to decrease passive sitting time and increase the number of breaks can also lead to substantial health improvements.”

The Stand Up Australia program was conceived as a research initiative to investigate the benefits from reducing sitting time in the workplace, explained Dr. Dunstan. He describes the Stand Up Australia program as one of intervention and measurement.

The Stand Up Australia program answered questions for the researchers about the valuable outcomes in worker health, well-being and productivity. Other researchers have effectively duplicated these results through small-scale lab studies and small population field studies. With these results being well known for the promise they hold for workplace health improvements, the task remains to institutionalize active workplace programs in real world settings.

The embrace of the active workplace at SC Johnson recognizes that much office work and highly mechanized production work has become largely sedentary over the prior 50 years. Dr. Kevin McCabe, Director, Occupational and Preventive Medicine at SC Johnson, says the company is “open to an active workplace” and continues to assemble the tools for creating it.

In one example, the headquarters has an elaborate fitness center. Though centrally located on the campus, Dr. McCabe notes that the facility is underutilized. He recognizes that exercise is necessary, but “exercise is not the same as being active”, nor will “exercise overcome a sedentary lifestyle.”

Stand Up Australia and NEAT show how to add beneficial movement into the workday, along with furnishings and equipment that provide workers with support for implementing active workplace strategies.



Stand Up Australia

“Move more, sit less, stand up.”

What happens through intervention in these key areas:

- **Environment at work and at home.**
- **Individual environment.**
- **Individual behavior.**
- **Organizational environment.**
- **Organizational behavior.**

Make objective measures of sitting time and standing time.

Focus on measures of health and productivity.

At the Healthcare division of General Electric, Lori Nicholson and her team implemented these strategies as a subset of the company's HealthAhead program. This is GE's global employee health and wellness program covering more than 300,000 employees as part of the company's Healthy-magination commitment to tackling global healthcare challenges. In recognition of the program's implementation of HealthAhead in GE's UK sites, the program was awarded the UK's Royal Society of Public Health's "Health Promotion and Community Well Being Award 2012." HealthAhead was cited for its "role in promoting and supporting employee and community health and wellness."

Ms. Nicholson, who was GE Healthcare's EHS Manager*, explains that the company began with a drive toward HealthAhead certification. This certification is achieved by passing a rigorous audit including more than 50 requirements grouped under elements such as Education and Prevention, Nutrition, Physical Activity, Tobacco Cessation, Leadership and Stress Management. HealthAhead provides targets and requirements across a number of dimensions, and individual sites are given flexibility in the details of design and implementation of plans to achieve these goals.

As evidence of GE's deep commitment to the health of their employees, Ms. Nicholson described the process by which the company cafeterias are individually certified. "First, they must provide healthy food. To provide incentives toward healthier food choices, the cafeterias can institute a token program. Finally, an onsite fitness center was considered an important component of the certification for both the cafeteria and the site itself."

To bring healthier choices into individual workstations, GE Healthcare undertook to provide sit-stand desks as part of program to improve ergonomics where employees work.

What GE did was much more than providing an employee with a sit-stand desk. A process was instituted to insure that all of the benefits of new equipment would be reaped. This process includes instructions for the best use of new workstation equipment and ongoing review of how well the equipment meets an employee's needs.

For the benefit of businesses looking to build a sit-stand component into their wellness programs, Ms. Nicholson shared a number of successes from HealthAhead and some challenges to be met. (Figure 1)

*Lori Nicholson is now EHS Manager at Covance, Madison, Wisconsin.

Figure 1. HealthAhead Successes and Challenges

Successes

- Early adopters were those who led active lifestyles.
- Other early adopters had medical needs that sit-stand might help.
- Participant numbers growing daily.
- Wide variety of users.
- Other businesses asking for start-up assistance.

Challenges

- Pushback due to workstation size, loss of storage space.
- Installation process had some rough edges to be worked out.
- Keeping units in use and available; none in storage.
- Difficulty in ordering the approved equipment.
- Develop an internal catalog for easier selection of equipment.

Conclusion

Most everyone who works using active workplace environments reports improvements in energy, reduced pain and weight loss.

In the months following the panel presentation in St. Paul, the evidence supporting more activity in the workplace has continued to grow. Some shocking headlines have been produced. One suggested that sitting is the new smoking, while another connected sitting too much with the shortening of life expectancy. While based on serious research, sensationalizing an issue can divert attention to style instead of substance. A number of news items have featured people who are working at treadmill desks, which could be simultaneously promoting the active workplace and limiting its adoption. When the interviewee is a writer, a scholar or technology-minded individual, the question lingers as to whether the audience believes they should be working in an active workplace or are these limited to elite professionals.

However, an effective argument may be made that the active workplace has not gone mainstream for another, simpler reason: skepticism. Even with compelling evidence of effectiveness in reducing health risks and return on investment, the facts alone could be insufficient for overcoming the notion that it is simply too good to be true.

The notion that standing up every twenty or so minutes and moving around a bit has the power to reduce ill effects from sitting too much at work might seem an unlikely means of helping thousands of workers feel better.

Except that the American Medical Association supports this concept. The AMA adopted policy in June, 2013 recognizing the health risks of prolonged sitting. (AMA. 2013)



All this, just from an investment in furniture or equipment that adjusts for work while standing or sitting, that delivers the benefit of healthy motion and activity where people work? Yes, except getting workers on their feet requires more than installing the equipment and holding a meeting.

Thinking of how this might happen points to the slogan that headlined ads from a Detroit automaker for decades. Updated for today, the slogan would read, "Ask the person who owns one." As it relates to sit-stand offices, talk to workers who have them or use them.

The way that active workplaces and sit-stand practices will become as common as smoke-free workplaces is when workers decide on their own to make the change. They will do so because they tried it, they liked it and it worked. They will stick with it because they feel better, get more done in less time and leave the office with enough energy to do more than fall onto the sofa every evening.

These results come after a worker decides to give the sit-stand work style a try.

Before that decision was made, what had to be overcome was the skepticism. One at a time, one after another, workers who give sit-stand a chance have nearly the same experience. Less fatigue at work, more energy after work, weight loss and, quite often, less back pain if it had been a problem. These workers will have likely reduced their sedentary risk factors as well.

One role for the design community is starting the active workplace conversation with clients. As an influential and pace-setting community, interior designers can lead in informing and providing solutions that take healthier work styles into each and every workstation.

The researchers such as Dr. Levine, Dr. Dunstan, Dr. Straker and others continue their work to reveal deeper insights into improving both worker and workplace health. Product development is creating a flood of desks, treadmill desks, and accessories that make easy the conversion of the conventional office to an active workplace.



What makes a difference is the commitment of the world's largest corporations, GE being one, devoting the resources to changing their facilities and programs to support healthier employees in healthier workplaces. Progressive businesses of all sizes are embracing healthier work environments. One of the reasons might be that real world results are available to light the path.

The study of American Express workers gave managements at businesses of all sizes something to act on. These were results generated outside a controlled group of study participants, where much theory was put into practice and quantified with hard numbers. What responsible management group would avoid implementing a program that reduces costs, improves productivity and improves the health of its workforce?

Rather than attempts at shocking management into action, provide them with news of experiences, results and improvements flowing from the implementations of active workplace theology. Where sitting has been compared to smoking, for instance, think how many years it took to create a smoke-free workplace. For that matter, consider those who continue smoking nonetheless.

The movement has begun. Organizations like JustStand.org provides a clearinghouse of healthy work styles, technology and resources for workers, managers and professionals. Research continues, as does reports of studies that make the point over and over again: more activity at work is good for workers and the work they do. As observed by Ergotron's Chief Marketing Officer, Jane Payfer, "Corporations have been inadvertently contributing to the poor health of their employees...I honestly believe that most corporations don't want to do that. They want healthy, productive employees."

What responsible management group would avoid implementing a program that reduces costs, improves productivity and improves the health of its workforce?



Appendix 1 //

An Introduction to Sit-Stand

What is sit-stand? In a sit-stand workstation or office, the worker has the choice to work while seated or while standing. Aside from raising the furniture on cinder blocks, this can be accomplished several basic ways. One is to raise and lower the mouse, keyboard and monitor using an articulating arm attached to a fixed height desk or work surface. Another is moving the desktop or work surface up and down using an electric motor, hand crank or pneumatic action. Workers could accomplish a sit/stand routine with a work surface at counter-height and a stool. Treadmills and stationery bicycles are sometimes added. Sit/stand might also be called the active workstation, active office or active workplace.

How does sit-stand improve worker health? Work has become less physically engaging. Weight gain has been associated with the decrease in jobs that require moderate/light physical activity. The first link between more active workers having fewer health issues was established in the 1950s in a study of drivers and conductors on London's double-decker buses. The sedentary drivers, forced to sit behind the wheel, had more heart disease than the mobile conductors who move constantly and use the stairs. Workers with lower back pain report that standing while working is more comfortable and productive than sitting.

Who says sit-stand is effective? Results show how switching workers to a sit-stand work style assists weight loss, thus reducing risk factors for coronary, heart disease, type 2 diabetes, hypertension and premature death. Sitting too much increases risk factors, especially obesity. "When people think of obesity they always think of food first, and that's one side of it, but it is time to look at the amount of time we spend inactive at work," said Dr. Barbara Ainsworth, an exercise researcher at Arizona State University. What about workouts, running or regular exercise outside the office being enough? It is not. "Even 30 to 60 minutes of jogging a day won't undo eight hours of sitting," said Dr. Elizabeth Joy at the University of Utah's Health Sciences Center.

What is the payback for sit-stand workstations? Using an online calculator designed for finding payback periods on this sort of investment returned paybacks of under one year. The variables entered were four hours of daily computer use and average annual compensation of \$81,500. That formula was then applied to three hypothetical purchases of sit-stand equipment.

The calculator projected a payback period of 73 days for a \$160,000 investment in 100 treadmill desks. Next, it projected an 18-day payback period on a \$40,000 outlay for 100 desk-mounted arms. Finally, the payback period was 55 days for 100 adjustable-height desks for \$120,000. Another way to measure savings comes from a study of 6,200 American Express workers. Those in fixed, non-adjustable workstations had work-related musculoskeletal disorder rates 20-times higher than workers in adjustable workstations. When there are a number of sit/stand options that integrate with existing furniture, this rate could be decrease in a cost effective method without re-modeling.

How does selling sit-stand affect chair sales? As the term implies, sitting remains part of the sit-stand formula. Chairs that adapt to seated work and to leaning against when standing become useful. Neutral Posture has developed a chair that includes a unique footrest system for sit-stand workstations. HAG offers Capisco that complements sit-stand with a variety of sizes, models and accessories. More unusual but purpose-built to sit-stand is the Locus Seat from Focus Upright Furniture. The bicycle-like seat mounted on a stalk allows slight movements with support. Seating has a role, but the specification criteria will change and it may entice manufacturers to develop lower cost models with sitstand versatility.

*Originally appeared in an OF Dealer article written by the author.



Appendix 2 //

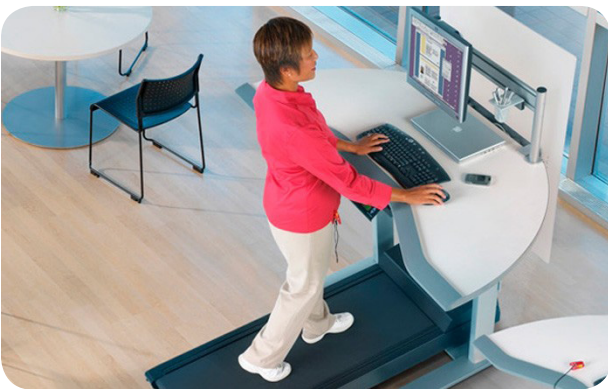
Furniture and Workplace Interventions



Ascend, by Harden Contract, offers solid wood furniture with height-adjustable features for the executive office. Pre-configured arrangements and custom furniture are available. More information at hardencontract.com.



Millennea, by Halcon, provides a desk with height-adjustability that coordinates with this series of standard, semi-custom and custom wood furniture. More information at halconcorp.com.



Walkstation, by Steelcase, is the standard-bearer in treadmill desks with adjustable height worksurfaces. Most popular in the insurance, high tech and healthcare segments. More information at steelcase.com.



Ergotron offers a range of products suited to sit-stand applications in office, education and healthcare environments. These products include height-adjustable desks, add-ons, stand-alone desks, and carts, and adjustable keyboard, notebook and display arms for ergonomic comfort and sit/stand usefulness. More information at ergotron.com.

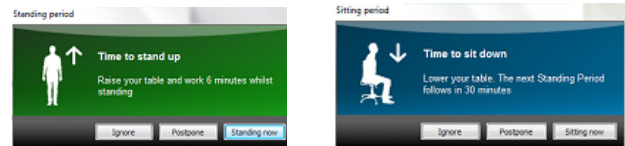
Flex, by Fitbit, is a wearable device that tracks the wearer's activities during the day and throughout the night. Flex is essentially a motion sensor, detecting steps taken, calories burned, hours slept and other wearer-directed activities. The wearer can establish a range of goals using computer software or mobile app, then Flex reports progress via Bluetooth. Flex can also remind wearers to move every so many minutes. More information at fitbit.com/flex.



Wellness Switch, by LINAK, is an accessory for LINAK's height-adjustable table base mechanisms. The Wellness Switch clocks the amount of time spent by the mechanism without the user adjusting height up or down. At intervals set by the user, it prompts the user to stand and estimates calories burned by the amount of minutes spent standing. Users can access LINAK's website to set up a personal health benefits calculator for tracking progress. More information at linak.us.com.



SitStandCOACH, by Efficiency Software, operates on individual or networked computers for advising users when they should alternate their sitting and standing position. The SitStandCOACH tracks the time users are working at their computers. At intervals users can establish, messages to stand or to sit appear in a window on the user's computer monitor. More information at efficiencysoftware.com.



Locus Seat, by Focal Upright Furniture, provides a bicycle-like seat on an adjustable-height stalk attached to a base panel. The stalk is swivel-mounted to the base, allowing the seated user to move side-to-side and forwards-backwards. By facilitating all of these motions, the Locus Seat gives the user some support while allowing muscle movements that burns more calories and maintain higher metabolic function than sitting. More information at focaluprightfurniture.com.



(Product information was accurate at time of publication.)

Appendix 3 //

Workstations with Touchscreen Monitors

Imagine touchscreen functionality from an iPhone or an iPad on a monitor far larger than anything handheld. Samsung introduced a 32" touch screen monitor at the Consumer Electronics Show in January, 2013. Google unveiled a touchscreen-enabled laptop in February, 2013. For some applications, touchscreen have become the default equipment choice. Among them, animation.

In an article about the Google laptop release, Geoff Blaber, an analyst at CCS Insight, commented that, "Touch is now pervasive across every computing category from phones to high-end PCs."

HP and Herman Miller collaborated on a program entitled Office of the Future: Incorporating Touch and Sit-Stand into Workstation Design. The result was data sets that suggest the optimum placement of touchscreen monitors on fixed height and adjustable height furniture.

The complete findings provide a template for how specifiers can establish comfortable, ergonomically-sound workstations where touchscreen monitors will be installed. The findings will be summarized here:

Two overwhelmingly clear guidelines for users of touchscreens:

- 1) Let comfort be a guide to adjusting the placement of the monitor.
- 2) When seated, position the touchscreen for usage that maintains good posture and proper back support from the chair.

The study included references to the need to reduce sedentary work styles, to alternate between seated and standing work, and that doing so reduces health risks.



Summary of findings:

- Sitting and standing users of touchscreens require different tilt ranges.
- Sitting users require up to 60 degrees of tilt for touchscreens.
- Standing users require up to 20 degrees of tilt for touchscreens.
- Touchscreen monitors for seated users need to be low, close and offer more tilt.
- Touchscreen monitors need 20" rise above the work surface.
- Arms supporting touchscreens need to move lower in front of and below the work surfaces.
- Arms supporting touchscreens need to be able to hover over keyboards.
- Arms need to "stay stable during the user exerted forces required by touch."
- Work surface depth of 24 inches is about the maximum for touchscreens.

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