

Ergonomics for Schoolchildren and Young Workers

Schoolchildren and Backpacks

Schoolchildren everywhere are being asked to carry more and more weight around on their backs. There are many reasons why children have to load up their backpacks, including schools that don't use lockers, increased levels of homework, and greater use of laptops and other electronic gear. Backpacks filled with heavy textbooks, notebooks, laptop computers, and class projects are more than just an annoyance, they can cause injury.



Researchers around the world have found that the average weight of backpacks worn by schoolchildren exceeds the weight limits that are recommended for adults! This added strain on the neck, shoulders and back leads to an alarming increase in children complaining of aches and pains in these parts of the body.

Recognizing this growing concern, several medical organizations have made recommendations for limiting the weight of backpacks children carry. Last year, the AOTA (American Occupational Therapy Association) teamed up with L.L. Bean to promote awareness of backpack safety, recommending that backpacks be limited to 15% of a child's weight. So, a child weighing 100 pounds should carry a backpack no heavier than 15 pounds.

The ACA (American Chiropractic Association), the APTA (American Physical Therapy Association), and the AAOS (American Academy of Orthopedic Surgeons) developed similar recommended limits based on the child's weight:

Person's Weight (lb.)	Maximum Backpack Weight (lb.)
60	5
60-75	10
100	15
125	18
150	20
200 or more	25*

*No one should carry more than 25 lb.

Additional tips for safe and comfortable backpacks



- ✓ Use a backpack with wide, padded shoulder straps, and wear them on both shoulders. Also, use a padded hip belt when wearing the pack for longer distances such as when walking to and from school. This will help distribute the load.
- ✓ Only carry the things that you need for that day in your pack.
- ✓ Evenly distribute the weight in your pack. Avoid using a pack that is too large, since this would allow the load to shift inside the pack.

For more on backpack safety, visit the following web sites:

<http://ergo.human.cornell.edu/MBergo/schoolguide.html#risks%20of%20backpacks>

<http://www.aota.org/backpack/index.asp?AUD=2>

<http://www.ergoweb.com/news/detail.cfm?id=714>

Schoolchildren and computers

Computer use among school age children is increasing. While this opens up some new avenues for education, it also has resulted in an alarming trend – injuries among young people related to long hours at the computer. Classroom work, homework, surfing the web and playing computer games all involve repetitive typing and mouse use, often done in awkward postures due to sitting at adult-sized, unadjustable tables on similarly ill-fitting chairs. This in turn has led to some adult-sized injuries - musculoskeletal disorders (MSDs) such as tendonitis and carpal tunnel syndrome. In the past, these types of injuries, which are sometimes referred to as RSIs (repetitive strain injuries) or CTDs (cumulative trauma disorders) were only seen in adults after years of exposure to risk factors at work and at home.



The fact that these injuries are being diagnosed among younger people has not escaped the notice of medical professionals, educators, ergonomists and businesses, who are concerned not only for the welfare as the students of today, but also for their future as the workforce of tomorrow. To help raise awareness of the issues and provide help in protecting schoolchildren from injury, the Puget Sound Human Factors and Ergonomics Society (PSHFES) is working on an Ergonomics for Schools program.

Ergonomics is the science and practice of designing jobs or workplaces to match the capabilities and limitations of the human body, in other words, fitting the job to the worker. Businesses have used ergonomics for decades to improve performance and prevent injuries among adults in the workplace. For example, ergonomists have helped professional computer users by setting them up in a neutral posture, a position where all of the body is in an optimal position that takes strain off of muscles and joints. Ergonomists also recommend that employers increase the variety of tasks that office workers do during the day so that they're not typing all day long.



Awkward postures that should be avoided:

- Reaching too far for the mouse
- Tilting the head back to view the monitor
- Sitting with the feet dangling



Computer set up for neutral posture:

- Top of the monitor at eye level keeps the head level
- Keyboard and mouse at elbow level keeps the wrists straight and arms relaxed
- Chair backrest supporting the low back helps with upright posture
- Feet on the floor or a footrest provides

These same principles can be applied to help children at school and at home. Setting up computer desks and chairs to keep children in a neutral posture, and limiting the time they spend at a computer while encouraging them to pursue other activities are the two most important steps towards preventing an injury. School administrators can take a lesson from businesses who have learned that one of the best times to apply ergonomics is when they have the opportunity to purchase new furniture. It's always much less expensive to specify the correct furniture when purchasing than to retrofit something that turns out not to work. For example, if the tables that are purchased are too high and students have to reach up to use the keyboards, it may be necessary to purchase keyboard trays to go under each table. Instead, it would be better to

purchase lower tables, and then place monitors and keyboards on books or other simple platforms to fit taller students.

What teachers can do	What parents can do	What students can do
<ul style="list-style-type: none"> ✓ Set up classroom computer workstations to fit students and keep them in neutral postures. ✓ Teach students the importance of neutral posture and good work habits at the computer. ✓ Limit computer use in class to 30 minutes at a time. 	<ul style="list-style-type: none"> ✓ Find ways to set up the home computer so that children and adults can both use it comfortably. ✓ Limit computer use to 30 minutes at a time. ✓ Encourage children to be physically active when taking a break from the computer. 	<ul style="list-style-type: none"> ✓ Take the time to set up each computer you work at so that it fits you. ✓ Don't save up all of your computer work for one long session. Get it done a little at a time. ✓ Take breaks often, and don't play computer games during these breaks. Go outside and play!

Additional tips for safe and comfortable computing:

- ✓ Use cushions as booster seats, and boxes or old 3-ring binders as footrests to raise smaller students to an appropriate height.
- ✓ When using a laptop for writing papers, plug in a full size keyboard and place the laptop on something so that the top of the screen is just below eye level.
- ✓ Your eyes need breaks, too. Every 20 minutes, look away from the computer focus on something off in the distance for a few seconds. Then, close your eyes and place your hands over them so that they can relax in the darkness for a few seconds more.

To find out more on ergonomics for schools, visit these web sites:

- <http://www.ergonomics4schools.com/>
- <http://www.orosha.org/cergos/>
- <http://ergo.human.cornell.edu/MBergo/intro.html>
- <http://www.aota.org/featured/area6/links/link02af.asp>
- http://www.education-world.com/a_tech/tech076.shtml
- <http://education.umn.edu/kls/ecee/default.html>
- <http://www.ergoweb.com/news/detail.cfm?id=552>

Ergonomics and young workers

Afterschool jobs can provide valuable work experience for teens, while hopefully giving them a break from the long hours of sitting, reading and computer work that school requires. For some students, this first work experience might be the beginning of a lifelong career. This first job is also a good opportunity to educate young workers on the importance of workplace safety and health, and important aspect of which is ergonomics.



Ergonomics is the science and practice of designing jobs or workplaces to match the capabilities and limitations of the human body.

Professionals in the field are called ergonomists, although many other professions, such as physical therapists and industrial engineers also incorporate ergonomics into the work they do. Ergonomics first began when engineers and psychologists applied what they knew about human performance to the design of aircraft controls to make them safer to operate. More recently, the focus of ergonomics has been on designing job duties and equipment so that they better fit workers, preventing injury and improving job performance.

Not enough focus has been placed on younger workers, however. Ergonomics is a way to prevent musculoskeletal disorders (MSDs), such as tendinitis, carpal tunnel syndrome, and low back injuries. These injuries are typically thought of as only occurring in older workers after years of exposure to physically demanding jobs or long days of computer use. However, students are increasingly using computers at school and at home, for work and for entertainment, and as a consequence more and more young people are being diagnosed with serious MSDs.

And these potentially debilitating injuries aren't limited to computer users. Young workers are also exposed to risk factors in physically demanding jobs, and their inexperience can play a part in becoming injured. The American Society of Safety Engineers (ASSE) recently published a statistic that back injuries due to heavy lifting are the number one cause of lost time injuries (injuries serious enough to require time off work) among workers under the age of 18. There is a tendency among young workers, especially young men, to believe that they are in some way invincible, that injuries can't happen to them. The problem can be compounded when employers believe in this invincibility as well and assign physically demanding tasks to young workers.

To help raise awareness of this issue, the Puget Sound Human Factors and Ergonomics Society (PSHFES) is publishing guidelines on ergonomics for young workers, and offering to visit local schools to give talks to students on how to protect themselves from injuries. The PSHFES will coordinate with the School-to-Work/Health and Safety efforts organized by the Washington State Department of Labor and Industries and the University of Washington, to develop more materials and lesson plans that schools can use to further educate young workers.

What teachers can do	What parents can do	What employers can do
<ul style="list-style-type: none"> ✓ Include ergonomics in curricula, especially for computer, shop and vocational classes. ✓ Make sure computer workstations, laboratory benches, shop tables, etc. are appropriately set up following ergonomic guidelines. 	<ul style="list-style-type: none"> ✓ Talk to your children about the demands of their jobs and make sure they know they have the right to refuse unsafe work. ✓ Monitor your children for symptoms of injury and get them medical attention promptly. 	<ul style="list-style-type: none"> ✓ Make sure that young workers have the appropriate safety and health training for the tasks assigned to them. ✓ Keep in mind that many school age workers already use the computer for schoolwork when assigning them office work. Make sure they have a variety of tasks, not just computer use.

What students can do	What safety and health professionals can do
<ul style="list-style-type: none"> ✓ Take your employer's safety and health training seriously. ✓ Work with your employer to find solutions to any hazardous work conditions you find. 	<ul style="list-style-type: none"> ✓ Volunteer to speak at a local school. ✓ Help develop materials, handouts and demonstrations that teachers can use with their classes.

To find out more about ergonomics for young workers, visit these web sites:

<http://depts.washington.edu/worksafe/>

http://www.asse.org/naosh03_workerbrochure_english2.pdf

[This document developed in conjunction with the Puget Sound Human Factors and Ergonomics Society, www.pshfes.org].