

Home Laptop Ergonomics

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What does your home office look like?



This?



Or maybe the bed?



Or the dining table?

What about your kids?



Lying on their stomach?




Sitting cross-legged on the floor?

We would not be surprised if any of the above situations are typical in your home. Unfortunately, most people don't put much effort into designing a home office and if they do, they seem to forget the basic rules of ergonomics. While searching for illustrations of good ergonomic design in home laptop use, we found very few pictures that were even close to being correct, and most were really horrible!

Laptops were originally designed to be used for a short period of time while traveling. Now that laptops have become more affordable and powerful, they have almost replaced the need for desktop computers. While the laptop is a valuable tool, it was not intended to be a stand-alone computer.

Since more people than ever before are using computers at home for work, pleasure and school, safe home workstations are essential for injury and illness prevention. In general, very little attention is paid to setting up a home office prior to starting computer work, regardless of the duration of use. In addition, people do not believe that using a laptop wherever they go will cause a problem. Sadly, improper use of laptops is causing Repetitive Strain Injuries at unprecedented rates among all users, including children!

What is wrong with these pictures?

 <p style="text-align: center;">Image Ref. 1</p>	 <p style="text-align: center;">Image Ref. 2</p>	 <p style="text-align: center;">Image Ref. 3</p>
<ul style="list-style-type: none"> ◦ A wicker chair for an office? No back support, wrong height, long seat ◦ Laptop computer is too high and far away at an awkward angle ◦ No external mouse and keyboard ◦ No keyboard tray ◦ No document holder ◦ No telephone within reach ◦ No filing within reach 	<ul style="list-style-type: none"> ◦ The non-adjustable chair with a short seat and no lumbar support is too low for the work surface. ◦ This is not a computer workstation. ◦ The surface is too high and lighting is inadequate for reading and writing. 	<ul style="list-style-type: none"> ◦ The overstuffed chair provides no adjustability and no lumbar support. ◦ The laptop screen is too low. ◦ There is no external keyboard and mouse, nor a keyboard tray. ◦ The computer is facing a bright window.

Popular media does great harm by featuring home workstations that are unsafe. Surfaces that are too high and chairs that are better suited for the living and dining room are common offenders. Interior decorators and architects can create pretty places, but they have little (or no) training in ergonomics. When the public tries to follow ideas they see in popular media, a lot of effort and expense is wasted by creating workstations that increase the risk of injury.

There is absolutely nothing that says a home office cannot be both beautiful and functional! However, the word is not getting out regarding the correct office setup that reduces the risk of Repetitive Strain Injuries.

Home office challenges

Not everyone has an extra room for a designated home office. But if the computer is going to be used at home for extended periods of time -- whether for work, homework, online shopping, emailing, or just cruising the 'net -- it's very important to carve out a space to create a setup that can be used without causing fatigue and risking injury. In addition, if users of varying sizes share the work location, adjustability of the work surface and chair height is mandatory. Before designing a workstation, make sure you consider the following:

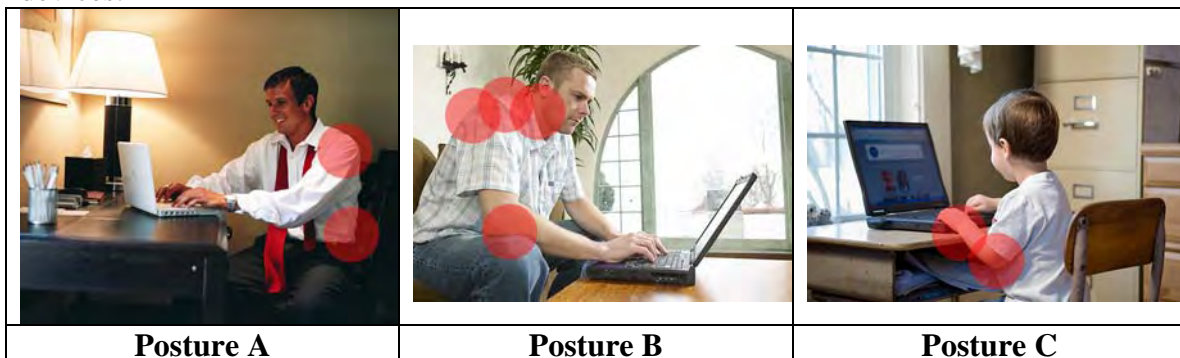
- Is one or more person using the workstation?¹
- Will the computer be used for more than 1 hour?¹

Here are just a few ideas for home office design:

- Remove closet doors and create a space in a closet for a workstation
- Take advantage of the small space beneath stairs
- Place the computer in a niche in the kitchen or living room
- Create a workstation in an under-used guest bedroom or den

Laptop posture problems

Laptop computers pose unique challenges because there is no setup that allows correct monitor height at the same time as correct keyboard and mouse height without other devices.



In Posture A, the monitor might be at the right distance (depending upon how well the user can see), but the keyboard is too high and the monitor is too low. The user is sitting

much too far away from the table, causing stress in the shoulders, neck and back due to his extended arms.

The person in Posture B is stabilizing his elbows on his knees, dropping his wrists on the front of the laptop, holding his head forward, and elevating his shoulders. Both the screen and the keyboard are too low and the keyboard is too far away. Neck, shoulder and back pain are a result of this extremely stressful posture that restricts circulation and causes irreparable damage to soft tissues.

The child in posture C is resting his wrists and upper arms on the sharp edge of the worksurface, a perfect recipe for inducing carpal tunnel syndrome. Also, his elbows are at an acute angle which puts strain on the cubital tunnel in the elbows, risking another of the “tunnel” syndromes. In addition, he is getting no low back support from the inappropriate chair. An adjustable chair would still not create a safe environment since the table is too high and the laptop is not set up correctly.

Sitting at a dining table or traditional desk will result in a posture much like that shown in postures A and C, since the typical table height is 29”. Even if the worksurface was at an acceptable height for the keyboard and mouse, the monitor would be too low. Most people will eventually end up slumping to see the display, as shown in the left illustration below. Using a laptop stand with an external keyboard and mouse will set both the screen and input devices (i.e., keyboard and mouse) at the correct height, assuming the worksurface is correct, as seen in the right illustration.



Image Ref. 4

Setting up your home office

The principles of ergonomics do not change when you leave work and head for home, so you can use the measurements taken and recommendations made during your office evaluation at work and use them to set up your home office. Use the workstation design rules outlined on our website at:

http://working-well.org/wkstn_design.html

And use our guidelines for children on the ErgoKids section of our website:

<http://working-well.org/ergokids.html>

Please also view the laptop tips pages (http://working-well.org/laptop_tips.html) and the laptop supplies pages (<http://working-well.org/plaptop.html>) if you use a laptop anywhere.

At a minimum, you will have to pay attention to, and probably invest in, the following basic components of a good laptop workstation:

Office Chair

The chair is one of the most critical items in any computer workstation, so this is where you should start. Without a warranted, fully adjustable chair, you will be at risk for back and neck problems as well as leg fatigue and sciatica. If you need a good office chair, please refer to our seating products page: <http://working-well.org/pchair.html> for our recommendations. There are many styles and fabrics available. As stated before, if more than one person is using the computer workstation, an adjustable chair is mandatory.

Work Surface

Working on traditional desks or tables puts the keyboard and mouse at a harmful height. We highly recommend that you do one of the following:

- Build a custom shelf that will place the input devices at a proper height. Raise the laptop so the top of the screen is at straight ahead height (or lower for bifocal wearers). Check our website for recommended laptop stands and docking stations - <http://working-well.org/plaptop.html>.
- Build a custom shelf that will allow the monitor to be at a proper height and install a height-adjustable keyboard tray to accommodate an external keyboard and mouse - <http://working-well.org/pwksfc.html>. Or use a lapboard to support both the keyboard and mouse.
- Use an adjustable height work surface, such as those available at Ikea. Set the surface at typing height and raise the laptop to the correct height - <http://working-well.org/pwksfc.html>. Other laptop table options are shown at: <http://working-well.org/plaptop.html#tables>

Document Holder

If you frequently refer to written materials, a document holder is imperative. It prevents neck strain caused by dropping the head to see documents. Not all document holders will work with every workstation setup, so set the workstation up first and then decide what document holder will work in your particular situation. Supporting the document in line with the monitor and keyboard is preferred; however, if there is not enough space, it might be necessary to have a holder next to the computer. See the various options on our website: <http://working-well.org/pdochldr.html>.

Keyboard and mouse

No input device is “ergonomic” (this is a marketing falsehood). Choose the product that fits you correctly. Read the guidelines in the keyboard and mouse tips featured on the website: http://working-well.org/keyboard_tips.html and http://working-well.org/mouse_tips.html.

View the approved keyboards at <http://working-well.org/pkybds.html> and input device options at <http://working-well.org/pmice.html>.

A smaller, more compact keyboard and mouse that packs easily is best when using the laptop during travel: <http://working-well.org/plaptop.html#accessories>.

Lighting

Ambient light in the room should be approximately the same as the monitor brightness. Sharp contrasts between light and dark cause eye strain and headaches.² If you are in a dark corner or tend to work at night, it's important to provide an external light source. Indirect lighting bounced off a ceiling is the least likely to produce glare on the screen, although diffused overhead lighting can be successfully used. Beware of bright light from windows. Placing the monitor so that you look directly out a bright window will cause eye strain. Placing the monitor so that a window is behind you will cause glare on the screen. The best solution is to place the workstation so that windows are at a right angle to the monitor. It may be necessary to use window coverings to adjust bright outside light sources.

Additional lighting may be necessary to illuminate documents. The challenge with task lighting is to avoid putting glare on the monitor. Raising the ambient light level is not recommended because it will cause the whole work area to be over lit, and it wastes a lot of energy. Lighting of documents requires 20-25% more light than ambient lighting. Therefore, task lighting is recommended to illuminate reading material.² Task lighting should be placed beside the work, not in front of it, to avoid glare.

The Kensington fly-light for laptops is shown under “accessories” on our laptop web page. It is extremely energy efficient with 8 LEDs and a dimmer that plugs into a USB port on your laptop. It's also small and portable.

<http://working-well.org/plaptop.html#accessories>

Some task lighting options are shown on our task lighting web page, although many other possibilities exist: <http://working-well.org/ptskltg.html>

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Rules for your home office

Learn how to maintain a relaxed, neutral posture that reduces stress and strain to your muscles. Below is a summary of ergonomic principles associated with computer use.³

- Take mini-breaks every 20 to 30 minutes to avoid static postures.
- Position the screen and documents so you can see them without holding your head forward.
- Keep your wrists straight while typing and using the mouse. NEVER drop your wrists on anything. Always maintain the natural hand position.
- A wristrest is not necessary if the input devices are at the correct height. If you choose to use a wristrest, never touch it while typing or moving the mouse/trackball.
- Use an external mouse instead of using the small touchpad or trackpoint on your laptop.

- If you have to raise your chair to get your elbow 1” above the keyboard and mouse, support your feet on a footrest (a large, 3-ring notebook is a temporary option). When seated, your hips should only be slightly higher than your knees. When your feet are not supported, there is excessive strain on hip, leg, and low back muscles.
- Keep glare off the computer screen by moving the screen, changing the lighting and/or covering the windows.
- Carefully clean the screen regularly using appropriate cleaning fluid for a laptop's LCD screen. Touching the screen may damage screen pixels.
- Do not place your laptop directly on your lap since its excessive heat has been proven to cause internal physical harm. Place it on one of the many adjustable laptop computer stands. <http://working-well.org/plaptop.html#portable>.

More laptop information

There is a lot of information regarding safe laptop use on the SRI Ergonomics Program website, including articles:

Laptop Beefs: <http://working-well.org/articles/laptop.html>

Laptop Props: <http://working-well.org/articles/laptop2.html>

Cornell University, as well as other academic institutions studying Repetitive Strain Injuries, have also published guidelines for safe laptop use.

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REFERENCES:

1. Ergonomic Design for Computer Workstations – Computer Workstation Ergonomics. <http://www.ergoindemand.com/computer-workstation-ergonomics.htm>
2. About Task Lighting - Lighting for Office, Illuminating Focused Work Areas. <http://www.ergoindemand.com/about-task-lighting.htm>
3. Ergonomic Tips on How to Use a Laptop. <http://www.ergoindemand.com/laptop-computer-ergonomics.htm>

IMAGE REFERENCES:

1. http://www.bhg.com/bhg/story.jsp?storyid=/templatedata/bhg/story/data/LHJ_AnOfficeThatsRightAtHome_0404.xml
2. http://www.bhg.com/bhg/story.jsp?storyid=/templatedata/bhg/story/data/SetUpHomeOffice.xml&categoryid=/templatedata/bhg/category/data/house_home.xml&page=1
3. <http://www.bhg.com/bhg/slideshow/slideShow.jsp?slideid=/templatedata/bhg/slideshow/data/1187879134122.xml>
4. SafeComputingTips.com. Laptop Ergonomics: Tips for Relaxed Position. <http://www.safecomputingtips.com/laptop-ergonomics-tips.html>