



# The Health-Positive Office

## THE REVITALIZING EFFECT OF ERGONOMIC TOOLS AND TRAINING



*Work at its best helps us be our best. Beyond providing a paycheck, work connects us to others and allows us to contribute to something larger than ourselves. It gives us the opportunity to learn and grow and to experience flow—that state of being so fully engaged in a stimulating activity that we lose all sense of time.*

*But unless we are comfortable, it's difficult to get lost in our work. A holistic, health-positive office that encourages movements large and small throughout the day helps us feel better. It improves health<sup>1</sup> comfort<sup>2</sup>, and connection. And when we feel better, we work better. We're more productive<sup>3</sup>, organized, and satisfied at work.*

## What We Know

Office work can take a toll on our bodies. Sitting, staring into a monitor, and using a keyboard for long stretches without a break will, at the very least, stress your body in ways that affect your performance. If you do those things day after day, you may end up with cumulative, long-term damage.

Vision is one area of concern. More than half of workers will experience difficulties with vision at work at one time or another, brought on by tired or aging eyes or environmental conditions like air quality or glare. We know that there are two things that affect viewing a monitor--seated eye height, which in the U.S. varies by over 11 inches, and, second, distance from the monitor. The distance at which a person prefers to view the monitor is affected by whether vision correction is used and even the type of vision correction. Standard monitors don't adjust enough to accommodate most people, and without the ability to adjust the monitor, a person will adopt and hold the posture that's most beneficial to the eyes even if that posture isn't comfortable.<sup>4</sup>

Office work also has a big impact on the hands and arms. Repetitive motions (like keying) and over-reaching when using the mouse can cause wrist, arm, and shoulder pain. Those areas of the body and the lower back and spine have borne the brunt of work that's become increasingly sedentary. Back support is central to health-positive design and "support" (broadly speaking) includes movement, which helps distribute nutrients to the spine. Without movement, the disks dehydrate and that results in back pain. Eighty-five percent of Americans will experience an episode of mechanical lower back pain at some point in their lives, and back pain remains the most common cause of disability among Americans under the age of 45.<sup>5</sup> About a third of adults in the U.S. experienced severe back pain in a three-month period according to the CDC.<sup>6</sup> One cause may be the amount of time spent sitting every day--something that is also associated with mortality, regardless of leisure time physical activity levels and BMI, according to researchers who studied 17,000 Canadians over 12 years.<sup>7</sup>

In addition to knowing exactly how office work stresses certain areas of the body, we also know the ways that furniture and workers themselves can reduce those stresses, avoid injury, increase comfort,

and maximize productivity. People are creatures of habit who, because the world is complex, don't have enough mindshare to think deeply about every choice they have to make. For that reason, typically they'll work the way they always have unless presented with a compelling reason to change. But once they understand how they are straining their bodies unnecessarily, they are likely to make better decisions about how they work. Furthermore, designers and architects can nudge them into making good decisions about their work habits by designing user-friendly environments.<sup>8</sup>

**Therefore**, introducing workers to the various ways to reduce stress and avoid injury is the first step toward a more healthful working environment in which workers can be at their best throughout the day.

## Design Problem

The design problem is a combination of "technology-induced inactivity" by the worker at their computer, a lack of awareness about that inactivity, and a lack of knowledge about how unhealthy postures can be overcome or avoided altogether. While people might know it's important to have a good chair and ergonomic work tools, they don't necessarily know why they go home every night with a pinched shoulder nerve or neck pain.

Given that the knowledge worker's work is computer intensive, we at Herman Miller feel that a health-positive work environment should be the default rather than the exception. "The starting point should be that all knowledge workers get ergonomic tools, rather than requiring a worker to make a case based on work-related aches and pains," says Bill Dowell, corporate ergonomist at Herman Miller. Companies that take the initiative and provide work tools that support dynamic work behaviors increase worker comfort and reduce the risk of worker injury.

## Design Solution: Part 1

The research Herman Miller has done on the ways people work and the physiological implications of those ways points to the importance of a workplace that allows and encourages movement. That knowledge guides the design of all our products, particularly Herman Miller

Thrive portfolio products, which actually improve health. When thinking through workplace design, it's helpful to look at both worker styles and physiology. A good solution will address both.

### WORKER STYLE CONSIDERATIONS

The first part of the solution is to give workers ergonomic tools that give them the ability to vary their posture. The kind of ergonomic tools a worker needs varies according to preference and work style. We've identified three styles of worker and offer some suggestions for ergonomic tools for each.

**Mobile workers** are typically on the go, working in a location for fewer than two hours a day or only one to three days a week.

Work surface: Fixed height

Chair recommendation: Accommodates the user without a lot of adjustments

Work tools: Laptop/tablet support, keyboard support, personal task light

Storage: Common area storage

Power and data: Desk height accessibility recommended

**Resident workers** spend most of their time (six or more hours, four to five days a week) in one location.

Work surface: Seated height adjustable or sit to stand

Chair recommendation: Offers maximum personalization, including adjustable arms, seat height and depth, and pelvic/sacral support

Work tools: Laptop/tablet support or CPU holder, keyboard support, personal task light, multiple monitor supports, tool rail

Storage: Personal storage

Power and data: Desk height accessibility recommended

**Flex workers** are a hybrid of mobile and resident. They work in one location at times (three to five hours a day, four to five days a week) and are on the go the rest of the time.

Work surface: Seated height adjustable

Chair recommendation: Offers maximum personalization, including adjustable arms, seat height and depth and pelvic/sacral support

Work tools: Laptop/tablet support, keyboard support, personal task light, CPU holder, multiple monitor supports

Storage: Personal storage

Power and data: Desk height accessibility recommended

### PHYSIOLOGICAL CONSIDERATIONS

It's not possible to design a health-positive office for any of these worker types without thinking about the impact work has on the body, particularly the lower body, arms and hands, and vision.

### BODY SUPPORT CONSIDERATIONS

Body support is the relationship between the body and the task environment—the working posture that needs to be supported while performing the job. Seating is a major component of body support. If the worker spends most of the day seated at the workstation, a greater range of ergonomic adjustments should be available. On the other hand, if the worker is mobile, consider a chair that is designed to accommodate the person without a lot of adjustments. And all workers should know two things. First, they should know how to use the chair's adjustments, and second, they should know that an ergonomic chair can't do its job unless the worker sits all the way back in the chair. It's best to lower a chair so that the worker's feet can rest on the floor and adjust the rest of the workstation accordingly. For those who like to work in the deep recline that's possible with the Envelop desk, a footrest can prevent the ankles from being in constant extension. Otherwise, footrests should only be used for people whose feet don't reach the floor. In both cases, encourage workers to rest their feet in a variety of positions throughout the day. Finally, offer easy access to power and data with plug-and-play height accessibility so workers don't have to suffer through contortions when plugging in.

### ARM/HAND SUPPORT CONSIDERATIONS

Motor support is the relationship between the hands and arms and the task. It's what the worker needs to touch and manipulate in order to get the job done. Certain postures can reduce the likelihood workers will experience pain. These include keeping the wrist straight, the head in a neutral position and shoulders relaxed, and creating a 90-degree angle between the arm and forearm.

In general, encourage workers to position the mouse, keyboard, frequently accessed files, and phone close to the body. A keyboard should be within one inch of the users' seated elbow height. If the work surface is a fixed height, consider providing a keyboard tray. When using an external keyboard on a keyboard tray, use a palm support. Consider adding a mousing surface if a worker can't

mouse in the near-reach zone and a headset and phone tray if the worker spends a lot of time on the phone. All these strategies will help workers maintain comfortable, neutral positions that don't stress the body.

If there will be multiple workers over the course of the day or the work surface height will change in the future, consider furniture with manual or electric height adjustability, and ensure the work surface is the right size and height to support the workers' tasks.

### VISION SUPPORT CONSIDERATIONS

According to experts, the relationship between the eyes and the task "largely determines the body posture."<sup>9</sup> This includes the position of the head, curvature of the spine, and the position of the upper and lower body. Because there is so much variation in seated eye height and in distance-from-monitor viewing preferences, and because the eyes always win—even when it means sacrificing comfort for the rest of the body, adjustable monitor arms are recommended. Consider the number, weight, and size of monitors; the attachment method; the number of users, and sit-to-stand accommodation. Laptop users should find a way to view the screen at eye level, either by using a docking station, a Lapjack laptop stand (or even a stack of books) with an external mouse and external keyboard in order to create a proper viewing distance and provide upper musculoskeletal support.

Lighting is important, too, and relatively easy and inexpensive to provide. Task lighting helps reduce glare both on screen and for general tasking while reducing eyestrain. Consider reducing ambient light and adding personal control with task lighting.

## Design Solution: Part 2

Education, the second part of the solution, is just as important as providing the right tools. People need to understand how to use those tools, and they need to know the steps they can take to reduce stress and strain on their bodies. Research shows that even people who know about ergonomics and have the right tools don't put their knowledge into action unless they receive thorough training on how to make adjustments to their chairs and work surfaces.

In one study<sup>10</sup> of the effect of ergonomic training and adjustable workplace design on things like musculoskeletal discomfort and performance, the group that was fully trained on how to use an ergonomic workstation reported significantly fewer musculoskeletal symptoms compared to the minimally trained group, which received a brief, standard orientation and the manufacturer's pamphlet. In fact, the trained group had few symptoms, and they performed better than the minimally trained group.

Herman Miller's workplace solutions and ergonomics consultants know the Thrive portfolio of ergonomic products and are available upon request at furniture installation to show the people who will be using the new products how to adjust them and to point them to additional resources on hermanmiller.com. Thrive consultants are also available (through special arrangement) to do formal ergonomic evaluations. Herman Miller also facilitates organization-wide, ongoing ergonomic maintenance at the customer's request.

### CONCLUSION

In the past, companies have defaulted to buying furniture that doesn't offer much ergonomic support. That decision has been driven largely by perceived expense and a lack of understanding about how ergonomic tools contribute to worker health. Today there's a greater awareness of how office work-related health problems, e.g., back, neck, and shoulder pain and carpal tunnel syndrome, drive up health costs. Herman Miller works with customers to create health-positive environments that offer a significant return on investment in the form of avoided medical expenses and worker satisfaction and productivity.

Many also have a greater understanding of the importance of education and training. Ergonomic training is most effective when it's paired with regular reminders,<sup>11</sup> at least until workers form new habits. Remind workers to adjust their chairs, stretch, and get up and walk around every hour or so to get the blood flowing and rejuvenate the body. Use floor plans that force workers to move during the course of the day, e.g., by placing the printer a short walk away. The most successful preventive programs are those that motivate workers to apply what they've learned, so consider implementing a rewards or recognition program. Chances are, workers will be healthier for it, and so will the company's bottom line.

## Notes

- <sup>1</sup> Peter T. Katzmarzyk, Timothy S. Church, Cora L. Craig, and Claude Bouchard, "Sitting Time and Mortality from All Causes, Cardiovascular Disease, and Cancer," *Medicine and Science in Sports and Exercise* 41: 998-1005, May 2009.
- <sup>2</sup> Arianne Cohen, "Your Office Chair Is Killing You," *Bloomberg Businessweek*, April 29, 2010. [http://www.businessweek.com/magazine/content/10\\_19/b4177071221162.htm](http://www.businessweek.com/magazine/content/10_19/b4177071221162.htm) (Accessed February 13, 2012).
- <sup>3</sup> Michelle M. Robertson, Ph.D., CPE, Vincent M. Ciriello, ScD., CPE, Angela M. Garabet, MS, "Randomized Control Testing of Training and Workstation Design," Proceedings of the 17th Congress of the International Ergonomics Association: Changes, Challenges and Opportunities; August 9-14, 2009, Beijing, China.
- <sup>4</sup> Herman Miller, "The Eyes Always Win," 2011. <http://www.hermanmiller.com/content/hermanmiller/english/research/solution-essays/the-eyes-always-win.html> (Accessed February 13, 2012).
- <sup>5</sup> Everett C Hills and Rene Cailliet, "Mechanical Low Back Pain," *Medscape*, January 12, 2012. <http://emedicine.medscape.com/article/310353-overview> (Accessed February 13, 2012).
- <sup>6</sup> U.S. Department of Health and Human Services, "Health, United States, 2010," February 2011. <http://www.cdc.gov/nchs/data/hus/hus10.pdf> (Accessed February 13, 2012).
- <sup>7</sup> Katzmarzyk, et al., "Sitting Time and Mortality from All Causes, Cardiovascular Disease, and Cancer."
- <sup>8</sup> Richard Thaler and Cass Sunstein, *Nudge: Improving Decisions about Health, Wealth, and Happiness*, Caravan Books 2008.
- <sup>9</sup> S.G. Hill and K.H.E. Kroemer, The Preferred Declination of the Line of Sight, *Human Factors*, 28, 127-134, 1986 .
- <sup>10</sup> Robertson et al., "Randomized Control Testing of Training and Workstation Design."
- <sup>11</sup> *Ibid.*

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